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EDITORIAL PREFACE

Dear readers,

The science of physiotherapy and rehabilitation is constantly evolving and strengthening with scientific innovations and technological advancements. Academic studies in our field play a crucial role in enhancing the quality of life for healthy individuals and patients, optimizing physiotherapy and rehabilitation processes, and developing new treatment approaches.

In this context, this journal, published with the valuable contributions of esteemed academicians, aims to bring together the latest research, clinical approaches, and scientific developments in the field of physiotherapy and rehabilitation. The widespread adoption of evidence-based practices will be one of the most significant steps in deepening the scientific foundation of our field and increasing its clinical effectiveness.

In this issue, we present articles focusing on new exercise approaches shaping our field, innovations in rehabilitation technologies, and the impact of multidisciplinary studies on health. Sharing and discussing academic knowledge are among the most fundamental elements of scientific progress. Therefore, we hope that each issue of our journal serves as an academic platform that contributes to the advancement of our field.

I would like to express my gratitude to the researchers who have contributed as authors in this issue for their dedication to science and education. I also extend an invitation to all academicians and researchers who wish to contribute to knowledge production to share their work and join our journal, which provides an opportunity for scientific dialogue.

We are all witnessing how technological advancements and multidisciplinary approaches are transforming rehabilitation processes in modern physiotherapy and rehabilitation science. With the vision of our journal, we will continue to contribute to the development of innovative approaches in our field.

Looking forward to meeting you between the lines.

Kind regards.

On behalf of the Editorial Board
Özlem Ülger PT PhD Prof
Journal of H.U. Faculty of
Physical Therapy and Rehabilitation,
Editor-in-Chief

PHYSIOTHERAPY TIMING AFTER REGENERATIVE APPROACHES

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ABSTRACT

Purpose: This study aims to evaluate commonly used regenerative treatments in orthopedic practice—specifically PRP, ACS, and SVF—in terms of their preparation protocols, mechanisms of action, and their integration into physical therapy processes.

Methods: A literature review was conducted by analyzing studies on PRP (Platelet-Rich Plasma), ACS (Autologous Conditioned Serum), and SVF (Stromal Vascular Fraction). Research articles retrieved from PubMed, SpringerLink, and Wiley databases were reviewed to summarize preparation methods, biological activity, and evidence on the timing of physical therapy following these interventions.

Results: PRP contains a high concentration of growth factors that promote angiogenesis, collagen synthesis, and cell proliferation. ACS, rich in anti-inflammatory cytokines, particularly IL-1Ra, is effective in inflammatory conditions such as osteoarthritis. SVF is composed of a heterogeneous cell population and exerts regenerative effects via paracrine mechanisms. The literature suggests that the average time to initiate physical therapy post-intervention is around 8 days, though this may vary depending on the modality and patient profile.

Discussion: While current findings indicate that early integration of physical therapy may be beneficial and not detrimental to the efficacy of the biological product, more prospective controlled studies are needed. Personalized rehabilitation programs, in close communication between physician and physical therapist, are recommended to maximize therapeutic outcomes.

Keywords: Platelet-Rich Plasma, Stromal Vascular Fraction, Mesenchymal Stem Cells, Physical Therapy, Regenerative Medicine

INTRODUCTION

Regenerative medicine applications have emerged as a rapidly developing and increasingly prominent area in the treatment of musculoskeletal disorders in recent years. Biological agents such as Platelet-Rich Plasma (PRP), Autologous Conditioned Serum (ACS), and Stromal Vascular Fraction (SVF) stimulate reparative processes by utilizing the body's intrinsic potential (1). The integration of these applications with appropriately timed supportive physiotherapy is crucial for the overall success of treatment (2,3). However, the optimal timing for initiating physiotherapy following regenerative interventions remains unclear, and there is no standardized protocol established in the literature (2). This review aims to summarize current knowledge on the definition, preparation, and mechanisms of action of regenerative therapies, along with updated data regarding the timing of subsequent physiotherapy interventions.

METHODS

This study is a narrative review based on a comprehensive literature search on regenerative medicine applications (PRP, ACS, SVF). Relevant articles were identified through searches in databases such as PubMed, SpringerLink, and Wiley using keywords including “PRP,” “ACS,” “SVF,” “regenerative therapy,” “physical therapy timing,” “physical therapy,” and “physical therapy protocol.” Data from selected studies were analyzed to extract information on preparation methods, biological effects, and integration with physiotherapy.

RESULTS

Regenerative (orthobiologic) therapies used in orthopedics aim to support tissue healing by employing endogenous cellular or extracellular components. The most frequently utilized agents in this category are Platelet-Rich Plasma (PRP), Autologous Conditioned Serum (ACS), and Stromal Vascular Fraction (SVF). These therapies are commonly employed in the management of osteoarthritis, meniscal tears, tendinopathies, cartilage lesions, and ligament injuries (1).

While these biological therapies provide a biochemical foundation for healing, they do not constitute a stand-alone treatment. Long-term functional outcomes necessitate physiotherapy protocols that are initiated at an appropriate time and tailored to the individual (3). The biological agents serve primarily to create a regenerative environment, but functional recovery depends on controlled loading and movement training (2,3).

The literature review revealed no international guidelines or consensus papers on the optimal timing of physiotherapy following regenerative treatments (2). Existing publications are predominantly review articles based on clinical experience and institutional practices, lacking robust scientific evidence to justify timing protocols (2,3).

PRP is prepared by centrifuging the patient's own venous blood to isolate the platelet-rich plasma fraction. This plasma contains a high concentration of platelets and various growth factors, including PDGF, TGF-β, VEGF, IGF-1, and EGF, which play roles in cell proliferation, angiogenesis, collagen synthesis, and modulation of inflammation. The biological efficacy of PRP may vary depending on the preparation technique and product composition (1). In the literature, the initiation of physiotherapy following PRP application is generally reported within 3 to 10 days. Specifically, stretching exercises may commence within 2–3 days after intratendinous application, while strengthening exercises are usually initiated after approximately two weeks (1,2).

ACS is also derived from autologous blood but differs in that it undergoes a 24-hour incubation period in tubes coated with pyrogen-free glass beads. This process enhances the release of anti-inflammatory cytokines, particularly the interleukin-1 receptor antagonist (IL-1Ra). Due to its lower cellular content but higher cytokine levels compared to PRP, ACS is preferred in inflammatory conditions such as osteoarthritis and tendinopathies. However, there is limited prospective data on the timing of physiotherapy after ACS, and clinical decisions are generally based on physician observation and patient response (1,2).

SVF is a heterogeneous cell population obtained from lipoaspirate tissue via enzymatic (e.g., collagenase) or mechanical methods. This fraction contains mesenchymal stem cells, pericytes, fibroblasts, and immune cells (4). Its regenerative effects are attributed not only to direct cellular differentiation but also to paracrine signaling and modulation of the local microenvironment. SVF is commonly used in degenerative joint diseases and tendon injuries. The recommended timing for initiating physiotherapy after SVF administration is generally between 7 to 10 days, with adjustments made based on clinical condition and inflammatory response (2,3).

The literature indicates that the rate of referral to physiotherapy following orthobiologic treatments is approximately 38.4%, with an average initiation time of 8 days for intra-articular applications (5). However, variables such as loading restrictions, movement planning, and exercise tolerance differ according to the treatment modality and patient-specific factors (3,5).

DISCUSSION

The transition to physiotherapy following regenerative treatments should be planned with careful consideration of the specific therapeutic modality, the treated tissue, and the patient's individual physiological condition. For treatments like PRP, which transiently activate the inflammatory process, physiotherapy content must be adapted to match the biological milieu (1). In contrast, agents with primarily immunomodulatory effects, such as ACS and SVF, typically allow for earlier physiotherapy due to lower levels of post-procedural inflammation (2,4). Although there are standardized preparation protocols for each regenerative application, their biological effects and composition may vary among individuals. Thus, physiotherapy protocols must be personalized, guided by physician recommendations and clinical assessment by the physiotherapist (3). There is no definitive evidence suggesting that early physiotherapy reduces the efficacy of the injected biologics (3).

CONCLUSION

Although there is no standardized protocol regarding the initiation of physiotherapy after regenerative treatments, current trends suggest beginning physiotherapy within a 3 to 10-day window. However, timing should be individualized based on the treatment site, the characteristics of the biological material used, and the patient's clinical condition. Effective communication between the physician and physiotherapist is essential during this transitional phase. Future prospective studies will be crucial to establishing more standardized and evidence-based protocols.

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NEUROPSYCHOLOGICAL PROBLEMS IN NEUROMUSCULAR DISEASES

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ABSTRACT

Purpose: Neuromuscular diseases (NMDs) are characterized by pathological involvement of motor unit structures and exert notable effects beyond the musculoskeletal system, including cognitive, behavioral, and psychiatric domains. This narrative review aims to discuss the spectrum of neuropsychological impairments associated with various NMD subtypes.

Methods: We aimed to review neuropsychological manifestations observed in motor neuron diseases, myasthenia gravis, muscular dystrophies, myotonic dystrophy, and mitochondrial disorders. Reported cognitive deficits, mood disturbances, and neurodevelopmental conditions were analyzed within disease-
specific contexts.

Results: Muscular dystrophies often involve impairments in social cognition, learning, and behavioral regulation. In Duchenne and Becker muscular dystrophies (DMD/BMD), dystrophin isoforms are associated with autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), obsessive compulsive disorder (OCD), and learning difficulties. In myotonic dystrophy and mitochondrial diseases, the neuropsychiatric profile varies with age of onset, ranging from intellectual disability and ASD in congenital forms to memory deficits in adult-onset cases. Patients with spinal muscular atrophy (SMA) frequently exhibit depression, anxiety, and separation anxiety. In myasthenia gravis (MG), psychiatric symptoms may arise due to autoantibody-mediated central effects, chronic steroid use, and psychosocial burden. Executive dysfunction and frontotemporal dementia are common in amyotrophic lateral sclerosis (ALS), while Kennedy disease is marked by deficits in memory and selective attention.

Conclusion: Neuropsychological comorbidities in NMDs are frequently underrecognized despite their substantial impact on quality of life. Early identification and appropriately tailored multidisciplinary interventions may significantly alter clinical outcomes. A comprehensive approach incorporating neuropsychiatric assessment is essential in the holistic management of NMDs.

Keywords: Neuromuscular diseases; Psychiatric disorders; Neurodevelopmental disorders.

INTRODUCTION

Neuromuscular diseases (NMDs) are characterized are characterized by muscle weakness resulting from pathologies affecting components of the motor unit. The motor unit consists of the motor neuron, brainstem motor nuclei, peripheral nerve, neuromuscular junction, and muscle tissue. The etiology of these diseases can be genetic or acquired. Neuromuscular diseases may manifest at any stage of life and most follow a chronic course, allowing patients to live for many years with appropriate supportive treatment and care approaches (1).

Molecular-level impairments that lead to motor dysfunction can also affect central nervous system structures, resulting in significant deficits in executive functions, behavioral processes, and psychosocial domains. Cognitive involvement in these patients varies and differs from one individual to another (2).

The neuropsychological problems observed in neuromuscular diseases can generally be examined under three main categories:

1. Cognitive Impairments: These include memory problems, attention and concentration deficits, and impairments in abstract thinking and problem-solving skills.
2. Emotional and Psychiatric Disorders: Depression, anxiety, apathy, irritability, and aggression fall into this category.
3. Behavioral Changes: These present with findings such as personality changes, loss of inhibition, and difficulties with emotional regulation.

This review will comprehensively examine these neuropsychological disturbances encountered in neuromuscular diseases.

Before addressing the neuropsychiatric disorders observed in neuromuscular diseases, it is important to review the fundamental concepts that will contribute to a clearer understanding of these conditions. In this context, neurodevelopmental disorders and psychiatric/behavioral disorders emerge as two primary categories.

Neurodevelopmental disorders are a group of conditions that impair personal, social, academic, motor, or occupational functioning by disrupting developmental milestones from birth onward. This group includes global developmental delay, intellectual disability, communication disorders, autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), specific learning disorders, and developmental coordination difficulties.

On the other hand, *psychiatric and behavioral disorders* encompass emotional, behavioral, or cognitive impairments that adversely affect an individual's social, occupational, and interpersonal functioning across one or more domains. This group of disorders includes schizophrenia, generalized anxiety disorder, obsessive-compulsive disorder (OCD), depressive disorders, bipolar disorder, and personality disorders (3, 4).

Both the neurodevelopmental and psychiatric characteristics of these disorders provide a fundamental basis for understanding the neuropsychological impairments frequently observed in neuromuscular diseases.

METHODS

In this review, the neuropsychological disorders observed in neuromuscular diseases will be systematically examined according to disease groups. The analysis will be conducted under five main headings: *motor neuron diseases, myasthenia gravis, muscular dystrophies, myotonic dystrophy, and mitochondrial disorders*.

Motor Neuron Diseases

Motor neuron diseases are disorders that result from the degeneration of motor neurons and present with multifaceted clinical manifestations, primarily characterized by loss of motor function. Despite often being overlooked, neuropsychological involvement is highly significant in this group of diseases.

Spinal Muscular Atrophy (SMA)

Spinal muscular atrophy (SMA) is a genetically inherited, autosomal recessive disorder belonging to the group of motor neuron diseases. Cognitive functioning in SMA has been studied predominantly in less severely affected types 2 and 3 patients, with findings indicating that their intelligence and language skills are at or above the level of their healthy peers. More recent research employing adapted assessment tools in SMA type 1 patients has revealed marked deficits, especially in attention and executive functions. Functional speech rarely develops in untreated individuals; limited expressive language skills restrict environmental interactions, negatively influencing cognitive development. This paucity of data is primarily due to the considerable challenges involved in evaluating cerebral functioning and cognitive abilities in severely affected patients. Severe muscle weakness, along with respiratory and bulbar dysfunctions, substantially restricts the capacity for interaction with the surroundings. Eye-tracking devices have been recommended as an alternative communication method for patients with SMA; however, these non-physiological communication pathways pose certain limitations in accurately assessing cognitive and verbal skills compared to typically developing peers. For this reason, the implementation of alternative and augmentative communication methods is recommended starting from the earliest stages of life in patients with SMA type 1 (5-8).

Neuropathological and neuroimaging findings in SMA types 0 and 1 indicate that, in severe phenotypes (type 0 and 1a), multiple structures — including the thalamus, basal ganglia, hippocampus, cortex, and cerebellum — may be involved and that this involvement can progress over time. Animal models also support this process, demonstrating hippocampal and motor cortical abnormalities. However, there are currently no studies establishing a direct relationship between structural changes and impairments in cognitive and language domains.

With the advent of novel therapies for SMA, life expectancy and motor function have improved, yet the extent to which these advances impact cognitive and language development remains unclear. In a limited number of patients followed for two years after gene therapy, speech development rates have exceeded 90%, whereas functional and intelligible speech is rarely observed in untreated individuals, and such skills generally emerge only in those with milder phenotypes. Although the natural history of the disease has been altered by current disease-modifying therapies, cognitive involvement under treatment is now being recognized as a newly emerging phenotype in SMA type 1 patients.

The need for continuous caregiver support in symptomatic SMA patients to perform basic physical activities lays the groundwork for significant social and emotional consequences. Over time, patients become aware of their differences compared to their peers and may experience feelings of guilt about being a burden to their families, as well as regret, uncertainty, and hopelessness regarding the future of their condition. All these factors play a decisive role in the development of neuropsychological impairments.

Cognitive impairment manifests particularly as deficits in memory, attention, planning, and problem-solving abilities. Depression and anxiety are the most commonly observed mood disorders in these patients.

Additionally, separation anxiety disorder is one of the most common neuropsychiatric problems observed in SMA. Furthermore, phobic disorders, oppositional defiant disorder, and introversion have also been frequently reported. Introversion is thought to be associated with the level of motor disability in these patients. Taken together, all these findings indicate that SMA has significant impacts not only on physical functioning, but also on cognitive and emotional domains.

Amyotrophic Lateral Sclerosis (ALS)

More than 50% of patients are reported to develop cognitive or behavioral impairments at some stage of the disease. Approximately 13% of these patients also progress to frontotemporal dementia (9). The presence of executive dysfunction in ALS patients is considered an important risk factor for a poor prognosis (2).

Kennedy's Disease (Spinal and Bulbar Muscular Atrophy)

It is characterized by X-linked recessive inheritance and an expansion of CAG trinucleotide repeats. In this disease, where lower motor neuron degeneration is predominant, pronounced muscle weakness and atrophy are especially evident in the arm, leg, and bulbar muscles. Patients with Kennedy's disease exhibit significant impairments in cognitive domains such as long-term memory and selective attention. Moreover, behavioral and emotional problems associated with frontal lobe dysfunction — including disinhibition (impaired behavioral control), executive dysfunction, and diminished affective responses — are also notable (2).

Neuromuscular Junction Disorders

Miyastenia Gravis (MG)

Myasthenia gravis (MG) is an autoimmune disorder that arises due to autoantibodies targeting postsynaptic acetylcholine receptors at the neuromuscular junction. The primary clinical manifestations of the disease include diplopia, ptosis, dysphagia, and muscle weakness — most notably in the proximal muscles — accompanied by prominent fatigability.

In MG patients, not only motor findings but also neuropsychiatric symptoms hold considerable importance. Studies have demonstrated that approximately 41% of patients present with psychiatric symptoms, with a higher prevalence observed in women compared to men (10). Depression and anxiety disorders are the most frequently encountered psychiatric conditions in these patients. Furthermore, somatoform disorders and other mood disturbances are also noteworthy.

Multifactorial mechanisms contribute to the emergence of psychiatric involvement in MG:

1. Autoantibodies: Autoantibodies produced by thymomas — such as anti-voltage-gated potassium channel and anti–glutamic acid decarboxylase (GAD) antibodies — are thought to give rise to psychiatric manifestations through immune-mediated effects on the central nervous system. Moreover, cholinergic dysfunction is also proposed to contribute to impairments in behavioral and emotional functioning.
2. Steroid therapy: The psychiatric side effects of corticosteroids, which are commonly employed in the treatment of MG, are well recognized. Short-term use may lead to euphoria or hypomania, while long-term and high-dose therapy can increase the risk of depression, anxiety, and psychotic disorders. Given that MG patients often require prolonged and high-dose corticosteroid treatment, these effects are especially significant.
3. The disease: The chronic nature of MG and the physical limitations imposed by the illness can cause psychological stress, feelings of helplessness, and social isolation. These factors may facilitate the development of psychiatric problems such as mood and anxiety disorders (11).

Neuropsychiatric symptoms and the motor manifestations of MG often overlap and can be difficult to differentiate. Symptoms such as fatigue, loss of interest, mood changes, psychomotor retardation, and social withdrawal may reflect either a primary psychiatric condition or a direct consequence of the disease. In particular, increased anxiety can exacerbate the clinical presentation of MG, creating a vicious cycle. Therefore, the early recognition and management of psychiatric symptoms are critically important for the overall treatment of MG. Moreover, clinicians must also remain vigilant to the possibility that psychiatric symptoms could be misattributed to myasthenic signs and should carefully differentiate between these overlapping presentations (12, 13).

Muscular Dystrophies

Muscular dystrophies are genetically heterogeneous, clinically variable inherited disorders characterized by progressive degeneration and weakness of skeletal muscle. This group of diseases can be diagnosed at different stages of life — including infancy, childhood, adolescence, and adulthood. The broad clinical spectrum reflects the genetic and pathophysiological diversity of these conditions.

Central nervous system involvement is not uncommon in muscular dystrophies. Neurological findings such as white matter anomalies, supratentorial structural abnormalities, seizures, and ocular anomalies have been reported in this patient population. Progressive loss of muscle strength and delayed motor development restricts children's physical and social interactions with their environment. This limitation reduces learning opportunities and can lead to significant impairments, especially in executive functioning and learning processes.

Limited exposure to environmental stimuli negatively impacts the development of social competencies. Impairments in social cognition — such as recognizing social cues, appreciating others' perspectives, and interpreting nonverbal communication — are frequently observed in these patients.

Intellectual disability, depression, anxiety disorders, as well as neurodevelopmental disorders such as autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD) are commonly reported in individuals with muscular dystrophies (2, 14).

In this review, we will primarily focus on Duchenne muscular dystrophy (DMD) and Becker muscular dystrophy (BMD), which are the most prevalent and most extensively studied subtypes of muscular dystrophies.

Duchenne and Becker Muscular Dystrophies

Duchenne muscular dystrophy (DMD) and Becker muscular dystrophy (BMD) are X-linked recessive disorders characterized by progressive muscle degeneration resulting from the absence or dysfunction of the dystrophin protein. Due to dystrophin deficiency, not only skeletal muscle but also cardiac muscle and the central nervous system are affected.

In the central nervous system, dystrophin expression is much more limited than in muscle tissue, comprising approximately one-tenth of its total expression (2). Three main dystrophin isoforms are present in the CNS: *Dp427, Dp140, and Dp71.*

- *Dp427*, is expressed in neurons of the hippocampus, amygdala, cerebellar Purkinje cells, and neocortex. This isoform plays a key role in the formation and maintenance of synaptic connections. Its absence leads to reduced clustering of GABA-A receptors and impaired inhibitory synaptic transmission. This results in GABAergic dysfunction, which contributes to cognitive deficits.
- *Dp140*, is essential for neuronal differentiation and dendritic development. Its deficiency can lead to impairments in learning and executive functions.
- *Dp71*, is located at perivascular astrocytic end-feet and is involved in maintaining the integrity of the blood–brain barrier. When it is absent, increased permeability of the CNS to peripheral inflammatory molecules is observed (15, 16).

Animal models and human studies have demonstrated chronically elevated proinflammatory cytokine levels in the hippocampus associated with dystrophin deficiency. This condition has been reported to lead to impairments in learning, memory formation, and anxiety regulation (17). Patients with DMD and BMD commonly exhibit marked impairments in overall cognitive functioning — including a significant reduction in verbal IQ — along with learning difficulties and executive dysfunctions (2, 15). Multiple studies have shown that children with DMD tend to have lower IQ scores, with approximately 30% demonstrating cognitive impairment. This is often associated with mutations that affect specific dystrophin isoforms expressed in the brain (18). The type and locus of the genetic mutation play a critical role in determining the severity of cognitive and neuropsychiatric involvement. In particular, mutations upstream of exon 44 in DMD are associated with a more favorable prognosis, whereas distal mutations that result in the loss of dystrophin isoforms more abundantly expressed in the limbic system and cerebellum have been linked to anxiety disorders.(2, 16, 19).

In DMD and BMD, autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), depression, anxiety disorders, obsessive-compulsive disorder (OCD), speech and language delays, and learning difficulties have all been reported at varying rates. Psychiatric and behavioral disorders appear to be more prominent than developmental impairments in distal mutations, suggesting that, especially in patients with more distal mutations, the neuropsychiatric spectrum may become an integral part of the disease phenotype (15, 20).

Children with DMD have been reported to experience significant difficulties in reading and writing, which are thought to arise from specific learning disorders such as dyslexia or from cognitive impairments such as working memory deficits. DMD patients also demonstrate impairments in executive functions — including problem-solving, inhibition, and working memory — which are critical for guiding goal-directed behavior, especially in novel and complex tasks. These deficits often go unrecognized due to the absence of overtly disruptive behaviors, becoming more evident as academic demands and expectations for independent functioning increase. Executive dysfunction, combined with short-term memory weaknesses, can restrict a child's ability to organize and complete assignments and projects. For this reason, the early identification of cognitive difficulties during the preschool years and the implementation of targeted intervention programs are of utmost importance for supporting cognitive capacity and fostering functional independence in individuals with DMD (18).

Although DMD primarily affects males, carrier females may also exhibit involvement of the muscles, heart, and nervous system. With increasing clinical awareness, research into cognitive impairments in these carriers has gained considerable attention. Studies have demonstrated that DMD carriers have lower mean IQ scores compared to the general population, that symptomatic carriers show more pronounced impairments, and that genotype–phenotype correlations may influence cognitive status.

Multiple investigations support the presence of mild but significant cognitive deficits in DMD carriers, especially when the Dp140 and Dp71 isoforms are disrupted by genetic mutations, which further increases this (21). In a study assessing cognitive functions in DMD patients and their carrier mothers, children with DMD showed notable weaknesses in executive functions, attention, and working memory, while cognitive skills such as vocabulary and reading were preserved. Carrier mothers also performed more poorly on tests of attention and executive function than non-carriers; however, these differences were not reflected on self-report scales. These findings highlight the importance of monitoring DMD carrier women not only for physical manifestations but also for cognitive impairments. They underscore the value of early neuropsychological evaluation and the need for individualized educational support starting from the earliest stages (22). These findings underscore the need to monitor DMD carrier women not only for physical symptoms but also for cognitive impairments, and highlight the importance of early neuropsychological assessment and individualized educational support.

Other Muscular Dystrophies

Beyond Duchenne and Becker muscular dystrophies, cognitive and behavioral impairments have also been described in numerous other dystrophies and myopathies, especially where the underlying genetic defect also affects neurodevelopmental processes. Congenital muscular dystrophies (CMDs) are particularly notable in this regard. Neurodevelopmental disorders such as autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD) have been observed at higher rates in children with CMD than in the general population. Specifically, in subtypes collectively termed dystroglycanopathies — characterized by defective glycosylation of α-dystroglycan — profound cerebral malformations (such as cobblestone lissencephaly, pachygyria, neuronal heterotopias, and pontocerebellar hypoplasia) frequently occur alongside severe intellectual disability and epilepsy. Because both cortical and subcortical structures are affected, deficits in social communication, attention, and executive functions often ensue. Conditions such as Walker-Warburg syndrome, muscle–eye–brain disease, and Fukuyama congenital muscular dystrophy exemplify this group and represent the most severe forms of cognitive involvement (2, 18).

Additionally, neuroimaging in patients with LAMA2-related CMD (MDC1A) often reveals widespread white matter abnormalities. Although isolated white matter lesions may not necessarily result in cognitive impairment, the presence of concomitant cortical dysplasia or cerebellar hypoplasia has been associated with intellectual disability and reduced performance IQ. Some limb-girdle muscular dystrophy (LGMD) subtypes, especially those due to FKRP gene mutations that impair dystroglycan synthesis, can also cause mild cognitive deficits (2). Furthermore, newly described CMD forms — such as those associated with *SYNE1 and CHKB* mutations — may present with severe intellectual disability. Similarly, *TMEM5*-related dystroglycanopathy has been reported in patients with moderate intellectual disability, limited verbal skills, and short-term memory deficits (18).

Children with CMD commonly show developmental delays that involve sensorimotor integration and body awareness, as well as cognitive domains. Delays in visual-motor coordination, fine motor skills, and planning abilities have marked effects on both cognition and behavioral adaptation. Motor impairments overlap with cognitive delays in areas such as play skills, language acquisition, and social interaction. Moreover, reductions in social competence, self-esteem, and increased emotional sensitivity and withdrawal are considered part of the behavioral profile of CMD. In a limited number of neuropsychological assessments, CMD patients have been shown to exhibit prominent deficits in visuospatial skills, visual memory, attention, and executive functioning, while verbal comprehension and vocabulary remain relatively preserved. This asymmetrical cognitive profile has been suggested to reflect underlying structural involvement in the posterior brain regions (23, 24).

Despite these observations, learning difficulties and cognitive profiles in the majority of CMD subtypes remain insufficiently investigated; as a result, even mild cognitive impairments may often be overlooked during the diagnostic process.

Congenital Myopathies

In these patients, neurological findings — such as developmental delay, epileptic seizures, and cerebellar signs — have been observed alongside the underlying structural myopathy. However, the fact that a definitive molecular diagnosis cannot always be established in many of these cases raises questions as to whether the observed clinical picture fully corresponds to the definition of congenital myopathy. This underscores the clinical heterogeneity and highlights the uncertainties surrounding genotype–phenotype correlations.

On the other hand, clinical observations indicate that individuals with congenital myopathies experience substantial mental fatigue during cognitive activities in addition to motor impairments. This finding has also been noted in other neuromuscular conditions characterized by fatigability, including metabolic myopathies and congenital myasthenic syndromes. Indeed, studies conducted in adolescents with chronic fatigue syndrome have revealed significant deficits in cognitive domains such as attention, processing speed, working memory, and verbal learning — impairments that persist independently of co-occurring factors such as depression, anxiety, or sleep disturbances.
Therefore, systematically evaluating mental fatigue and the subtle cognitive dysfunctions that may result from it in individuals with congenital myopathies is crucial for achieving a comprehensive understanding of their cognitive profile and for identifying appropriate intervention strategies (18).

Myotonic Dystrophy

Myotonic dystrophy types 1 (DM1) and 2 (DM2) are autosomal dominant neuromuscular diseases. DM1 is characterized by an expansion of CTG trinucleotide repeats in the intronic region of the *DMPK* gene, whereas DM2 results from a CCTG repeat expansion in the *ZNF9 (CNBP)* gene. In addition to muscle dystrophy, myotonia, cataracts, and cardiac involvement, neuropsychological impairments constitute a significant clinical feature of these conditions.

The expansion of CTG repeats disrupts neural plasticity and can lead to structural and functional changes in brain regions involved in social communication, behavior, attention, and motor activity. The prevalence of neuropsychiatric disorders is increased in DM1 and DM2 compared to the general population. This impact is more pronounced in DM1, and the greater volume of literature focused on DM1 further reinforces this relative emphasis (25).
Cognitive impairments have been reported in 24% to 75% of DM1 patients. In particular, in congenital cases, a higher number of CTG repeats, maternal inheritance, and early age of onset have been associated with lower IQ scores. Visuospatial deficits are the most prevalent cognitive problem in DM1, with reported rates between 75% and 86%. Executive dysfunction is observed in 60% to 79% of patients (26). Moreover, adult DM1 patients frequently present with memory and language impairments, and up to 80% of those with a late onset demonstrate significant memory deficits (2).
In DM2, visuospatial and executive dysfunctions are the most common cognitive impairments, but overall neuropsychiatric involvement is generally milder than in DM1.
Neuroimaging studies have revealed that white matter abnormalities are more pronounced than cortical changes in DM1 patients. Temporal lobe involvement is considered a characteristic feature of the disease. Ventral frontotemporal cortex pathology is associated with executive dysfunction, apathy, and depression, while lesions in the external capsule contribute to semantic processing deficits and reduced verbal expression. The extent of white matter lesions increases with disease duration, suggesting that a slowly progressive demyelinating process with axonopathy may underlie the etiology of these findings.
The profile of neuropsychological impairment varies according to the age of onset.

- *Congenital onset***:** Intellectual disability, autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), and learning difficulties are prominent.
- *Childhood onset*: Low IQ, attention deficits, and executive dysfunctions are common.
- *Adult onset:* Impairments in executive functions and visuospatial abilities are most notable
- *Late onset***:** Memory impairments predominate (2).

In DM1, the prevalence of ASD has been reported as 14%, with rates reaching as high as 79% in congenital cases. The prevalence of ADHD is approximately 21% and is similar between congenital and juvenile cases. Depression and anxiety have been reported in 14% and 16% of DM1 patients, respectively, while the prevalence of depression in DM2 is about 16% (25).
Although the precise mechanism underlying ASD in congenital and juvenile DM1 patients is not fully understood, it has been proposed that cerebellar cortical heterotopias, white matter changes, ventricular dilation, corpus callosum hypoplasia, and prefrontal structural alterations may play a role in its pathogenesis.

Mitochondrial Diseases

Mitochondrial diseases are inherited disorders characterized by remarkable clinical heterogeneity, resulting from mutations in mitochondrial DNA (mtDNA) or nuclear DNA. Affecting approximately 1

in 5,000 individuals, these diseases not only impair energy metabolism but also disrupt central nervous system development and functioning, leading to significant neuropsychiatric complications.
Cognitive impairment is frequently observed in mitochondrial diseases. Deficits commonly involve abstract reasoning, verbal and visual memory, language skills, executive functions, calculation, and attention processes. These cognitive disturbances may arise due to oxidative stress and energy metabolism deficits during early brain development (3).
Neuropsychiatric manifestations cover a broad spectrum. The most observed are:

- Autism spectrum disorder (ASD)
- Intellectual disability
- Speech and language disorders
- Attention-deficit hyperactivity disorder (ADHD)
- Depression and anxiety disorders
- Bipolar disorder and schizophrenia

The relationship between autism spectrum disorder and mitochondrial dysfunction is particularly noteworthy. Studies have reported a higher prevalence of mitochondrial dysfunction in individuals with autism. However, it is also acknowledged that some of these findings may be influenced by selection bias and research trends. Systematic investigation of mitochondrial dysfunction is therefore crucial for better understanding the etiology of autism and may help establish this relationship more clearly.
In conclusion, mitochondrial diseases constitute a complex group of disorders that demand a multidisciplinary approach due to their physical, cognitive, and psychiatric dimensions. Recognition and appropriate management of neuropsychiatric impairments play a critical role in improving the quality of life for these patients (3).

RESULTS

Neuromuscular diseases extend beyond mere loss of motor function and can lead to significant disruptions in neurodevelopmental processes. Learning difficulties, speech delays, intellectual disability, and autism spectrum disorder are among the neurodevelopmental conditions that may be part of the clinical presentation even in the early stages of these diseases. Cognitive challenges recognized during early childhood not only impair academic success but also have profound effects on lifelong learning, self-care skills, social participation, and independence in adulthood (18).
The frequency and severity of cognitive and neuropsychiatric impairments in neuromuscular diseases have not yet been fully elucidated. Therefore, further research and prospective studies are needed. Future investigations will contribute both to a better understanding of the natural history of these conditions and to the development of effective interventions and management strategies.
Therapeutic approaches for this group of diseases must not only address medical aspects but also incorporate social and psychosocial components. Individualized rehabilitation programs, strengthened social support networks, and active involvement of the family and the broader community play a pivotal role in the management of neuropsychiatric disturbances. In conclusion, a multidisciplinary, holistic approach must be adopted as the primary objective in the management of neuromuscular diseases, with solutions that encompass all areas of the individual's life.

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POPULAR APPROACHES TO EXERCISE: THE LIGHT OF SCIENCE OR A TEMPORARY TREND?

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ABSTRACT

In recent years, one of the most prominent trends in exercise science has been the rapid proliferation of innovative exercise approaches that appeal to diverse populations. These methods notably High-Intensity Interval Training (HIIT), calisthenic exercises, aqua HIIT, Animal Flow, blood flow restriction (BFR) exercises, the Wim Hof Method, yoga, swing yoga, and face yoga—not only increase individual participation and motivation but also present alternative strategies to enhance physical fitness. Despite their popularity, often fueled by social media and popular culture, the scientific foundations of these practices are frequently overlooked. Therefore, this section examines both the origins and the scientific validity of these exercise methods. Their effectiveness, safety, and potential applications in physiotherapy and rehabilitation are discussed in light of current literature and guideline recommendations.

Keywords: Blood Flow Restriction, Exercise Therapy, High-Intensity Interval Training, Rehabilitation, Yoga

High-Intensity Interval Training

High-Intensity Interval Training (HIIT) is a training model that involves alternating short periods of high-intensity exercise with low-intensity recovery intervals. It offers an effective option, especially for individuals who want to save time. The American College of Sports Medicine (ACSM) accepts the effectiveness of HIIT in increasing cardiorespiratory fitness and includes HIIT among its weekly recommendations (27). Scientific studies have shown that HIIT is effective in increasing VO2max in both healthy individuals and populations with chronic diseases (type 2 diabetes, obesity, heart disease) (28, 29). The effects of HIIT on insulin sensitivity, blood pressure, and body composition have also been documented. It has also been observed to cause an increase in intramuscular mitochondrial biogenesis (30).

However, individuals' physical fitness levels, joint health, and cardiovascular risks should be taken into consideration in HIIT applications; programs should be individualized by physiotherapists or exercise specialists. Although high intensity initially increases motivation, it may cause a decrease in sustainability in some individuals. Therefore, exercise variety and suitability for individual preferences are important in the integration of HIIT into programs.

Calisthenic Exercises

Calisthenic exercises (Street Workout) consist of bodyweight-based movements, typically beginning with basics such as chin-ups, push-ups, and sit-ups. However, over time, it has evolved into a more complex form that includes dynamic movements (such as plank, front lever, and muscle-up) based on the human body carrying its own load on different axes. ACSM recommends bodyweight exercises as part of resistance training. Especially for young and healthy individuals, such exercises have been shown to have positive effects on muscle endurance and strength development (31). Studies in the literature show that calisthenics practices improve functional capacity, increase neuromuscular control, and are metabolically effective in those new to exercise (32).

Aqua HIIT Exercises

Aqua HIIT provides a unique exercise environment characterized by reduced gravitational load, decreased joint pressure, and the use of water resistance. Thanks to these features, it is frequently preferred especially in cases such as orthopedic rehabilitation, fall prevention exercises for elderly individuals and obesity management. The buoyancy of the water reduces the load-bearing stress by supporting a portion of the body weight during exercise; this creates safe movement opportunities for individuals with arthritis, disc herniation or after joint surgery (33).

ACSM defines aqua HIIT exercises as low-impact aerobic activities and recommends them especially for osteoarthritis, rheumatic diseases, age-related joint stiffness and physical limitations due to excess weight. The viscosity of the water provides a natural resistance during movement and this resistance can be used for muscle strength and endurance gains. At the same time, the hydrostatic pressure of the water contributes to the reduction of edema by increasing circulation and can increase respiratory capacity by stimulating the respiratory muscles (31).

Aqua HIIT is an innovative exercise form that has come to the fore in recent years. This method, created by adapting terrestrial HIIT protocols to the aquatic environment, uses a combination of high-intensity effort and water resistance. In a limited number of studies, aqua HIIT has been reported to increase aerobic capacity, reduce fat mass, and increase muscle strength (34). However, since the literature on this field is still limited, there is a need to create standard protocols. Aqua HIIT exercises are widely used in physiotherapy practice and are effectively applied for the purposes of increasing range of motion, improving balance, and reducing pain in conditions such as lumbar disc herniation, total hip-knee prostheses, multiple sclerosis, and Parkinson's (35, 36). However, individualization of applications, consideration of pool hygiene, water temperature, and cardiopulmonary risks are of vital importance. Considering all these factors, aqua HIIT exercises are considered a sustainable and safe exercise option in both clinical and performance-based areas.

Animal Flow

Animal Flow is an exercise system inspired by animal movements, performed on the ground using body weight. The movements are mostly performed with the hands and feet in contact with the ground and flow in series. This approach aims to increase mobility, strength, endurance, coordination and body awareness. It stands out as a method blended with the fluidity of yoga, the rhythm of capoeira and the agility of parkour.

It is reported in the literature that Animal Flow applications have positive effects especially on proprioceptive control, motor coordination and core stability. Research shows that Animal Flow exercises can play a supportive role in performance development and reducing the risk of injury, especially in athletes (37). In addition, significant increases in balance and range of motion have been observed in short-term intervention studies conducted in sedentary individuals.

Animal Flow exercises also have potential in rehabilitation processes in terms of being able to be done with minimal equipment and increasing the individual's body awareness. It can be a complementary method, especially in scoliosis, low back pain or postural disorders, thanks to its structure that encourages the body to move in different planes. However, since the movements require a high level of balance and mobility, careful guidance is required for beginners. It is important to perform the exercises with the guidance of a trainer for both exercise effectiveness and safety.

Blood Flow Restriction Training

Blood flow restriction training (BFR) is a method that aims to increase the effect of low-intensity exercises by restricting venous return with special bands or cuffs placed on the proximal extremities. This technique was developed to provide muscle hypertrophy and strength gains, especially in individuals who cannot perform traditional resistance training or who are at risk of doing so. BFR increases muscle fiber recruitment, stimulates metabolic stress and intracellular anabolic signals. In the literature, BFR exercises have been shown to provide significant increases in muscle strength and volume even when performed at low intensity (e.g. 20-30% 1RM) (38). It is used especially in rehabilitation processes after orthopedic surgery, to prevent muscle atrophy during periods when intense loading is contraindicated. It can also be safely applied in areas such as cardiac rehabilitation, sarcopenia management in elderly individuals, and muscle regain after immobilization (39).

ACSM and the European Association for Exercise Physiology (EAPC) recommend careful protocol determination in BFR applications. The applied pressure, exercise type, and duration should be

individualized based on the person's circulatory status and peripheral vascular health. Basic parameters to be monitored during BFR applications include pain, numbness, color change and excessive pressure sensation. Inadvertent use in individuals who have not received application training can pose serious risks (40).
BFR is a powerful tool for physiotherapists, but it should be used with careful evaluation, with the guidance of a trained practitioner and within an individualized exercise plan. As it is supported by more randomized controlled studies in the future, its potential for use in areas such as musculoskeletal disorders, neurological rehabilitation and athlete health is expected to increase even more.

The Wim Hof Method

The Wim Hof Method is a holistic approach consisting of three basic components: cold exposure, breathing techniques and meditation. This method, developed by Wim Hof, nicknamed "The Iceman", aims to improve individuals' immune systems, mental endurance and physiological adaptation capacity. In recent years, it has attracted attention in both alternative health circles and sports sciences, and has also been the subject of some academic studies.
Controlled cold exposure, one of the most striking aspects of the method, is usually applied in the form of ice baths, cold showers or being outdoors in light clothing at low temperatures. Cold stimulation can trigger vasoconstriction, increased brown fat activity and noradrenaline release in the body, leading to metabolic and circulatory adaptations. It is also thought to have the potential to regulate immune system responses with the activation of the sympathetic nervous system (41).
Breathing exercises are performed with hyperventilation followed by short-term apnea (breath holding) cycles. As a result of these cycles, a temporary respiratory alkalosis and mild hypoxia occur in the body. This increases plasma epinephrine levels, promotes the release of cytokines such as interleukin-10, which regulate the inflammatory response, and has been associated with a decrease in cortisol levels in some studies. For example, in a controlled study conducted by Kox et al., an increased sympathetic response to lipopolysaccharide (LPS) injection and suppressed proinflammatory cytokine production were observed in individuals applying the Wim Hof Method (42).
The meditation and mindfulness components aim to support stress regulation while preserving physical and psychological well-being. Increased cold resistance is associated not only with physiological but also with cognitive and emotional regulation. Indeed, studies reporting a decrease in depression and anxiety levels in individuals practicing Wim Hof are also found in the literature (43). However, there are important points to be considered regarding the method. It is known that breath-holding exercises, especially those performed in water, can pose serious risks, and that incidents such as syncope and drowning have been reported. Therefore, it is not recommended that the practice be performed alone, unsupervised, or by inexperienced individuals. The Wim Hof Method is still controversial as a direct treatment method in the field of physiotherapy; however, it is suggested that it can be a supportive tool in the areas of stress management, chronic pain, autoimmune diseases and performance development (44). In conclusion, the Wim Hof Method is a holistic approach that can have potential effects on the individual's autonomic nervous system, immune response and psychological resilience. However, before applying it, the person's general health status should be taken into consideration and an evaluation should be made especially in terms of respiratory, cardiovascular or neurological risk factors.

Yoga

Yoga is a holistic mind-body practice that includes physical exercise, breathing techniques (pranayama) and meditation. Yoga, which has a history of thousands of years, is widely used in physical activity and rehabilitation in both traditional and modern forms today. The American College of Sports Medicine (ACSM) and the National Center for Complementary and Integrative Health (NCCIH) recommend yoga for its positive effects on both mental health and physical fitness (45).
The effects of yoga on the musculoskeletal system are documented in detail in the literature. While Yin yoga generally involves long-term isometric muscle holds, styles such as Hatha yoga have a structure that includes more eccentric and concentric muscle contractions. In this respect, yoga supports both strength and flexibility development; it is an effective tool for the development of spinal alignment, balance and postural stability. It contributes to the physiotherapy process in terms of increasing the individual's body awareness and supporting correct movement patterns, especially in postural disorders such as scoliosis, low back and neck pain (46).

Yoga also draws attention with its regulating effects on the central nervous system. Studies show that regular yoga practice balances the hypothalamic-pituitary-adrenal (HPA) axis, reduces cortisol levels, and increases parasympathetic nervous system activity. Thanks to these physiological changes, yoga plays a supportive role in the management of conditions such as chronic pain, anxiety, and insomnia. It is also thought to be effective in reducing central sensitization (47).

Studies in the field of women's health have shown that yoga practices positively affect menstrual symptoms, labor pains, and the postpartum recovery process. Prenatal yoga applied during pregnancy improves the psychological state of the mother, facilitates preparation for birth, and supports the function of the pelvic floor muscles. In the postpartum period, yoga helps to reduce urinary incontinence and pelvic pain by contributing to the reconstruction of the pelvic floor muscles (48).

Yoga can also have positive effects on balance, proprioception, and motor control in neurological rehabilitation. Studies conducted on individuals with Parkinson's disease, multiple sclerosis, and post-stroke patients show that yoga practices reduce the fear of falling and support independence in daily life activities. In addition, yoga exercises are also included in pulmonary rehabilitation programs due to the activation of respiratory muscles. Pranayama techniques can increase respiratory capacity and ventilatory muscle strength (49).

However, possible risks that may be seen during yoga practices are also included in the literature. In particular, the knee, waist and shoulder regions are at risk of injury due to misalignment and excessive strain. In advanced movements, such as inverted postures, reverse bends or excessive loads on the knee, problems such as lumbar disc herniation, sacroiliac joint dysfunction or osteoarthritis may occur. For this reason, it is recommended that yoga practice be organized in accordance with the anatomical characteristics and functional capacity of the individual; if necessary, auxiliary equipment, modifications and application with the supervision of a physiotherapist.

In summary, yoga offers a valuable contribution to modern physiotherapy practices due to its holistic effects. Addressing many physical, neurological and psychological goals, this method can be considered an important therapeutic tool with correct application, individualization and professional guidance.

Swing Yoga

Swing yoga, also known as aerial yoga, is a modern type of yoga based on the application of traditional yoga poses using a special hammock mounted on the ceiling to reduce gravity. This approach was developed to increase flexibility, improve balance and decompress the spine (relieve pressure), and at the same time appeals to a wide range of users with its fun and motivating structure.

In an announcement made by the American Council on Exercise (ACE), it was reported that swing yoga practices can provide a significant increase in VO_2max, regulate blood pressure and positively affect HDL cholesterol levels. It was also stated that it can allow for deeper stretches and contribute to spinal alignment thanks to the reduction of the effect of gravity. With these features, it is thought that it can be especially beneficial for individuals experiencing cervical and lumbar disc compression with careful and controlled use (50).

Swing yoga can have positive effects on postural control and balance. Inversions support balance and proprioception by stimulating the vestibular system, while increasing lymphatic drainage and venous return by changing the direction of blood circulation. However, inversions should be applied with caution in individuals with blood pressure, glaucoma, retinal problems, or vertebrobasilar circulation problems.

While movements performed with hammock support may facilitate access to classical yoga poses for some individuals, they may also challenge coordination, upper extremity strength, and trunk stability. Temporary adaptation problems such as dizziness and nausea may be experienced, especially in individuals with vestibular system sensitivity. For this reason, swing yoga should be applied with simplified modifications and under the guidance of an instructor for beginners.

In rehabilitation practice, swing yoga can be used to support spinal mobility and improve body awareness. In addition, it can facilitate individuals' adaptation to exercise thanks to its motivation-enhancing structure and variety of applications. However, it should not be forgotten that this method may have contraindications for some special populations, medical evaluation should be made before application and personalized programs should be preferred considering the risks. In conclusion, swing yoga is a modern form of exercise that adds an innovative dimension to traditional yoga approaches and

has both physiological and psychological effects. It can provide a safe and effective exercise experience for suitable individuals with professional guidance.

Face Yoga

Face yoga is a set of exercises developed to increase facial muscle tone, support circulation, and slow down age-related changes. This practice, which has become widespread especially for aesthetic purposes, has also started to attract attention in the field of physiotherapy and orofacial rehabilitation in recent years. Since facial muscles are often involuntarily exercised, awareness-based movements targeting this area both improve motor control and contribute to facial expression. Although there are limited studies on face yoga in the literature, current data show that these practices can provide increased tone in facial muscles, increased circulation in subcutaneous tissues, and functional improvement in temporomandibular joint (TMJ) dysfunctions. In studies conducted specifically on TMJ dysfunction, it has been reported that 6-week facial exercise programs provide reduced pain, improved chewing function, and increased range of motion (51). The face yoga exercises primarily target facial expression muscles; they include isometric or light dynamic muscle contractions targeting the forehead, eye contour, cheeks, mouth, and neck area. In addition, some techniques use breath control, massage, and manual relaxation maneuvers as complements. In this respect, face yoga can improve not only the facial muscles but also the individual's general relaxation and stress coping skills (52).

However, the scientific basis of face yoga practices is not yet strong enough. Some practices popularized through social media and popular culture for aesthetic purposes may be far from anatomical reality and ineffective. For this reason, it is important that face yoga trainings are given by physiotherapists or professionals who are experts in facial anatomy. These exercises should be carefully planned and monitored, especially in individuals with neurological disorders in the facial area (e.g. facial paralysis) (53).

As a result, face yoga can serve both functional and aesthetic goals when applied with the right techniques and consciously. However, evidence-based protocols need to be created and research in this area needs to be increased. Especially in the field of orofacial physiotherapy, testing face yoga in controlled studies is critical for its application safety and effectiveness.

The Role of Social Media in Developing an Exercise Habit

Social media has become an increasingly decisive factor in shaping exercise habits. Short videos, exercise routines, and “before-after” visuals shared on platforms such as Instagram, TikTok, and YouTube increase individuals’ motivation to start physical activity and reach large audiences. Especially for individuals who have turned to digital resources after the pandemic, social media has emerged as a powerful tool in terms of both information source and role model access.

When its advantages are examined, social media offers accessibility, especially for individuals who are new to exercise, reduces anxiety about physical environments such as gyms, and is effective in introducing new types of exercise. For example, previously little-known methods such as Animal Flow, Aqua HIIT, Swing Yoga, and BFR have become known on a global scale thanks to social media. In addition, the production of scientifically based content by various physiotherapists and trainers supports the dissemination of evidence-based information.

However, the effects of social media on exercise behavior are not only positive. Content that lacks a scientific basis, promises quick results and generally targets body image can cause short-term motivation, disappointment and potential injuries. Claims such as “Burn belly fat with this move!” or “Lose 10 cm in 10 minutes!” can lead to misleading guidance by ignoring the physiological basis of exercise.

In addition, the movements suggested by some content producers are presented in ways that are not compatible with body mechanics and can cause serious problems, especially in individuals at risk from an anatomical perspective. Some trends that have become popular on social media, such as weightless overhead poses or uncontrolled stretching movements, can pave the way for musculoskeletal system injuries if not planned carefully. In addition, individuals applying these exercises solely for aesthetic motivation without considering their own body structure is also risky in terms of long-term sustainability.

Although social media is a powerful platform for the spread of exercise habits, it creates a double-sided effect because it is an area where the scientific accuracy of the content is not checked. Therefore, it is

of great importance for physiotherapists and exercise professionals to actively participate in social media and support the dissemination of accurate information. Conscious content production, individualized exercise recommendations and posts that draw attention to anatomical safety principles will contribute to the development of healthier and more sustainable exercise habits in society.

CONCLUSION

Popular approaches to exercise have great potential in terms of increasing individuals' interest in physical activity, discovering new exercise routines and maintaining motivation. However, in evaluating the effectiveness and safety of these methods, not only their visibility but also their scientific basis should be taken into account. Methods such as HIIT, underwater exercises, Animal Flow, blood flow restriction exercise, Wim Hof method, yoga types and face yoga; While they can be extremely beneficial with correct application, individualization and clinical guidance, they can also cause potential harm when applied unconsciously.

The American College of Sports Medicine (ACSM) and other international guidelines recommend that the individual's physical capacity, health status and goals be taken into account in exercise prescription. In this context, popular approaches should not be seen as trends only, but as effective tools that can be integrated into physiotherapy practices with appropriate evaluation and programming.

In addition, the impact of social media in disseminating information should not be ignored; however, whether each content is scientifically based or not should be carefully analyzed. The presence of physiotherapists on these platforms plays a strategic role in terms of reaching the public with accurate information. At the point where popular approaches and science meet, it is possible to create safer, more effective and sustainable exercise habits.

In conclusion, popular approaches in exercise can offer innovative and effective solutions when carefully considered in physiotherapy and rehabilitation practice. However, evaluating these approaches not only as fashion trends but also with an evidence-based perspective that takes individual differences into account will produce more productive results for both health professionals and society.

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COMPLEX REGIONAL PAIN SYNDROME FOLLOWING MULTI-FRAGMENTARY MIDFOOT FRACTURE: A TAILORED REHABILITATION APPROACH

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ABSTRACT

Purpose: Complex Regional Pain Syndrome (CRPS) is a chronic pain condition often triggered by trauma or surgery, leading to disproportionate pain, sensory disturbances, and functional limitations. The aim of this study was to investigate the effects of a tailored rehabilitation approach including graded motor imaginary, sensory training, physical modalities, and exercise program.

Method: A 40-year-old male textile worker presented with CRPS symptoms in his left foot following a motor vehicle accident and open reduction internal fixation (ORIF) for multifragmentary fractures involving the navicular, medial cuneiform, and first and second metatarsals. After delayed presentation, a comprehensive pain management and rehabilitation program including neural therapy, desensitization techniques, motor re-education, and progressive functional exercises was initiated.

Results: The patient (height: 179 cm, body mass index: 24.3 kg/m^2) completed a structured, phase-based rehabilitation strategy delivered over two distinct periods. The rehabilitation protocol adopted in this case was structured around a restorative, goal-oriented framework aimed at improving functional outcomes while minimizing symptom exacerbation. The patient showed significant improvements in pain, mobility, and quality of life. A combination of physical and neurocognitive strategies was employed to address the complex sensory, motor, and autonomic manifestations of CRPS.

Conclusion: Early diagnosis and interdisciplinary management are essential for CRPS. Tailored rehabilitation targeting sensorimotor deficits and gradual functional reintegration can facilitate recovery. A proactive, interdisciplinary approach that addresses both the peripheral and central components of the syndrome offers the best chance for symptom resolution and long-term functional recovery.

Keywords: CRPS Type I, Foot and ankle rehabilitation, Physical therapy, Post-traumatic pain.

INTRODUCTION

The foot and ankle complex serves as a foundational structure for human locomotion, playing a pivotal role in weight-bearing, shock absorption, and proprioceptive input essential for balance and coordination (1). Its biomechanical integrity is crucial for efficient gait and load transfer during dynamic activities. Trauma to this region—particularly involving bony structures of the midfoot—can result in significant impairment of mobility and quality of life. Post-traumatic rehabilitation often emphasizes the restoration of joint alignment and bone healing; however, secondary complications such as Complex Regional Pain Syndrome (CRPS) remain underrecognized and can severely hinder functional recovery if not identified and managed early (2).

CRPS is a debilitating chronic pain condition characterized by disproportionate regional pain, sensory disturbances, vasomotor and sudomotor changes, and motor dysfunction, typically following a noxious event such as fracture, surgery, or soft tissue injury (3). In 1993, the International Association for the Study of Pain formalized the contemporary classification of these neuropathic pain conditions by defining Complex Regional Pain Syndrome (CRPS) types I and II (4). Type I manifesting when symptoms arise following a traumatic event in the absence of confirmed nerve injury. Type II is associated with nerve injuries (5). Although the pathophysiology of CRPS is not fully understood, central and peripheral sensitization, inflammation, and autonomic dysregulation are known to contribute to its development (6). The relative influence of each of these factors differs from patient to patient, leading to diverse clinical manifestations of the condition (7). Early diagnosis and an interdisciplinary treatment approach are critical to prevent long-term disability.

This case report presents a patient who developed CRPS Type I following a multi-fragmentary midfoot fracture. The clinical presentation met the Budapest criteria for CRPS, and a multidisciplinary rehabilitation protocol—encompassing graded motor imagery, desensitization, functional strengthening, and patient education—was implemented. We aim to highlight the importance of early diagnosis, a multidisciplinary rehabilitation approach, and tailored pain management in the successful resolution of CRPS symptoms.

CASE PRESENTATION

Patient Profile and Initial Treatment

A 40-year-old male patient (height: 179 cm, body mass index: 24.3 kg/m²), employed in a sedentary office setting and with a history of active tobacco use, sustained a high-energy trauma to the left foot due to a motorcycle accident on October, 2023. The patient presented to the emergency department with severe pain, functional impairment and swelling in the left foot following the incident. A detailed physical examination, in conjunction with radiographic imaging (X-rays), of the left lower limb, resulted in the diagnosis of foot multifracture. Radiographic evaluation revealed multifragmentary fractures of the navicular, medial cuneiform, and first and second metatarsals with intra-articular extension. The patient underwent open reduction and internal fixation (ORIF) with plate and screw fixation (Figure 1). Postoperatively, the foot was immobilized in a cast for six weeks, followed by three months of non-weight-bearing ambulation with bilateral crutches. No active physiotherapy was initiated during this period.

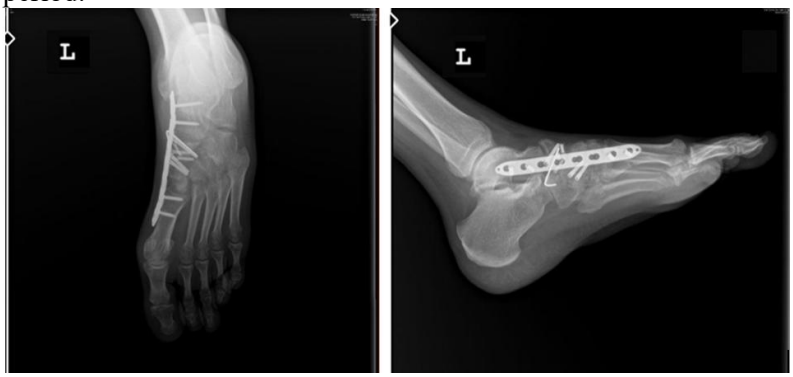

Figure 1: Radiography After ORIF Surgery.

Subsequent to hospital discharge, the patient underwent three outpatient follow-up visits, which included X-rays of the left foot and alterations to the plaster cast. It is noteworthy that symptoms indicative of developing CRPS remained unnoticed until the final control visit. By January 2024, the patient reported intense pain, swelling, skin discoloration, temperature changes, hypersensitivity, and joint stiffness. A neurological evaluation revealed the presence of hyperalgesia, allodynia, and diminished range of motion, thereby satisfying the Budapest Criteria for CRPS Type I (8). In light of the manifestation of concerning symptoms, the patient was subsequently referred to physiotherapy and rehabilitation center.

Pain evaluation was conducted using both subjective descriptors and standardized tools. The patient characterized the pain as constant, burning in nature, and disproportionate in intensity and duration relative to the original injury. These characteristics were consistent with neuropathic pain mechanisms. The Numerical Pain Rating Scale (NPRS) score was recorded as 8 out of 10, and the Douleur Neuropathique 4 (DN4) questionnaire further supported the neuropathic profile of the pain (as 5 out of 10). (9).

Motor assessment demonstrated marked weakness, particularly in the intrinsic foot muscles, tibialis posterior, and calf muscles, with additional weakness observed in the gluteal muscles due to prolonged off-loading and altered gait mechanics. The patient reported heightened stiffness, especially during movement initiation along with significantly reduced active range of motion. Functional performance was substantially impaired, with notable difficulty observed during weight-bearing and dynamic tasks, which were exacerbated by both pain and neuromotor deficits. Additionally, trophic changes were evident upon clinical inspection. The skin over the affected region appeared thin, smooth, and shiny, consistent with sympathetic dysregulation. Early nail dystrophy was noted, characterized by increased brittleness and subtle longitudinal ridging—hallmark indicators of trophic involvement in CRPS (6).

The patient was referred to pain specialists for pharmacological therapy and neural therapy. Adequate pain control was prioritized to enable initiation of rehabilitation. The treatment regimen included weekly supplementation with Vitamin D_3 at a dose of 20,000 IU. Pain management was achieved with nonsteroidal anti-inflammatory drugs (NSAIDs), including Naproxen 250 mg and Ibuprofen 200 mg, administered as needed without exceeding recommended maximum dosages. In addition to pharmacological measures addressing nociceptive and inflammatory components, physiotherapy played a central role in the rehabilitation process, focusing on functional restoration, desensitization, and gradual mobilization. This multidisciplinary strategy is consistent with current evidence-based recommendations for CRPS management, which emphasize early intervention, multimodal pain control, and the integration of physical therapy to prevent chronic disuse and central sensitization (10).

Treatment and Rehabilitation Strategy

Following the diagnosis of CRPS Type I in January 2024, a structured, phase-based rehabilitation strategy was implemented to address the patient's sensory, motor, and functional impairments while minimizing pain exacerbation and disuse-related complications. The program was delivered over two distinct rehabilitation periods (pre- and post-hardware removal) and was adapted dynamically according to clinical milestones.

Initial Rehabilitation

First phase of the initial rehabilitation prioritized pain control and desensitization. It began with gentle sensory re-education and desensitization techniques, aiming to reduce tactile allodynia and normalize somatosensory input through graded exposure to textures and pressures. Concurrent edema management was implemented through limb elevation and use of compression garments. Skin care protocols, including hydration and protective strategies, were prescribed to address sympathetic-related trophic changes. Concurrent edema management and skin care protocols, including hydration, protective strategies, and limb elevation, were prescribed to address sympathetic-related trophic changes. During this phase, the patient was not yet weight-bearing. Active-assisted range of motion (AAROM) exercises were introduced in pain-free planes to preserve joint integrity and prevent contractures. By the third week, early motor imagery beginning with laterality recognition and low-dose mirror therapy, were initiated to begin cortical reorganization without provoking movement-related discomfort.

Phase II focused motor re-activation and weight-bearing transition between 5 to 10 weeks. Rehabilitation progressed to include active range of motion exercises and GMI Stage 2 (imagined movements). Low load strengthening of intrinsic foot muscles and the tibialis posterior were initiated to rebuild neuromuscular engagement. This was paralleled by the gradual reintroduction of weight-bearing, beginning with partial weight-bearing supported gait training using assistive devices and progressing toward independent ambulation. Proprioceptive and balance training began with double-leg stance tasks on firm and compliant surfaces and functional tasks were trained including sit-to-stand and heel raises.

Phase III (weeks 11–16) emphasized functional reintegration and motor control. Therefore, the focus shifted toward advanced neuromuscular control, endurance, and task-specific retraining. Exercises progressed to gentle eccentric strengthening, retro-walking, step-downs, lunges, with careful monitoring to avoid symptom recurrence. GMI Stage 3 (functional motor imagery) and dynamic mirror therapy tasks were used to further reestablish the cortical body schema and reduce residual motor neglect. Gluteal strengthening was added to support pelvic stability and kinetic chain alignment. The patient also participated in perturbation-based balance training to enhance dynamic postural responses.

A home exercise program was tailored to reinforce clinic-based gains and foster long-term self-management. Each phase incorporated structured patient education to enhance coping strategies, explain pain neurophysiology, and encourage active participation.

Post-Removal Rehabilitation

In August 2024, the patient underwent elective removal of orthopedic hardware due to persistent discomfort. Rehabilitation was paused for approximately three weeks postoperatively to allow for soft tissue healing and resolution of acute inflammatory responses. During this period, only passive mobility and edema control strategies were maintained.

The rehabilitation plan adopted a long-term perspective, prioritizing functional maintenance and the prevention of secondary complications such as osteoarthritic progression, recurrent pain flares, or further postural adaptations. Rehabilitation was re-initiated three weeks following the second surgical intervention, with a progressive and individualized protocol designed to restore strength, function, and

sensorimotor control. The program began with active-assisted ROM exercises, gradually advancing to resisted movements as the patient's tolerance improved. This progression aimed to prevent joint stiffness while gradually re-establishing muscular engagement around the affected joints. This 8-week program focused on advanced motor recovery, dynamic stability, and functional endurance. Interventions included progressive strengthening, proprioceptive training, gait retraining, and eccentric loading tasks such as retro-walking and step-down drills. Perturbation-based balance training was used to reinforce joint protection and symmetry under functional stress.

By November 2024, the patient exhibited near-complete functional recovery, with full range of motion, significant pain reduction (NPRS 2/10; DN4 1/10), and return to independent, asymptomatic ambulation. Final assessments indicated restored postural stability, improved proprioceptive control, and only minimal limitations during high-demand tasks. During the course of rehabilitation, the patient's SF-12 scores demonstrated significant improvement, with the Physical Component Summary (PCS) increasing from an estimated 28 to 48, and the Mental Component Summary (MCS) improving from 35 to 52, indicating meaningful recovery in both physical functioning and mental well-being. This comprehensive, phased rehabilitation approach—aligned with current CRPS management guidelines—demonstrated the importance of early intervention, cortical engagement, and gradual load progression in promoting recovery and minimizing long-term disability (11).

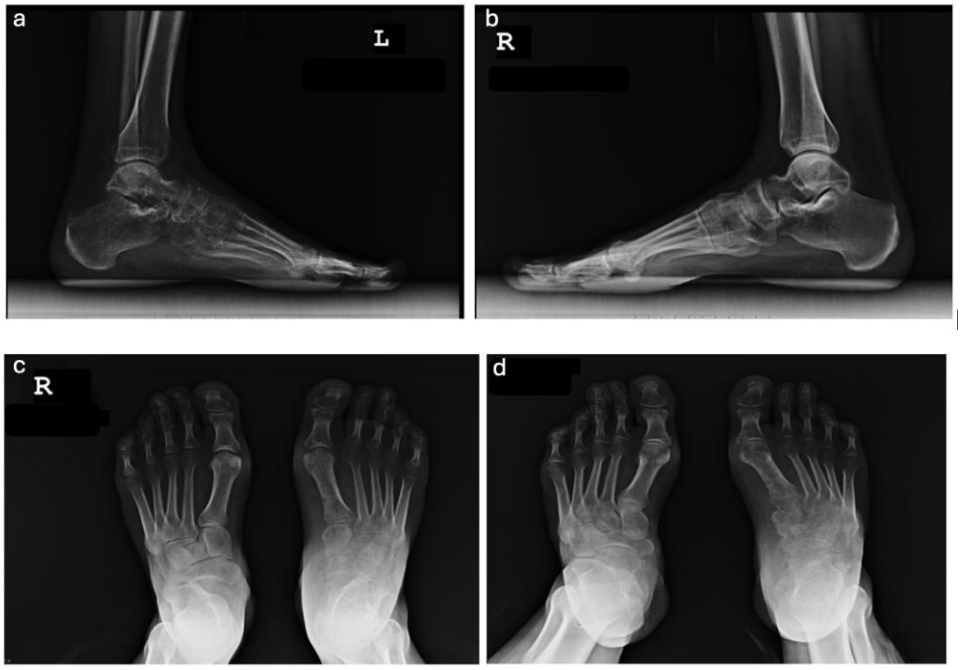

Figure 2: Bilateral Foot AP and Lateral Radiography After Surgical Removal of Hardware (a, b and c: weight bearing; d: non- weight bearing).

DISCUSSION

Complex Regional Pain Syndrome (CRPS) is a multifactorial and often debilitating condition marked by disproportionate, persistent pain accompanied by a constellation of sensory, vasomotor, sudomotor, and motor abnormalities (12). Although its exact pathophysiology remains elusive, current theories suggest the involvement of peripheral and central sensitization, autonomic dysregulation, and cortical reorganization (7). In this case, the patient developed CRPS Type I following multifragmentary midfoot fractures and surgical fixation — a scenario consistent with known high-risk profiles for CRPS onset. This report highlights the critical importance of early recognition and multidisciplinary management of CRPS. Restorative rehabilitation with attention to central sensitization, neural re-education, and gradual loading proved effective. Mirror therapy and graded motor imagery were particularly beneficial in retraining cortical maps and reducing pain perception.

Prompt identification of CRPS symptoms, followed by a multidisciplinary rehabilitation approach, was critical to favorable functional outcomes. As recommended in international guidelines (10), early intervention that includes both pharmacological pain control and active rehabilitation is essential to

prevent chronicity. In this patient, the therapeutic strategy incorporated desensitization protocols, gradual loading, motor relearning, and non-invasive neuromodulatory techniques such as mirror therapy and graded motor imagery (GMI). These modalities have been shown to reverse maladaptive cortical changes and modulate central pain processing mechanisms (13,14). Mirror therapy and GMI were introduced during the early stages of rehabilitation, once acute allodynia was tolerable. These techniques aim to normalize disrupted body perception and reduce pain through cortical engagement without provoking nociceptive input (13). Combined with structured proprioceptive training, balance retraining, and functional strengthening, they contributed significantly to the restoration of sensorimotor control and functional independence.

Muscular weakness—particularly in the intrinsic foot musculature, tibialis posterior, and proximal stabilizers such as the gluteal muscles—was addressed through progressive loading and task-specific reconditioning. Prolonged non-weight-bearing had contributed to postural asymmetry, further compounding functional limitations. A structured reloading program, including eccentric strengthening and gait retraining, was key in restoring limb confidence and mobility. These findings align with the broader literature emphasizing the role of tailored, activity-based interventions in CRPS management (3). Additionally, surgical removal of orthopedic hardware in the later stages provided symptom relief and enabled more dynamic rehabilitation strategies. Although CRPS symptoms can persist long after the inciting event, this case demonstrates that consistent, interdisciplinary intervention can yield meaningful recovery. Notably, full resolution of pain and return to near-baseline function were achieved within 12 months, supporting the effectiveness of early and progressive rehabilitation.

This case underscores the importance of timely diagnosis, cortical-targeted interventions, and individualized rehabilitation in the management of CRPS. Active approaches that address both central and peripheral mechanisms are more effective than passive strategies alone (8). Integration of neurocognitive and biomechanical components ensures not only pain relief but also restoration of autonomy and quality of life.

CONCLUSION

CRPS remains a complex and challenging condition in musculoskeletal rehabilitation. This case underscores the value of coordinated pain management and individualized rehabilitation strategies. Early mobilization, patient education, and a multidisciplinary team approach are vital in optimizing outcomes. Initial delays in rehabilitation, along with risk factors such as smoking and lack of early mobilization, may have contributed to the onset of CRPS. However, timely pharmacological support and a carefully structured rehabilitation program emphasizing sensorimotor reintegration and functional progression led to substantial recovery.

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ARTIFICIAL INTELLIGENCE-GUIDED REHABILITATION PROGRAM FOLLOWING ACL RECONSTRUCTION

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ABSTRACT

Purpose: Artificial intelligence (AI) is increasingly being integrated into physiotherapy to support clinical decision-making. This report presents a structured rehabilitation program generated by AI for a patient four weeks post-anterior cruciate ligament (ACL) reconstruction, aiming to compare its clinical feasibility and relevance with traditional physiotherapy approaches.

Methods: A 19-year-old competitive basketball player, four weeks post-ACL reconstruction with hamstring autograft and concomitant medial meniscus posterior root repair, presented for rehabilitation. Key findings included 10° knee extension lag, 90° knee flexion range, +2 cm thigh circumference difference (compared to contralateral side), inability to perform a straight leg raise with full extension, and no weight-bearing tolerance. No night pain was reported.

Results: Based on the clinical profile, AI generated a phase-appropriate rehabilitation protocol targeting pain control, quadriceps reactivation, range of motion restoration, edema reduction, and proprioceptive re-education. Emphasis was placed on neuromuscular electrical stimulation (NMES), biofeedback-enhanced quadriceps sets, early weight-bearing drills (as permitted), and proprioceptive exercises.

Conclusion: The AI-generated program provided an evidence-based, patient-specific rehabilitation framework. It is consistent with current clinical guidelines, illustrating AI's potential to support physiotherapists in structuring individualized rehabilitation plans. Further comparative trials are needed to assess functional outcomes versus therapist-driven protocols.

Keywords: Anterior Cruciate Ligament, Artificial Intelligence, Reconstruction

INTRODUCTION

Artificial Intelligence (AI) refers to the simulation of human intelligence processes by computer systems, including learning, reasoning, and self-correction. In recent years, AI has evolved from rule-

based systems to sophisticated machine learning and deep learning algorithms capable of analyzing vast and complex datasets with remarkable accuracy. These systems can identify patterns, make predictions, and provide recommendations, offering new opportunities for transforming healthcare delivery and patient outcomes (1).

In healthcare, AI is increasingly used for medical imaging analysis, risk prediction, clinical decision support, drug discovery, and administrative tasks. Its application spans across numerous specialties, including radiology, oncology, cardiology, and rehabilitation sciences. One of the most promising areas is personalized medicine, where AI enables individualized diagnosis and treatment planning based on a patient's unique clinical profile (2, 3).

Within the field of physiotherapy and rehabilitation, AI technologies are being utilized to assist clinicians in patient evaluation, exercise prescription, adherence monitoring, and outcome prediction. For musculoskeletal injuries such as anterior cruciate ligament (ACL) tears, AI-driven platforms can generate phase-specific rehabilitation programs, simulate progression scenarios, and adjust plans based on real-time feedback. This approach has the potential to enhance clinical efficiency, reduce variability in care, and support early return to function — particularly in high-demand athletic populations.

The purpose of this case report is to demonstrate the application of an AI-generated rehabilitation protocol for a post-operative ACL reconstruction patient and to evaluate its alignment with evidence-based physiotherapy principles.

CASE PRESENTATION

Patient Profile:

- Age/Sex: 19-year-old male
- Sport Background: Competitive basketball player
- Surgery: ACL reconstruction with hamstring tendon autograft and medial meniscus posterior root repair
- Time Since Surgery: 4 weeks

Assessment Findings:

Clinical Parameter	Value/Observation
Knee Extension Deficit	10° lag
Knee Flexion Range of Motion	90°
Thigh Circumference Difference	+2 cm (compared to non-operative side)
Straight Leg Raise	Not possible with full knee extension
Weight Bearing	Not tolerated
Night Pain	Absent

AI-GENERATED REHABILITATION PROGRAM

Goals for Week 4–6 Post-op:

- Restore full passive knee extension
- Improve quadriceps activation
- Gradually increase knee flexion to ≥120°
- Minimize swelling and prevent atrophy
- Begin neuromuscular control and proprioceptive training

1. Pain and Edema Management

- Cryotherapy: 15 min every 2–3 hours
- Elevation + compression garments
- Patellar mobilization (superior/inferior glides)

2. Quadriceps Activation

Technique	Description
NMES on VMO	15–20 min daily, synchronized with voluntary contraction

Isometric Quad Sets	10 reps × 10s hold × 3–4 sets/day
Biofeedback Training	Visual-EMG device for muscle awareness and engagement
Straight Leg Raises (SLR)	Progressively initiated as extension lag reduces
Terminal Knee Extensions	Resistance band-assisted (from 30° to 0°), 3×15 reps

3. Range of Motion and Mobility
- Passive knee extension with heel props or prone hangs
- Seated assisted flexion using towel/band
- Wall slides up to 90°, progress as tolerated

4. Proprioception and Balance (Initiated as tolerated)

Exercise	**Details**
Single-leg stance (with support)	Eyes open → eyes closed, on flat surface
Balance board drills	Gentle anterior–posterior rocking
Weight shifting (lateral & Anteroposterior)	Begin in parallel stance, progress to split stance

5. Precautions
- No open kinetic chain terminal extension exercises
- Avoid loaded knee flexion >90° until meniscus healing is confirmed
- Monitor for signs of effusion or increased pain post-exercise

Progression Criteria Toward Phase II (Week 6–12)
- Full passive extension
- Knee flexion ≥120°
- Pain-free quadriceps contraction
- Tolerance to partial weight-bearing activities
- Minimal joint effusion

CONCLUSION

This case report highlights the potential of artificial intelligence to develop phase-specific, individualized rehabilitation protocols following ACL reconstruction. The AI-generated program demonstrated clinical coherence with current best practices in physiotherapy, particularly in addressing early-stage goals such as quadriceps activation, edema control, and proprioceptive training. While not a replacement for clinical expertise, AI can serve as a valuable adjunct, offering structured guidance and optimizing time-efficient decision-making. Future studies should explore comparative outcomes between AI-assisted and therapist-led rehabilitation models to determine their respective impacts on functional recovery and return-to-sport timelines.

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S001.ANALYSIS OF MASTER'S THESES ON PHYSIOTHERAPY AND REHABILITATION IN TÜRKIYE BETWEEN 2021-2023 IN TERMS OF DIFFERENT VARIABLES

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Purpose: The aim of this study is to evaluate the master's theses in the field of Physiotherapy and Rehabilitation in Türkiye between 2021-2023 in terms of various variables.
Methods: In our study, 1047 Master's theses in the fields of 'Physiotherapy and Rehabilitation Department','Cardiac and Respiratory Physiotherapy and Rehabilitation Department', 'Cardiopulmonary Physiotherapy Department','Cardiopulmonary Physiotherapy and Rehabilitation Department', 'Musculoskeletal Physiotherapy and Rehabilitation Department', 'Neurological Physiotherapy and Rehabilitation Department', 'Sports Physiotherapy Department', 'Sports Physiotherapy and Rehabilitation Department', 'Sports Physiotherapy Department', 'Physiotherapy and Rehabilitation in Sports Department' and 'Basic Physiotherapy and Rehabilitation Department' from the website 'http://www.tez.yok.gov.tr' were analysed in terms of various variables using the document analysis method. The data were analysed using the percentage (%) and frequency (n) analysis of the descriptive statistical methods.
Results: Of the theses, 583 (55.69%) were conducted in foundation and 464 (44.31%) in state universities. The universities with the highest number of theses are Hacettepe 93(8.9%), Bahçeşehir 76(7.3%) and Yeditepe University 62(5.9%). The most commonly studied specialties were Orthopaedic 191(18.2%), General 170(16.2%) and Neurological rehabilitation 144(13.8%). Of the theses, 617(58.9%) were assessment theses and 425(40.6%) were treatment theses. A total of 76,678 people were included in the sample when theses were analysed. The most commonly used statistical analyses were 2-group difference tests, before-after scores, and correlation (relationship) analyses.Turkish validity and reliability studies account for 41 of these (3.9%).
Conclusions: The examination of master's theses in physiotherapy and rehabilitation in Türkiye in terms of different variables is important in order to determine the general situation and developments in the field.
Keywords: Master's Thesis, Physiotherapy and Rehabilitation, Türkiye

S002.TURKİSH VERSİON OF PHYSİOTHERAPİST SELF-EFFİCACY QUESTİONNAİRE: VALİDİTY AND RELİABİLİTY

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Purpose: The aim of this study is to determine the validity and reliability of the Turkish version of the 'Physiotherapist Self-Efficacy Questionnaire (PSE)'.
Methods: After obtaining permission from the author who developed original questionnaire, two independent researchers translated it into Turkish. The Turkish version was back-translated into English and compared with the original. Translators worked independently. The final version was piloted with 10 individuals, who reported no difficult-to-understand items. A total of 122 intern or graduate physiotherapists participated, completing the PSE and the General Self-Efficacy Questionnaire (GSE). One week later, the PSE was emailed again for re-test. Validity was assessed using Pearson correlation

coefficients between PSE and GSE scores. Internal consistency was analysed, and reliability was determined through test-retest analysis.
Results: A significant relationship was found between the subscales (Neurological, Orthopaedic, and Cardiopulmonary Rehabilitation) of the 'Turkish PSE' and the 'GSE' ($p<0.001$). The reliability of the subscales in neurological and cardiopulmonary rehabilitation was found to be high (Cronbach's $\alpha = 0.81$ and 0.87, respectively). The orthopaedic rehabilitation subscale was also found to be reliable (Cronbach's $\alpha = 0.76$). The Turkish version of the 'PSE' demonstrated high internal consistency in the neurological, orthopaedic, and cardiopulmonary rehabilitation subscales (Cronbach's alpha values were 0.98, 0.98, and 0.99, respectively).
Conclusions: The Turkish PSE is a valid and reliable measurement tool. It can be used to assess the professional self-efficacy levels of undergraduates as well as physiotherapists in their post-graduate professional careers.
Keywords: physiotherapy and rehabilitation, education, self-efficacy, validity, reliability

S003.EVALUATION OF THE EFFECTIVENESS OF EARTHQUAKE AWARENESS TRAINING IN PHYSIOTHERAPY STUDENTS

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Purpose: Turkey is located in a region with a high earthquake risk, making earthquake awareness training crucial. Physiotherapists play critical roles in the rehabilitation of affected individuals during disasters. This study aims to evaluate the impact of basic earthquake awareness training on the awareness levels of physiotherapy students.
Method: A total of 94 final-year students (18 women, 76 men; mean age 24±2.7 years) from Hacettepe University, Faculty of Physical Therapy and Rehabilitation, participated in the study. A 26-question survey was administered via QR code before and after the training. The survey assessed students' knowledge, attitudes, and behaviors regarding earthquake preparedness, appropriate actions during an earthquake, post-earthquake first aid, and the role of physiotherapists.
Results: According to the survey results, although students already had relatively high awareness levels regarding earthquakes and physiotherapy needs, their knowledge of emergency gathering points increased from 41% to 99% after the training. Before the training, 56% of students expressed interest in first aid education, 23% in triage and basic life support, and 21% in multiple trauma management. After the training, 46% preferred triage and basic life support, 40% first aid, and 14% multiple trauma management. A significant improvement was observed, especially in knowledge about appropriate actions during an earthquake and post-earthquake first aid.
Conclusions: Basic earthquake awareness training significantly enhances physiotherapy students' disaster awareness and proper intervention competencies. After the training, notable improvements were observed in students' knowledge and behaviors related to earthquake response and post-earthquake care. Therefore, it is recommended that expanded disaster awareness education be integrated into physiotherapy curricula and repeated regularly to ensure ongoing preparedness.
Keywords: Disaster, Earthquake, disaster, physiotherapist, awareness.

S004.CONTENT ANALYSIS OF AI-INTEGRATED PRESENTATION TECHNOLOGIES IN PHYSIOTHERAPY AND REHABILITATION EDUCATION

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Purpose: Presentation technologies play a crucial role in conveying theoretical knowledge and developing clinical skills in physiotherapy and rehabilitation education. This study analyzes the content of AI-integrated presentation technologies used in the field.
Methods: The research examines commonly used tools such as PowerPoint, Prezi, interactive e-learning platforms, augmented reality-based applications, and AI-driven adaptive learning systems.
Results: Content analysis reveals that presentation materials primarily focus on fundamental topics such as anatomy, biomechanics, clinical assessment methods, and rehabilitation techniques. AI-supported technologies, including automated feedback systems, virtual patient simulations, and speech-to-text conversion, have been identified as emerging tools that enhance personalized learning and improve accessibility. Additionally, the integration of AI-powered data analytics enables educators to track student progress more effectively. However, the study also highlights the limited use of AI-driven interactive features, particularly in simulation-based clinical training.
Conclusions: Based on these findings, it is concluded that expanding the use of AI-enhanced tools can provide a more effective and personalized learning experience in physiotherapy and rehabilitation education. The effective integration of AI in educational technologies has the potential to improve student engagement, knowledge retention, and clinical competency. These results need to be validated through a comparative study. There is a need for research examining knowledge retention in the same course through traditional and technological learning methods. Quizzes and similar exams conducted at different time intervals should be used to evaluate and test the brain's processes of storing, recalling, and retrieving information.
Keywords: Physiotherapy education, AI in education, presentation technologies, digital learning, interactive education, adaptive learning

S005.EXAMINATION OF THE RELATIONSHIP BETWEEN OBSTETRIC CHARACTERISTICS, PELVIC FLOOR DYSFUNCTION SEVERITY, AND QUALITY OF LIFE IN PREGNANT WOMEN

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Purpose: To examine the relationship between obstetric characteristics, pelvic floor dysfunction (PFD) severity, and quality of life in pregnant women.
Methods: 45 pregnant women (age = 29.0 [(17.0); (39.0)] years; body mass index = 28.4 [(22.2); (36.4)] kg/m²) were included in the study.Participants' obstetric data were recorded. PFD severity was assessed using the Pelvic Floor Distress Inventory-20 (PFDI-20), which consists of the Quality of life was evaluated using the Pelvic Floor Impact Questionnaire (PFIQ), which includes the Pelvic Organ Prolapse Impact Questionnaire-7 (POPIQ-7), Colo-Recto-Anal Impact Questionnaire-7 (CRAIQ-7), and Incontinence Impact Questionnaire-7 (IIQ-7) subscales. Spearman's correlation test was used for statistical analysis.
Results: Positive moderate and strong correlations were found between gestational age and CRADI-8 (rho=0.299; p=0.046), CRAIQ-7 (rho=0.408; p=0.006), and total PFIQ score (rho=0.391; p=0.009). Similarly, positive moderate and strong correlations were observed between the number of pregnancies and CRADI-8 (rho=0.341; p=0.022), CRAIQ-7 (rho=0.466; p=0.001), POPIQ-7 (rho=0.308; p=0.042), and total PFIQ score (rho=0.483; p=0.001).Positive moderate and strong correlations were found between the number of births and CRADI-8 (rho=0.423; p=0.004), PFDI-20 score (rho=0.300; p=0.045), IIQ-7 (rho=0.326; p=0.029), CRAIQ-7 (rho=0.575; p=0.000), POPIQ-7 (rho=0.404; p=0.007), and total PFIQ score (rho=0.558; p=0.000).No significant relationships were found among other parameters (p>0.05).

Conclusions: It was observed that as gestational age, number of pregnancies, and births increased, the severity of some PFD symptoms increased, and quality of life was negatively affected.Evaluating pelvic floor health in the early stages before and during pregnancy and taking preventive measures may be important for improving quality of life.
Keywords: Pregnancy, Pelvic Floor Disorders, Quality of Life

COGNITIVE TRACES OF TYPE 2 DIABETES: A PILOT STUDY

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Purpose: During motor imagery, activation is observed in structures responsible for motor planning, like actual movement execution. These structures are known as important neural connections for cognitive functions and body awareness. Type 2 Diabetes Mellitus (T2DM) leads to impairments in brain and cognitive functions due to poor glycemic control. However, how motor imagery ability, body awareness, and cognitive functions are affected in the course of this disease and the relationships between these functions remain unclear. This study aimed to examine the relationship between motor imagery ability, body awareness, and cognitive functions in individuals with T2DM.
Methods: Thirty-two T2DM individuals with T2DM were included in the study. Demographic data were collected using demographic data form. Motor imagery abilities were assessed using mental chronometry and mental rotation tests, body awareness was evaluated with Body Awareness Questionnaire, and cognitive functions were measured using Montreal Cognitive Assessment (MOCA).
Results: A moderate negative correlation was found between mental chronometry ratio and total MOCA score ($r=-0.412$, $p=0.019$). Total MOCA score showed a moderate positive correlation with right mental rotation accuracy rate ($r=0.437$, $p=0.012$) and a strong positive correlation with left mental rotation accuracy rate ($r=0.545$, $p=0.001$). A weak positive correlation was detected between total MOCA score and body awareness scores ($r=0.392$, $p=0.027$).
Conclusions: This study determined that motor imagery ability, body awareness, and cognitive functions are interrelated in individuals with T2DM. It is suggested that incorporating strategies targeting these variables in T2DM assessment and rehabilitation programs may positively contribute to rehabilitation outcomes.
Keywords: Imagination, Type 2 Diabetes Mellitus, Cognition, Body Images.

S007.A BIBLIOMETRIC ANALYSIS OF ACADEMIC PUBLICATIONS ON 6-MINUTE WALK TEST ASSESSMENTS IN COPD PATIENTS BASED ON THE WEB OF SCIENCE (2014-2024)

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Purpose: "This study aims to evaluate the bibliometric analysis of academic publications on the Six-Minute Walk Test assessments in COPD patients based on the Web of Science (WoS) database between 2014 and 2024."
Methods: In this bibliometric analysis, the keywords 'Chronic Obstructive Pulmonary Disease' and '6-Minute Walk Test' or '6 MWT' or 'Six-Minute Walk Test' were used in the Web of Science database. A total of 679 articles published between 2014 and 2024 were identified. No restrictions were applied regarding document types, publication languages, or other parameters. The obtained data were analyzed using VOSviewer.
Results: The bibliometric analysis of the 679 academic publications obtained from the WoS database has revealed significant findings regarding the Six-Minute Walk Test (6MWT) assessments in COPD

patients. The most represented field in the WoS categories is 'Respiratory System,' with 268 publications in this category. Most of the publications were released in 2021, with a total of 89 articles. On a country basis, China stands out as the country with the highest number of publications, contributing 95 studies to the literature in this field. It is observed that a significant portion of the research was published in journals indexed in SCI-EXPANDED and ESCI, while conference papers and books occupy a more limited space.

Conclusions: This bibliometric analysis highlights a broad academic interest in the assessments of the Six-Minute Walk Test in COPD patients. Future studies using analyses conducted with different databases may highlight the importance of the widespread use of various field tests in chronic respiratory diseases.

Keywords: Chronic obstructive pulmonary disease, 6 minute walk test, databases, bibliometric.

S009.The Effect of Combined Exercise Program on Quality of Life in Patients with MASLD: Preliminary Findings

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Purpose: Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD) is the most common chronic liver disease worldwide and a leading causes of liver failure and transplantation (54, 55). This study aimed to examine the effects of an eight-week combined exercise program on the quality of life in MASLD patients.

Methods: A randomized controlled trial was conducted with 20 MASLD patients divided into control (8 males, 2 females, mean age 47.6±7.1) and intervention groups (8 males, 2 females, mean age 45.3±9.4). The control group engaged in 45 minutes of walking and followed dietary recommendations, while the intervention group adhered to the same diet and participated in a supervised 8-week resistance and aerobic exercise program (1 hour, 3 days/week) with a physiotherapist. Resistance training was implemented in the first 4 weeks, followed by aerobic exercises in the remaining 4 weeks. Quality of life was measured using the Chronic Liver Disease Questionnaire (CLDQ).

Results: The intervention group showed significant improvements in CLDQ subscales of fatigue, abdominal symptoms, and total score ($p<0.004$, $p<0.041$, $p<0.005$, respectively). The control group exhibited improvement only in systemic symptoms ($p<0.046$). No significant changes were observed in anxiety, emotional state, or disease activity in either group ($p>0.05$).

Conclusions: The supervised eight-week combined exercise program enhanced the quality of life in MASLD patients, improving functional capacity and symptom control. These findings suggest that supervised exercise programs should be integrated into the long-term management and treatment protocols of MASLD patients in clinical practice.

Keywords: MASLD, Exercise program, Aerobic exercise training, Quality of life

S010.THE EFFECT OF COMBINED EXERCISE PROGRAM ON QUALITY OF LIFE IN PATIENTS WITH MASLD: PRELIMINARY FINDINGS

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Results: The intervention group showed significant improvements in CLDQ subscales of fatigue, abdominal symptoms, and total score ($p<0.004$, $p<0.041$, $p<0.005$, respectively). The control group exhibited improvement only in systemic symptoms ($p<0.046$). No significant changes were observed in anxiety, emotional state, or disease activity in either group ($p>0.05$).
Conclusions: The supervised eight-week combined exercise program enhanced the quality of life in MASLD patients, improving functional capacity and symptom control. These findings suggest that supervised exercise programs should be integrated into the long-term management and treatment protocols of MASLD patients in clinical practice.
Keywords: Aerobic exercise training, Exercise program, MASLD, Quality of life

INVESTIGATION OF THE RELATIONSHIP BETWEEN THORACOLUMBAR FASCIA THICKNESS AND MORPHOLOGICAL CHARACTERISTICS AND TRANSVERSUS ABDOMINIS CONTRACTION RATIO IN HEALTHY ADULTS

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Purpose: This study examines the relationship between thoracolumbar fascia thickness, its morphological characteristics, and the transversus abdominis (TrA) contraction ratio in healthy young adults.
Methods: TrA contraction ratio, thoracolumbar fascia thickness, and morphology were evaluated using ultrasound imaging (4–13 MHz, L7HD3, Clarius). Fascia morphology was categorized as "highly disorganized," "slightly disorganized," "slightly organized," or "highly organized" [1]. The TrA contraction ratio was calculated as the thickness during contraction divided by the thickness at rest [2].
Results: Fifteen healthy individuals (mean age: 22.06 ± 6.02 years) participated. A positive correlation was found between the right TrA contraction ratio and thoracolumbar fascia organization on the right ($r=0.82$, $p=0.001$) and left ($r=0.82$, $p=0.001$). A negative correlation was observed between the right TrA contraction ratio and thoracolumbar fascia thickness on the right ($r=-0.52$, $p=0.049$) and left ($r=-0.60$, $p=0.017$). The left TrA contraction ratio also correlated positively with right ($r=0.74$, $p=0.002$) and left ($r=0.74$, $p=0.002$) fascia organization, but no significant correlation was found with fascia thickness ($p>0.005$).
Conclusions: TrA contraction is crucial for spinal stabilization. Increasing research suggests that thoracolumbar fascia structure influences spinal health. Our findings indicate that greater fascia thickness is associated with reduced TrA contraction, while more organized fascia positively correlates with TrA contraction. These results suggest that thoracolumbar fascia may impact TrA activation, influencing spinal stability.
Keywords: Musculoskeletal Systems, Spinal Column, Ultrasound Imaging

RELATIONSHIP BETWEEN UNSUPPORTED ARM EXERCISE CAPACITY AND ARM FUNCTION/ENDURANCE WITH UPPER EXTREMITY FUNCTIONALITY IN PATIENTS WITH BREAST CANCER

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Purpose: The primary aim of this study was to compare unsupported arm exercise capacity and upper extremity functionality in patients with breast cancer with healthy subjects. It was also aimed to examine the relationship between unsupported arm exercise capacity and arm functionality in patients with breast cancer.
Methods: The study included 45 breast cancer patients (mean age: 56.69 ± 9.37 years) and 45 healthy subjects (mean age: 54.71 ± 6.54 years). The unsupported arm exercise capacity and function/endurance was assessed using the 6-minute Pegboard and Ring Test (6PBRT). The Quick Disabilities of the Arm, Shoulder and Hand Questionnaire (Q-DASH) was used for upper extremity function.
Results: The 6PBRT score of the breast cancer group was significantly lower than that of healthy subjects (194.16 ± 34.91, 218.87 ± 43.87, respectively, p=0.004). The mean Q-DASH score of the breast cancer group was 22.12 ± 15.70. According to the Q-DASH score, 35.6% (n=16) of the participants were classified as normal, 51.1% (n=23) as mild and 13.3% (n=6) as impaired. A moderate negative correlation was found between Q-DASH score and 6PBRT score in breast cancer patients (r=-0.453, p=0.002).
Conclusions: In patients with breast cancer, unsupported arm exercise capacity and endurance and upper extremity functionality are negatively affected during long-term follow-up. Therefore, upper extremity assessment and exercise training programs should be included in rehabilitation programs after breast cancer.
Keywords: Breast Cancer, Exercise Test, Upper Extremity.

S013.THE EFFECT OF GENDER ON PAIN, DEPRESSION LEVEL, BALANCE AND QUALITY OF LIFE IN ADULTS DIAGNOSED WITH LYMPHOMA: A CROSS-SECTIONAL STUDY

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Purpose: The aim of this study was to investigate the effect of gender on pain intensity, depression level, balance and quality of life in adults with lymphoma.
Methods: Seventeen individuals aged between 19 and 62 years (mean age 39.94±14.89 years) who were diagnosed with lymphoma at least 1 year ago and whose cancer treatment was ongoing at Hacettepe University Oncology Hospital participated in the study. Pain intensity was assessed using the Visual Analog Scale, depression level was assessed using the Beck Depression Scale, balance was assessed using the Fullerton Advanced Balance Scale, and quality of life was assessed using the function subscale of the European Organization for the Treatment of Cancer Research Quality of Life Scale.
Results: A total of 17 adults diagnosed with lymphoma were included and 58.8% (n=10) were male and 41.2% (n=7) were female. 82.4% of the patients were receiving chemotherapy treatment. As a result of the study, it was found that female patients had higher pain intensity (women group 2.86±3.39; men group 0.30±0.95) (p=0.039) and depression level (women group 13.00±9.09; men group 4.20±3.33) (p=0.021) compared to male patients. Male patients had better balance (women group 36,57±1,81; men group 38,70±1,89) (p=0.034) and function-related quality of life (women group 77.77±12.70; men group 91.11±5.92) (p=0.028) compared to female patients.
Conclusions: Increased activity pain and depression level in female patients may have negatively affected their function-related quality of life. In addition, the better balance ability of male patients may have contributed to their ability to perform their functions in daily life more independently, thereby improving their function-related quality of life. In addition, gender may be an important factor affecting activity pain, depression, balance and quality of life in patients diagnosed with lymphoma. Therefore,

different needs and different physiotherapy and rehabilitation programs should be developed for individuals with lymphoma according to gender.
Keywords: Gender, Depression, Lymphoma, Pain, Quality of Life.

S014.INVESTIGATION OF THE RELATIONSHIP BETWEEN FRAILTY AND POSTURAL CONTROL, PHYSICAL ACTIVITY, FATIGUE, PHYSICAL PERFORMANCE AND QUALITY OF LIFE IN GYNAECOLOGICAL CANCERS

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Purpose: This study aimed to examine the relationship between frailty, postural control, physical activity level, fatigue, physical performance, and quality of life in gynecological cancers.
Methods: The study included 21 women (mean age: 60.61±15.05 years, BMI: 27.58±6.00 kg/m²) who had completed chemotherapy or radiotherapy at least four weeks prior. Frailty was assessed using the FRAIL Frailty Questionnaire, postural control with the Tecnobody Balance System, physical activity with the International Physical Activity Questionnaire-Short Form, fatigue with the Short Fatigue Questionnaire, physical performance with the Short Physical Performance Battery, and quality of life with the EORTC QLQ-C30. Relationships were analyzed using Spearman's correlation test.
Results: Frailty was negatively correlated with physical performance (rho=-0.671, p=0.001), physical function (rho=-0.670, p=0.001), and role function (rho=-0.556, p=0.009). It was positively correlated with fatigue (rho=0.676, p=0.001) and sleep function (rho=0.620, p=0.03). Frailty also showed a positive correlation with daily activity fatigue (rho=0.517, p=0.016) and general fatigue (rho=0.559, p=0.008). No significant relationship was found between frailty and postural control or physical activity (p>0.05).
Conclusions: This study shows that frailty is moderately associated with physical performance and quality of life subdomains. Increased frailty is linked to lower physical and role function and higher fatigue. These findings highlight the impact of frailty on health and quality of life in gynecological cancer patients, emphasizing the need for interventions to improve physical performance and manage fatigue.
Keywords: Gynaecological Cancers, Frailty, Postural Control, Quality of Life

S015.COMPARISON OF PAIN, FATIGUE, AND KINESIOPHOBIA LEVELS IN BREAST CANCER SURVIVOR WITH HEALTHY CONTROLS: A PILOT STUDY

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Purpose: The aim of this study is to compare levels of pain, fatigue, and kinesiophobia in breast cancer survivors (BCS) with healthy control.
Methods: The study included 14 women who had undergone breast cancer surgery, completed their treatments at least 3 months ago, and 14 healthy women matched by age. To measure pain, fatigue, and kinesiophobia, Pain Disability Index (PDI)Cancer Fatigue Scale (CFS), and Tampa Kinesiophobia Scale (TKS) were used, respectively.

Results: Mean age of BCS was 42.93±7.86 years, and body mass indeks (BMI) was26.16±3.79 kg/m². Mean age of control group was 42.93±7.71 years, and BMI was 28.50±4.45 kg/m². There was no statistically significant difference between two groups in terms of age and BMI ($p>0.05$). When comparing pain levels between the groups, the PDI score of BCS (Mean=9.86±8.09) was significantly higher than the control group (Mean=0±0, $p<0.001$). The CFS score in BCS (Mean=19.57±5.21) was significantly higher than the control group (Mean=9.64±3.85, $p<0.001$). The TKS score in BCS (Mean=43±4.69) was significantly higher than the control group (Mean=32.86±4.73, $p<0.001$).
Conclusions: Many studies have reported that patients may experience side effects such as pain, fatigue, limited shoulder movement, and kinesiophobia during breast cancer treatments. In our study, the severity of symptoms in terms of pain, fatigue, and kinesiophobia was found to be higher in patients compared to healthy controls. Even after completing treatments, individuals with a history of breast cancer should be monitored by physiotherapists and directed towards intervention programs, including exercise and behavioral therapies, to reduce their symptoms.
Keywords: Breast Cancer, Fatigue, Kinesiophobia, Pain

S016.EXAMINATION OF PHYSICAL FITNESS AND MOTOR PERFORMANCE IN PRESCHOOL-AGED PRETERM CHILDREN WITH AND WITHOUT BRONCHOPULMONARY DYSPLASIA

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Purpose: This study aimed to compare the physical fitness and motor performance of preschool-aged preterm children with and without bronchopulmonary dysplasia (BPD).
Methods: A total of 36 preterm children with BPD (n=18) and without BPD (n=18, control group) were included. Physical fitness was assessed using the PREFIT (Assessing FITness in PREschool Children) and motor performance with the Bruininks-Oseretsky Test of Motor Proficiency-2/Short Form (BOT-2/SF).
Results: Gestational age and birth weight (mean±standard deviation) were found to be 27.0±2.58 weeks and 955.89±476.60 grams in children with BPD, and 32.0±2.57 weeks and 1649.72±654.96 grams in the control group, while the assessment age was 64.33±11.21 months and 60.55±9.06 months, respectively. No differences between the groups in the handgrip strength in the both extremities (right/left), the standing long jump test, the 4x10-m run test, and single-leg stance duration for both extremities (right/left) ($p>0.05$). Children with BPD completed fewer laps in the 20-m shuttle test ($p=0.045$). Among the BOT-2/SF sub-scores, while fine motor precision, fine motor integration, manual dexterity, speed and agility, and upper-limb coordination scores showed no differences between the groups ($p>0.05$), bilateral coordination ($p=0.027$), balance ($p=0.011$), and strength ($p=0.047$) scores were lower in children with BPD, and the BOT-2/SF standard score was also lower ($p=0.001$).
Conclusions: Our findings suggest that preschool-aged children with BPD might be at risk in terms of physical fitness and motor performance parameters, and alongside prematurity, children with BPD should also be followed for these developmental parameters and provided with clinical support as needed.
Keywords: Bronchopulmonary Dysplasia, Motor Performance, Physical Fitness, Preterm

S017.IS THERE A DİFFERENCE İN PELVİC FLOOR MUSCLE FUNCTİON BETWEEN CHİLDREN WİTH MONOSYMPTOMATİC AND NON-MONOSYMPTOMATİC NOCTURNAL ENURESİS?

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Purpose: This study aims to compare pelvic floor muscle (PFM) function in children with monosymptomatic nocturnal enuresis (MNE) and non-monosymptomatic nocturnal enuresis (NMNE) before and after treatment, and to explore how these differences impact the duration of pelvic floor muscle rehabilitation (PFMR) sessions.
Methods: The study involved 24 children with MNE and 58 with NMNE, aged 9.38 years on average. Evaluation parameters included PFM strength, activation, and the number of PFMR sessions. PFM strength was assessed via digital palpation and the Modified Oxford Scale, while activation was measured using an EMG-biofeedback device. Assessments took place pre-treatment (PT) and post-treatment (ST). Participants attended 75-minute weekly PFMR sessions under a physiotherapist's guidance.
Results: No significant difference was found in muscle activation and strength between the groups (PT p: 0.26 / ST p: 0.096). In terms of muscle function, the MNE group showed a 100% improvement, while the NMNE group showed a 98.3% improvement. However, the differences between the groups were not statistically significant (PT p: 0.824 / ST p: 0.707). The MNE group had fewer PFMR sessions (8.38) than the NMNE group (10.43) (p: 0.012).
Conclusions: This study shows that children with MNE have similar pelvic floor muscle function to those with NMNE. The findings suggest that PFMR may be an effective and appropriate method for treating MNE and could also provide similar benefits in NMNE.
This study did not receive any financial support, and the authors have no conflicts of interest.
Keywords: Children, Nocturnal Enuresis, Pelvic Floor

S018.COMPARİSON OF THE EFFECTS OF PAİN NEUROSCİENCE EDUCATİON AND BİOMEDİCAL PAİN EDUCATİON İN INDİVİDUALS WİTH PRİMARY DYSMENORRHEA: A RANDOMİZED CLİNİCAL TRİAL

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Purpose: To compare the effects of pain neuroscience education (PNE) or biomedical pain education (BPE) added to exercise training (ET) in primary dysmenorrhea (PD).
Methods: Women with PD were randomly assigned to PNE (n=19) or BPE (n=19) combined with ET groups. Interventions were administered for two menstrual cycles. Individuals were evaluated at baseline, after the interventions, and at 1-month follow-up. The primary outcome measure was menstrual pain intensity, while secondary outcome measures included menstrual stress, pain catastrophizing, central sensitization, and emotional symptoms. Friedman's test and the post-hoc Conover test were utilized for the purpose of intra-group comparisons. The independent groups t-test, the Mann-Whitney U test, or the Fisher-Freeman-Halton exact test were employed for inter-group comparisons. Statistical significance was set at $p \leq 0.05$.

Results: PNE or BPE combined with ET led to a reduction in the levels of all outcome measures ($p<0.05$). In addition, it was found that PNE improved menstrual pain, pain catastrophizing, central sensitization, and emotional symptom level more than BPE after the intervention or at follow-up ($p<0.05$), while menstrual stress decreased at a similar level between the groups ($p>0.05$).
Conclusions: PNE or BPE combined with exercise are effective approaches in the management of menstrual pain and stress in PD, and PNE seems to be more effective in improving menstrual pain, pain catastrophizing, central sensitization and emotional symptom level compared to BPE. Further studies should be performed in which PNE is combined with different physiotherapy approaches in PD.
Keywords: Clinical Trial, Dysmenorrhea, Exercise, Patient Education, Rehabilitation

S019.INVESTİGATİON OF THE EFFECT OF EXTERNAL AND INTERNAL FOCUSED PİLATES EXERCİSE PROGRAM ON LOWER EXTREMİTY PERFORMANCE AND REACTİON TİME İN SEDENTARY YOUNG INDİVİDUALS: A RANDOMİZED CONTROLLED TRİAL

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Purpose: This study aims to evaluate the effects of internal (IO) and external (EO) focus strategies on performance, reaction time, and motor control in Pilates exercises.
Methods: The study is a randomized controlled trial conducted on 56 sedentary individuals aged 20-40 years. Participants were randomly assigned to either the internal focus Pilates (IOP) or external focus Pilates (EOP) groups and performed 50-minute Pilates exercises twice a week for eight weeks. Performance assessment was conducted using squat jump and multiple jump tests, while reflex speed and focus level were measured using the acoustic reaction test.
Results: The findings indicated significant differences between the groups in terms of squat jump height, acoustic reaction time, and the number of jumps in the 30-second jump test ($p<0.05$). Specifically, internal focus strategies were found to be more effective in improving squat jump height, and this effect persisted independently of variables such as age, gender, and BMI. However, the differences in acoustic reaction time and the number of jumps disappeared when adjustments for age, gender, and BMI were made. On the other hand, no significant difference was found between the groups in terms of 30-second jump height and jump test power (W/kg) values ($p>0.05$).
Conclusions: In conclusion, internal focus strategies were shown to provide advantages, particularly in movements requiring muscle control and explosive strength, while external focus was found to be more effective in movement rhythm and endurance. It is recommended that Pilates programs be tailored to meet individual needs.
Keywords: Explosive Power, Focus Strategies, Pilates, Physical Performance, Reaction Time

S020.THE EFFECTIVENESS OF VIRTUAL REALITY BASED REHABILITATION PROGRAM IN ADOLESCENT IDIOPATHIC SCOLIOSIS INDIVIDUALS AFTER POSTERIOR FUSION SURGERY

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Purpose: The aim of this study is to investigate the effectiveness of the virtual reality-based rehabilitation program in individuals with adolescent idiopathic scoliosis (AIS) who have undergone posterior fusion surgery.
Methods: The study included 28 individuals aged 10-18 who had undergone posterior spinal fusion surgery. Participants were randomly divided into Exercise (n=14) and Control (n=14) groups. The exercise group received a virtual reality-based rehabilitation program with Kinect Xbox 360 for 30 minutes, two days a week for 6 weeks. Similar exercises were applied to the control group. Participants' respiratory muscle strength was assessed using the "Micro RPM" device, spinal mobility was assessed using the "Modified Schober Test", physical activity levels were assessed using the pedometer, kinesiophobia status was assessed using the "TAMPA Kinesiophobia Scale", and quality of life was assessed using the "Scoliosis Research Society-22 Survey (SRS-22)".
Results: In the exercise group, a significant improvement was found in MIP, MEP, spinal mobility, physical activity level, TAMPA and SRS-22 values compared to pre-treatment ($p > 0.0001$). In the control group, no statistically significant difference was found in all parameters ($p > 0.05$). When the groups were compared, statistically more improvement was found in the exercise group compared to the control group in MIP ($p<0.029$), spinal mobility ($p<0.048$) and physical activity levels ($p <0.01$).
Conclusions: It was observed that the virtual reality-based rehabilitation program applied after surgery provided additional benefits on respiratory muscle strength, spinal mobility and physical activity levels of individuals with AIS in the postoperative period.
Keywords: Rehabilitation, Scoliosis, Spinal Fusion, Virtual Reality

S021.EVALUATION OF POSTURAL HABITS AND POSTURAL AWARENESS IN UNIVERSITY STUDENTS WITH DIGITAL GAME ADDICTION

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Purpose: This study aims to evaluate the levels of postural habits and postural awareness in university students with digital game addiction.
Methods: During the preliminary screening phase, the Digital Game Addiction Scale for University Students was administered to 259 volunteer university students to determine their addiction levels. Based on the threshold value obtained from the scale, a total of 46 students—23 addicted and 23 non-addicted—were included in the study on a voluntary basis. All participants completed the Postural Habits and Awareness Scale. Data were analyzed using IBM SPSS 25. The normality test showed that the data were normally distributed, and the difference between the two groups was assessed using an independent samples t-test. Effect size was calculated using Cohen's d.
Results: No statistically significant difference was found in postural awareness scores between the addicted and non-addicted groups ($t(43) = 0.113$, $p = 0.911$). The effect size between the two groups was calculated as Cohen's $d = 0.033$, indicating a very small practical effect.
Conclusions: The findings suggest that digital game addiction does not have a significant impact on postural awareness. According to Cohen's d analysis, the effect size of the difference between digital game addiction and postural awareness ($d = 0.033$) is very small, implying no practically meaningful difference. The literature on the relationship between digital game addiction and postural awareness is limited. However, this study observed that addiction levels had a minimal effect on postural awareness.
Keywords: Addictive Behavior, Awareness, Digital Games, Posture, Young adults

S022.COMPARISON OF PAIN INTENSITY AND SOMATOSENSORY FUNCTION İN CHRONIC PAIN PATIENTS WITH AND WITHOUT LYMPHEDEMA AFTER BREAST CANCER SURGERY

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Purpose: The aim of this study was to compare pain intensity and somatosensory function in chronic pain patients with and without lymphedema after breast cancer surgery.
Methods: Fifty female patients with chronic pain after breast cancer surgery (age=53.49±10.93 years; BMI =27.63±4.74 kg/m2) were included in the study. Lymphedema in the patients was assessed by circumference measurement. Pain intensity was assessed by Visual Analog Scale and somatosensory function, pressure pain threshold, was assessed by Digital Pressure Algometer. The pain pressure threshold points were the pectoral muscle, trapezius muscle, lateral trunk of the affected side and quadriceps muscle of the unaffected side. Numerical data were analyzed by Independent Samples t Test. The statistical significance value was determined as $p<0.05$.
Results: Of the fifty chronic pain patients, 38% (n=19) had lymphedema. The evaluation showed that no statistically significant difference in pain intensity between patients with and without lymphedema ($p>0.05$). No statistically significant difference between the two groups in terms of pressure pain threshold (affected side pectoral muscle, trapezius muscle, lateral torso) ($p>0.05$). However, the pressure pain threshold of the quadriceps muscle on the unaffected side was significantly different in favor of the group without lymphedema ($p<0.05$).
Conclusions: This study found that lymphedema did not change overall pain intensity or the pressure-pain thresholds of the pectoral, trapezius, or lateral-trunk muscles on the operated side. However, it lowered the pain threshold in the quadriceps on the unaffected side. Larger studies are needed to clarify lymphedema's impact on chronic pain after breast-cancer surgery.
Key words: Breast Cancer, Chronic Pain, Lymphedema

S023. DOES POSTURAL HYPERKYPHOSIS AFFECT TRUNK AND FOOT TOUCH PERCEPTION?

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Purpose: The aim of this study was to compare foot and trunk touch perception in young individuals with postural hyperkyphosis with healthy individuals.
Methods: Individuals aged 18–25 years with a thoracic kyphosis angle between 20° and 60° were included. Kyphosis angle was measured using a flexicurve, while touch perception was assessed with a monofilament kit. Touch perception was evaluated at seven reference points on both feet: three dorsal (three points at 10%, 50%, and 90% of the length from 15% of the distance between the lateral malleoli and the fibular head to the mid-metatarsals, designated as proximal, middle, and distal points) and four plantar (first metatarsal, medial arch, lateral arch, heel). Additionally, three thoracic reference points (T4, T5, T6) were assessed.

Results: A total of 62 participants (mean age: 22.4±1.87 years) were divided into two groups: postural hyperkyphosis (n=31, kyphosis angle ≥40°, mean 50.7°±3.53) and healthy (n=31, kyphosis angle 20–39°, mean 30.8°±2.72°). No significant differences were found in touch perception at the dorsal foot points, heel, medial arch, or lateral arch ($p>0.05$). However, a significant difference was observed at the first metatarsal of both feet (left: $p=0.004$, right: $p=0.03$). Additionally, touch perception was significantly reduced in the hyperkyphosis group at T4, T5, and T6 ($p<0.001$ for all).
Conclusions: Young subjects with postural hyperkyphosis had decreased touch perception in the forefoot and thoracic region compared to healthy subjects. These results suggest that an increase in postural kyphosis angle may cause a decrease in thoracic touch perception.
Keywords: Kyphosis, Touch Perception

S024. INVESTIGATION OF THE EFFECT OF FOOT POSTURE ON FOOT FUNCTION AND POSTURAL STABILITY IN YOUNG ADULTS – A PILOT STUDY

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Purpose: The foot has many important functions such as maintaining balance, supporting body weight, absorbing impacts from the ground, and foot posture changes may affect foot functions. The aim of this study is to investigate the effect of foot posture on foot functions and postural stability in young adults.
Method: The study included 15 university students with no known musculoskeletal disorders. Foot posture was assessed using the Foot Posture Index (FPI); foot functions using the Foot Function Index-Revised (FFI-R); and postural stability using the GYKO body sway measurement device (Microgait, Italy). Postural stability measurements were performed on the dominant foot. The Mann Whitney-U test was used in the analysis of data.
Results: The mean age of the included individuals was 21.6±0.98 years. When the individuals were grouped according to foot posture (8 normal, 7 pronation), no significant difference was found between the groups in terms of postural stability parameters ($p>0.05$). However, a significant difference was found between the FFI-R activity limitation subscale ($p=0.006$). It was observed that FFI-R activity limitation subscale scores were higher in individuals with pronated foot posture.
Conclusions: It was observed that individuals with pronated foot posture had more difficulty in participating in daily activities, but no significant difference was found between the postural stability parameters of individuals with different foot postures. In the future, the scope of the study will be expanded by conducting a larger case scan and examining the effects of different foot postures on foot function and postural stability.
Keywords: Flatfoot, Foot Function, Postural Balance

S025. THE EFFECT OF UPPER EXTREMITY LYMPHEDEMA DEVELOPING AFTER UNILATERAL BREAST CANCER SURGERY ON THE PRESENCE OF MYOFASCIAL PAIN SYNDROME IN THE NECK AND SHOULDER REGION

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Purpose: In this study, the effect of the presence of lymphedema on the formation of Myofascial Pain Syndrome (MPS) in the neck and shoulder regions of patients who underwent breast cancer surgery was investigated.
Methods: 16 women with lymphedema [age: 54.5±7.0 (41-60) years, height: 162.0±6.1 cm, body weight: 74.4±9.7 kg, body mass index: 24.1±2.2 kg/m²] and 11 women without lymphedema [age: 50.1±10.0 (35-60) years, height: 163.8±6.8 cm, body weight: 64.7±6.7 kg, body mass index: 28.3±3.3 kg/m²] who had undergone unilateral breast cancer surgery were included in the study. The presence of

MPS in the upper trapezius, sternocleidomastoideus, levator scapula, scalenus, supraspinatus, and infraspinatus muscles was assessed based on the criteria defined by Simons et al. (1999).
Results: As a result of the study, when comparing the incidence rate of Myofascial Pain Syndrome (MPS) between individuals who developed lymphedema and those who did not, it was found that the rate was significantly higher in individuals who developed lymphedema ($p<0.005$).
Conclusions: Lymphedema is a chronic disease that leads to many secondary problems after breast cancer surgery, and its effect on the formation of myofascial trigger points is unknown. Our study results showed that the presence of lymphedema increases the risk of MPS in patients who undergo breast cancer surgery. It is important to emphasize that preventing the development of lymphedema may have these side effects as well.
Keywords: Breast Cancer, Myofascial Pain Syndrome, Lymphedema

S026. COMMON PAIN AREAS AND PAIN MANAGEMENT STRATEGIES IN PREMENSTRUAL SYNDROME

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Purpose: Premenstrual Syndrome (PMS) is defined as a set of physical, psychological, emotional, behavioral, and social symptoms experienced by some women of reproductive age during the late luteal phase of menstrual cycle. These symptoms typically resolve within a few days after onset of menstruation. Among these symptoms, pain is one of most common and distressing complaints. This study aims to identify common pain regions in PMS and determine their pain management strategies.
Methods: This study was conducted using a web-based survey. The presence of PMS was assessed using the Premenstrual Syndrome Scale (PMSS), with a score above 110 considered indicative of PMS. A total of 865 women were evaluated, and 582 participants with PMS were included in the study. Participants' demographic information, pain management strategies, and pain regions were assessed.
Results: The mean age of participants was 26.55±6.53 years, and mean body mass index was 22.59±3.82. According to findings, the most frequently reported pain regions among participants were abdominal (64.94%) and perineal (62.19%). These were followed by lumbar(54.63%), anterior thigh (27.14%), chest (17.69%), and head (13.40%). When examining pain management strategies for PMS-related pain, the most commonly used method was heat therapy (50.34%), followed by medical treatment (38.65%) and herbal remedies (32.98%). Additionally, 28% of participants did not use any method, while mental and physical techniques (17.01%), body therapies (5.49%), and lifestyle changes (6.18%) were less preferred strategies.
Conclusions: Among women with PMS, the most common pain regions are concentrated in abdominal and perineal regions, with heat therapy being the most frequently used pain management strategy.
Keywords: Pain, Pain Management, Premenstrual Syndrome

S027. INVESTIGATION OF FACTORS INFLUENCING PHYSICAL ACTIVITY AND FUNCTION IN INDIVIDUALS WITH PRIMARY SJOGREN SYNDROME: PILOT STUDY

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Purpose: The study aimed to examine the relationship between physical activity and physical function and disease activity, fatigue, emotional status, and health perception in individuals with Primary Sjögren Syndrome (PSs).

Methods: 30 individuals with PSs were included in the study. Physical activity levels were assessed with the International Physical Activity Questionnaire (IPAQ) and physical activity barriers were assessed with the Perceived Barriers to Participation in Physical Activity Scale (SPBPA). Grip strength and 30-second sit-to-stand test (30-STS) were used to assess physical function. Disease activity was assessed with the (EULAR) Sjögren Syndrome Patient Reported Index (ESSPRI), fatigue with the Multidimensional Assessment of Fatigue Scale (MAF), emotional status with the Hospital Anxiety and Depression Scale (HAD), and health perception with the Perception of Health Scale (PHS).
Results: No correlation was found between IPAQ and ESSPRI, MAF, HAD-A, HAD-D, and PHS ($p>0.05$). A moderate correlation was found between SPBPA and HAD-A (p: 0.002; r: 0.560), a good correlation with HAD-D ($p<0.001$; r: 0.641), and a very good correlation with MAF ($p<0.001$; r: 0.728). No relationship was found between grip strength and ESSPRI, MAF, HAD-A (anxiety), HAD-D (depression) and PHS ($p>0.05$). A low-moderate correlation was found between 30-STS and MAF (p:0.047; r:0.372), and no relationship was found with other parameters ($p>0.05$).
Conclusions: The study found that fatigue may adversely affect physical function and that both fatigue and emotional disorders may had a negative effect on the perception of barriers to physical activity in individuals with PSs.
Keywords: Fatigue, Physical Functional Performance, Sjogren's Syndrome

S028. CARPAL TUNNEL SYNDROME AND PHYSIOTHERAPY REHABILITATION: A BIBLIOMETRIC APPROACH

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Purpose: This study aims to determine the role of physiotherapy and rehabilitation interventions in carpal tunnel syndrome (CTS) within the Web of Science (WoS) database over the last 10 years and to analyze the number, distribution, and trends of studies conducted.
Methods: Bibliometric data were retrieved from the WoS database by searching all categories between 2015 and 2024. In the literature review, the keywords "Carpal Tunnel Syndrome," "CTS (Carpal Tunnel Syndrome)," "Carpal Tunnel," and "Rehabilitation" or "Physiotherapy" or "Physical Therapy" were used in searches conducted within the abstract and title sections.
Results: In this study, a total of 278 publications met the research criteria. The most common document type was research articles, accounting for 72.66%, followed by review articles with 19.07%. The most frequently studied research area was rehabilitation with 32.26%. A significant proportion of the publications, 66.91%, were indexed in SCI-Expanded. The highest number of publications was recorded in 2024 with 14.39% and in 2022 with 14.03%. The United States was the leading country in terms of the number of publications, representing 17.92%. According to the VOSviewer analysis, the most frequently used keyword was "Carpal Tunnel Syndrome," followed by "Physiotherapy" and "Manual Therapy." Citation network and author collaboration analyses conducted with VOSviewer revealed that the most cited and academically influential author in the CTS field was "Fernández-de-las-Peñas C."
Conclusions: The rising number of publications shows growing scientific interest in CTS, emphasizing its multidisciplinary relevance in rehabilitation. Future studies in databases like Scopus and PubMed may further enrich the literature.
Keywords: Bibliometric Analysis, Carpal Tunnel Syndrome, Physiotherapy, Rehabilitation, Web of Science (WoS)

S029. EVALUATION OF LOWER EXTREMITY TACTILE SENSATION WITH MONOFILAMENT TEST IN HEALTHY YOUNG ADULTS

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Purpose: The Semmes-Weinstein monofilament test is widely used to identify sensory losses due to peripheral nerve damage and is particularly valuable for early diagnosis in conditions such as neuropathy. The aim of this study was to assess tactile sensation in the lower extremities using the monofilament test in individuals with no history of disease or surgery.
Methods: A total of 121 participants were included based on criteria set by the Physiotherapy and Rehabilitation Department at Istanbul Arel University. Informed consent was obtained. Monofilament testing was performed three times on 10 lower extremity regions with participants' eyes closed and in various positions. Thicker filaments were used if the stimulus was not perceived. Tested areas included the proximal, lateral, mid, and posterior thigh; proximal and distal lateral leg; medial leg; great toe tip; 1st–2nd metatarsal interval; and 5th metatarsal.
Results: Males had significantly higher values at the dominant great toe tip than females ($p=0.010$; $p<0.05$). In all other regions, females showed significantly higher values on both dominant and non-dominant sides. A weak but significant correlation was found between BMI and non-dominant great toe tip values ($r=0.280$; $p=0.002$; $p<0.01$). Reference values were 15.05±54.07 to 2.01±0.39 for females, and 18.56±57.11 to 1.76±0.27 for males.
Conclusions: This study identified normative monofilament values for lower extremity sensation in healthy young adults. Sensation varied across skin regions, increasing from proximal to distal. These values may aid in assessing somatosensory abnormalities. Larger studies are needed for validation.
Keywords: Tactile Sensation, Lower Extremity, Monofilament Test

S030. RELATİONSHİP BETWEEN NECK PAİN, PAİN KNOWLEDGE, SMARTPHONE ADDİCTİON, AND NECK AWARENESS İN PHYSİOTHERAPY STUDENTS: A PİLOT STUDY

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Purpose: Study aimed to investigate the relationship between neck pain, smartphone addiction, pain knowledge, cervical extensor muscle endurance, and neck awareness in physiotherapy students at Karabuk University.
Methods: 31 students with neck pain ≥3 according to the Numerical Pain Scale (NPRS) were included in the study. Smartphone addiction using the Smartphone Addiction Scale-Short Form (SAS-SF), pain knowledge using the Revised Neurophysiology of Pain Questionnaire (rNPQ), and neck awareness using the Fremantle Neck Awareness Questionnaire (FreBFA). Cervical extensor muscle endurance was measured by recording the duration participants could maintain a neutral head position while in a prone position with a 2 kg sandbag placed at ear level. Pearson and Spearman correlation analyses were used for data analysis.
Results: A negative correlation was found between neck pain intensity and cervical extensor muscle endurance ($r=-0.628$, $p<0.001$). The rNPQ score was negatively correlated with SAS-SF ($r=-0.533$, $p=0.002$) and FreBFA ($r=-0.564$, $p=0.001$), while showing a positive correlation with class level ($r=0.398$, $p=0.027$). Smartphone addiction and neck awareness were positively correlated ($r=0.399$, $p=0.026$). Class level was positively correlated with cervical extensor endurance ($r=0.477$, $p=0.007$) and negatively correlated with neck awareness ($r=-0.481$, $p=0.006$).
Conclusion: Study suggests that as neck pain severity increases, cervical extensor muscle endurance decreases; as pain knowledge increases, smartphone addiction decreases and neck awareness improves. This may be related to prolonged study habits leading to postural deterioration. These findings

emphasize the importance of pain neuroscience and postural awareness education for physiotherapy students and should be further validated with larger sample sizes.
Keywords: Neck Awareness, Neck Pain, Pain Education, Pain Knowledge, Smartphone Addiction

S031. EFFECTS OF CORE MUSCLE ENDURANCE ON PAIN, POSTURE AND UPPER EXTREMITY FUNCTION IN UPPER STRINGS PLAYERS

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Purpose: The aim of this study is to investigate the effect of core muscle endurance on pain, posture and upper extremity function in musicians playing upper strings instruments (violin and viola).
Methods: 31 participants aged 18-35 were included in the study. Pain was assessed with the McGill-Melzack Pain Questionnaire, posture was assessed with the Posture Screen Mobile application, upper extremity functions were assessed with the Turkish version of Disability of Arm, Shoulder and Hand Questionnaire, and core muscle endurance was assessed with the McGill Endurance Tests. Evaluations were made once. The relationship between the evaluated parameters was compared statistically using Pearson and Spearman correlation.

Results: Musicians with weak core muscle endurance were found to have worse pain status, upper extremity function and posture ($p<0.05$).
Conclusions: In light of the findings from the study, it is thought that increasing core muscle endurance may contribute to reducing pain, functional development in the upper extremity and postural improvement in musicians playing upper strings instruments (violin and viola).
Keywords: Core Endurance, Function, Pain, Posture, String Musicians

S032. INVESTIGATION OF THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY, HEALTH LITERACY, QUALITY OF LIFE, AND PERCEIVED SOCIAL SUPPORT IN CANCER PATIENTS UNDERGOING CHEMOTHERAPY

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Purpose: This study investigates how physical activity relates to health literacy, quality of life, and perceived social support in cancer patients undergoing outpatient chemotherapy.
Methods: A total of 70 cancer patients (64% female, 36% male) with a mean age of 54.5±9.4 years participated in the study. The distribution of diagnoses was as follows: 29% gastrointestinal system cancers, 29% breast cancer, 21% genitourinary cancers, 16% lung cancer, 3% brain tumors, and 2% lymphoma. Hand grip strength was assessed using a dynamometer; perceived social support with the "Multidimensional Scale of Perceived Social Support (MSPSS)"; quality of life with the "European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Cancer 30 (EORTC QLQ-C30)"; physical activity level with the "International Physical Activity Questionnaire (IPAQ)"; and health literacy with the "Turkish Health Literacy Scale-32 (TSOY-32)."
Results: A moderate correlation was found between IPAQ and the TSOY-32 sub-parameters of disease prevention ($r=0.504$, $p<0.001$) and treatment and services ($r=0.438$, $p<0.001$). A moderate relationship was also detected between functional level ($r=0.413$, $p<0.001$) and symptom control ($r=0.415$, $p<0.001$) in the EORTC QLQ-C30 sub-parameters. A low-level correlation was found with hand grip strength ($r=0.285$, $p=0.017$). However, no significant relationship was found between perceived social support and IPAQ ($r=0.217$, $p=0.07$).

Conclusions: This study found that physical activity is significantly linked to health literacy, symptom control, and quality of life in cancer patients on outpatient chemotherapy, but not to perceived social support. The results highlight the value of multidisciplinary approaches promoting activity and health literacy.
Keywords: Cancer, Health Literacy, Physical Activity, Social Support, Quality of Life

S033. EFFECTS OF AEROBIC AND RESISTANCE EXERCISE TRAINING IN INDIVIDUALS WITH URINARY INCONTINENCE AND ERECTILE DYSFUNCTION AFTER RADICAL PROSTATECTOMY: A PILOT RANDOMIZED CONTROLLED STUDY

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Purpose: Radical prostatectomy is the gold standard treatment for individuals diagnosed with localized prostate cancer and a life expectancy of 10 years or more. Urinary incontinence (UI) and erectile dysfunction (ED) are important and common complications of RP. The aim of this study was to investigate the additional effects of aerobic and resistance exercise trainings on pelvic floor muscle training (PFMT) in individuals with UI and ED after RP in a randomized controlled design.
Methods: 19 individuals (intervention group, n=9; control group, n=10) were included in the study. Patient education and PFMT were given to individuals in the control group, while aerobic and resistance exercise trainings were additionally given to the intervention group. Assessments were performed at the baseline and after 12 weeks of intervention. The International Consultation on Incontinence Questionnaire-Short Form and the International Index of Erectile Function (IIEF-15) were used for primary outcome measures. Secondary outcome measurement tools were the International Incontinence Questionnaire-Male Lower Urinary Tract Symptoms, 1-hour pad test, penile length and peripheral muscle strength measurements, 6-min walking test (6-MWT) and Depression-Anxiety-Stress Scale.
Results While IIEF-15, 6 MWT and peripheral muscle strength values were higher in the intervention group ($p< 0.05$), no difference was found between the groups in terms of other outcome measurements ($p> 0.05$).
Conclusions: In individuals with UI and ED complaints after RP, aerobic and resistance exercise training given in addition to patient education and PFMT improves erectile function, aerobic and muscular capacity more, but does not seem to provide additional benefit in terms of lower urinary tract symptom severity, penile length and emotional symptoms. The sample size of the study should be increased and further results should be presented.
Keywords: Endurance Training, Erectile Dysfunction, Exercise Training, Men's Health, Urinary Incontinence,

S034. INVESTIGATION OF THE RELATIONSHIP BETWEEN KINESIOPHOBIA AND QUALITY OF LIFE IN INDIVIDUALS WITH ADVANCED ASTHMA

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Purpose: Biologic agents are utilized as a new treatment option in advanced asthma patients who do not respond to conventional treatments. Our aim was to investigate the relationship between kinesiophobia and quality of life levels in advanced asthma patients using biological agents.

Methods: Fifteen individuals with advanced asthma (11F, 4E, 46.06±14.73 years) participated in the study. Kinesiophobia was assessed with the Tampa Scale for Kinesiophobia and quality of life with the Asthma Quality of Life Questionnaire.
Results: The total score of Tampa Scale for Kinesiophobia was 37.13±5.74 and the total score of the Asthma Quality of Life Questionnaire was 4.69±1.16. The total score of Tampa Scale for Kinesiophobia was negatively correlated with the symptoms, activity limitation, emotional function, environmental stimuli subscales and total score of the Asthma Quality of Life Questionnaire (r=-0.723, p=0.002; r=-0.818, p<0.001; r=-0.747, p=0.001; r=-0.630, p=0.012; r=-0.751, p=0.001, respectively).
Conclusions: When the quality of life of individuals with advanced asthma is to be improved, the level of kinesiophobia should be taken into account. Managing kinesiophobia will also contribute to patients' quality of life.
Keywords: Asthma, Kinesiophobia, Quality of Life

S035. INVESTIGATION OF THE IMPACT OF LYMPHEDEMA SEVERITY ON FUNCTIONALITY, ANXIETY-DEPRESSION, AND QUALITY OF LIFE IN PATIENTS WITH LOWER LIMB LYMPHEDEMA

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Purpose: Lymphedema is a chronic, progressive condition characterized by the accumulation of protein-rich fluid in the interstitial space. Lower limb lymphedema (LLL) may develop as primary lymphedema due to congenital or hereditary lymphatic anomalies or as secondary lymphedema resulting from surgery, radiotherapy, malignancies, trauma, infections, or venous insufficiency (2-3). This study aimed to assess the objective severity of edema in individuals with LLL and examine its effects on functionality, anxiety, depression, and quality of life.
Methods: This cross-sectional study included 51 individuals diagnosed with LLL (mean age: 51.88±15.49 years, BMI: 30.37±7.38 kg/m²). Edema severity was measured using volumetry, circumferential assessment, and bioimpedance spectroscopy. Functionality, quality of life, and psychosocial impact were evaluated with the "Lower Extremity Functional Scale (LEFS)", "the Hospital Anxiety and Depression Scale (HADS)", and "the Lymphedema Functioning, Disability, and Health Questionnaire (Lymph-ICF LL)". Pearson correlation analysis was used to examine relationships between variables.
Results: Edema severity showed significant correlations with functionality (r =-0.42, p =0.027), anxiety (r =0.46, p= 0.011) and depression (r = 0.64, p=0.017). Additionally, moderate to strong correlations were observed between edema severity and Lymph-ICF LL subdomains (r =0.41-0.69, p< 0.05).
Conclusions: In individuals with LLL, increased lymphedema severity is associated with reduced functionality, lower quality of life, and higher levels of anxiety and depression. These findings highlight that lymphedema is not only a physical condition but also has significant psychosocial consequences. Future research should focus on long-term assessments across different lymphedema stages and evaluate the effectiveness of personalized rehabilitation approaches.
Keywords: Anxiety And Depression, Functionality, Lower Limb Lymphedema, Oedema Severity, Quality of Life

S036. ARTIFICIAL INTELLIGENCE LITERACY AND ITS ASSOCIATED FACTORS AMONG PHYSIOTHERAPY AND REHABILITATION STUDENTS

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Purpose: As artificial intelligence literacy (AI literacy) becomes increasingly important in an era of rapid technological advancement, identifying the factors influencing AI literacy is essential. The aim of this study is to determine the AI literacy level and investigate the factors associated with AI literacy among physiotherapy and rehabilitation students.
Methods: This single-center, cross-sectional study included 154 participants with a mean age of 25.30 ± 6.92 years. AI literacy, attitude towards AI, reading habits, academic achievement, internet addiction, and smartphone addiction were assessed using the *'Artificial Intelligence Literacy Scale*,' '*General Attitude Toward Artificial Intelligence Scale,' 'Reading Habits Short Form*,' students' latest GPA, *'Internet Addiction Scale Short Form*,' and *'Smartphone Addiction Scale*,' respectively. *Spearman correlation analysis* examined the relationships between AI literacy and other parameters
Results: The mean AI Literacy Scale score was 55.79 ± 11.11, indicating a moderate level of AI literacy. AI literacy exhibited a moderate correlation with attitude towards AI (r = 0,459/p < 0.001) and weak correlations with reading habits (r = 0.258/p = 0.001) while it showed no significant correlation with internet addiction (r =-0,095 /p = 0.242) smartphone addiction (r 0,054= /p = 0.506), or academic achievement (r =-0,016 /p = 0.845). "
Conclusions: AI literacy is associated with attitude towards AI and reading habits, regardless of academic achievement, internet addiction, and smartphone addiction. This study provides guidance on strategies to enhance AI literacy in the education and health sectors.
Keywords: Academic Achievement, Artificial Intelligence, Attitude, Internet Addiction Disorder, Reading

S037. INVESTIGATION OF THE RELATIONSHIP BETWEEN REACTION TIME, ACTIVE JOINT MOVEMENTS AND HAND PERFORMANCE IN CHILDREN WITH BRACHIAL PLEXUS BIRTH INJURY

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Purpose: Brachial plexus birth injury (BPBI) is a multiple peripheral nerve injury that occurs during delivery. It has been shown that children with BPBI have decreased muscle strength, sensory disturbances, activity and participation limitations, but reaction time has not been studied. The aim of the study was to investigate the relationship between reaction time (RT), active joint movements and hand performance in children with BPBI.
Methods: This study was conducted at Hacettepe University. Ethics committee approval was obtained before the study began. Forty-five children with upper trunk injuries were included in the study. RT was assessed with the Blazepod and mean reaction times were recorded. Active joint movements were evaluated with the Active Movement Scale (AMS) and the sum of all joint movements was recorded as the total score. Hand performance was evaluated with the Box and Block test (BBT). Since the data were not normally distributed, the relationships between variables were examined using Spearman's correlation coefficient.
Results: There was a weak negative correlation (p=0.01, r= -0.36) between AMS score and RT; a moderate negative correlation (p<0.01, r= -0.67) between BBT score and RT. There was a moderate correlation (p<0.01, r=0.54) between AMS score and BBT score.
Conclusions: Our study showed a moderate correlation between hand performance and both reaction time and total AMS score, but the correlation coefficient between performance and reaction time was higher. This suggests that approaches to improve reaction time should be included in treatment programs to increase success in activities requiring performance in BPBI.
Keywords: Birth Injuries, Brachial Plexus, Reaction Time

S039. THE RELATIONSHIP BETWEEN SYMPTOM SEVERITY AND AUTONOMIC FUNCTION, PSYCHOLOGICAL STATUS AND QUALITY OF LIFE IN INDIVIDUALS WITH ERECTILE DYSFUNCTION: A PILOT STUDY

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Purpose: It was planned to investigate the relationship between symptom severity and autonomic function, psychological status and quality of life in individuals with erectile dysfunction (ED).
Methods: Men diagnosed with ED (n=30, age=45.17±8.20 years, body mass index=26.79±4.47 kg/m2) were included in the study. ED symptom severity was assessed with the International Index of Erectile Function (IIEF-5), autonomic functions with the Composite Autonomic Symptom Score (COMPASS-31), psychological status with the Depression Anxiety Stress Scale (DASS-21) and quality of life with the Quality of Life-Short Form Questionnaire (SF-36). Pearson correlation test was used for statistical analysis.
Results: A significant relationship was found between IIEF-5 score and DASS-21-Depression (r=-0.375, p=0.041) and SF-36-Physical health score (r=0.366, p=0.046). However, no significant relationship was observed between IIEF-5 score and DASS-21-Anxiety (r=-0.119, p=0.532), DASS-21-Stress (r=-0.251, p=0.182) and SF-36-Physical mental score (r=0.07, p=0.714). Also, no significant relationship was found between IIEF-5 score and COMPASS-31 score (r=-0.021, p=0.912).
Conclusions: It was found that psychological status and quality of life worsened with increasing ED symptom severity. However, there was no relationship between ED symptom severity and autonomic functions. Therefore, it is important to evaluate the parameters related to psychological status and quality of life in individuals with ED.
Keywords: Autonomic Function, Erectile Dysfunction, Psychological Status, Quality of Life

S040. INVESTIGATION OF THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY LEVEL, DEPRESSION, ANXIETY AND FEAR OF CHILDBIRTH DURING PREGNANCY

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Purpose: The aim of this study was to determine the relationship between physical activity level, depression, anxiety and fear of childbirth during pregnancy.
Methods: This study was performed on healthy pregnant women over the age of 18. Sociodemographic, clinical and obstetric characteristics of pregnant women were evaluated using a standardized questionnaire. The Pregnancy Physical Activity Questionnaire (PPAQ), the Hospital Anxiety and Depression Scale (HADS), and the Wijma Birth Anticipation/Experience Questionnaire (W-DEQ) A Version was applied. Pearson-correlation was used to statistical analysis.
Results: The study included 56 healthy pregnant women (Age: 28.16 ± 4.99 years; Height: 163.23 ± 11 cm; Weight: 76.00 ± 11.6 kg; Body mass index: 28.79 ± 4.1 kg/m^2). 15 (26.8%) of the pregnant women were in the first trimester, 11 (19.6%) in the second trimester and 30 (53.6%) in the third trimester. 62.5% of the pregnant women had undergraduate or postgraduate education levels. There was a significant moderate negative correlation between the PPAQ-total activity score and the HADS-D score (r=-0.409, p=0.002). There was a moderately significant positive correlation between the HADS-A score and the W-DEQ-A total score (r=0.423, p=0.001). However, no significant correlation was found between the other parameters (p>0.05).
Conclusions: As the total physical activity level increased, depression levels of pregnant women decreased. In addition, as the anxiety level decreased, the level of fear of childbirth decreased. Supporting pregnant women to increase their physical activity levels during pregnancy may play important roles in terms of decreasing their anxiety levels and indirectly their anxiety about childbirth.

Key words: Exercise, Healthy Lifestyle, Pregnancy

S041. INVESTIGATION OF THE EFFECTIVENESS OF PELVIC FLOOR PHYSIOTHERAPY COMBINED WITH SEXUAL THERAPY IN THE TREATMENT OF VAGINISMUS

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Purpose: Vaginismus is a sexual dysfunction characterized by difficulty in sexual intercourse due to spasm of the pelvic floor and adductor muscles. This study aimed to evaluate the effect of pelvic floor physiotherapy and sexual therapy combination (PTF-CT) on sexual function, cognition and muscle activity for vaginal penetration in individuals diagnosed with vaginismus.
Methods: The study included 44 women diagnosed with vaginismus between the ages of 20-45. 22 participants in the intervention group received PTF-CT, and 22 participants in the control group received only sexual therapy. All participants were administered twice a week for 6 weeks. Participants were assessed with the Female Sexual Function Index (FSFI), Vaginal Penetration Cognition Questionnaire (VPCQ), and surface electromyography (sEMG). In the PTF-CT protocol; sexual therapy, pelvic floor muscle training, biofeedback, electrotherapy, manual therapy, breathing and stretching exercises were applied gradually.
Results: In the intervention group, more improvement was observed in the mean, mode and minimum sEMG values of the pelvic floor and adductor muscles after treatment compared to the control group ($p<0.05$). Significant improvement was noted in both groups in FSFI and VPCQ scores ($p<0.001$); however, no significant difference was found between the groups ($p>0.05$).
Conclusions: The positive effects of PTF-CT combination on sexual function, vaginal cognition and muscle activation in the treatment of vaginismus were determined. As a result of the study, it was concluded that the combined treatment can manage psychological and physiological factors together and is more effective.
Keywords: Electromyography, Sexual Dysfunction, Sexual Therapy, Pelvic Floor Physiotherapy, Vaginismus

S042. INVESTIGATION OF THE EFFECTIVENESS OF MULTICOMPONENT PELVIC FLOOR PHYSIOTHERAPY PROGRAM IN THE MANAGEMENT OF FECAL INCONTINENCE IN CHILDREN WITH ANORECTAL MALFORMATIONS: PRELIMINARY STUDY

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Purpose: This study aimed to evaluate the long-term efficacy of a multicomponent pelvic floor physiotherapy (MPFPT) program in managing fecal incontinence (FI) following anorectal malformation (ARM) surgery.
Methods: Seven pediatric patients with high-type ARM (age: 7.29 ± 2.05) were included in the study. They participated in a 12-week MPFPT program consisting of one 90-minute session per week. The MPFPT included dynamic neuromuscular stabilization (DNS) techniques, biofeedback-assisted pelvic floor muscle training, manual therapy, transcutaneous posterior tibial nerve neuromodulation, sensory education, and patient training. Assessments included the Rintala Bowel Function Score(RBS), EMG measurement of pelvic floor resting muscle activity (PICA), weekly symptom diaries, and exercise logs. Patient satisfaction and ease of defecation were evaluated using the Visual Analog Scale (VAS). Pre- and post-treatment differences were analyzed using the Wilcoxon Signed-Ranks test.

Results: Significant post-treatment decreases were observed in EMG PICA and FI frequency (Z=-2.371, p=0.018 and Z=-2.388, p=0.017, respectively), along with significant improvements in ease of defecation and RBS values (Z=-2.414, p=0.016 and Z=-2.375, p=0.018, respectively). Family-reported patient satisfaction on the VAS averaged 9.14 cm. At the six-month follow-up, improvements in EMG PICA, FI frequency, and ease of defecation remained significant (Z=-2.371, p=0.018; Z=-2.379, p=0.017; Z=-2.379, p=0.017, respectively).
Conclusions: MPFPT appears effective in controlling symptoms and improving quality of life in children with ARM-related FI. We believe that incorporating MPTF into the treatment program supports the patient's recovery process and enhances the quality of life in controlling FI post-surgery. However, further validation through randomized controlled trials with larger sample sizes is necessary.
Keywords: Anorectal Malformation, Fecal Incontinence, Pelvic Floor, Rehabilitation

S043. HOW DOES LOWER EXTREMITY LYMPHEDEMA AFFECT PROPRIOCEPTION?

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Purpose: The diminished contribution of proprioceptive receptors adversely affects the protective reflex mechanisms of muscles, leading to decreased motor control and an increased risk of injury, which in turn exacerbates the severity of lymphedema. Studies evaluating proprioception in patients with lymphedema are quite limited. Therefore, the aim of this study is to investigate the effect of lower extremity lymphedema on proprioception.
Methods: In this study, patients with stage 2 lower extremity lymphedema (n=15) in the Phase 2 of Complex Decongestive Physiotherapy were evaluated along with age- and gender-matched healthy adults (n=15). The proprioception of the hip, knee, and ankle joints of the participants was assessed using the Joint Position Sense Test. Statistical analyses were performed using SPSS 22.0, and the significance level was set at $p<0.05$.
Results: The evaluations revealed that the joint position sense errors in hip flexion (9.67±2.80; p=0.001) and knee flexion (9.67±3.27; p=0.001) were significantly higher in patients with lower extremity lymphedema compared to healthy individuals. However, ankle dorsiflexion joint position sense errors (6.07±3.4; p=0.10) were found to be similar between the two groups.
Conclusions: The study demonstrated that proprioception is impaired, particularly in the hip and knee joints, in patients with lower extremity lymphedema. The deterioration of joint position sense can lead to balance impairments and an increased risk of injuries. These injuries may cause damage to ligaments and sensory nerve fibers, creating a vicious cycle that further exacerbates proprioceptive deficits. Our study highlights the importance of proprioception-focused approaches in treatment strategies.
Keywords: Lymphedema, Proprioception

S044. DOPPLER-BASED EVALUATİON OF AEROBİC EXERCİSE AND YOGA TRAİNİNG İN PRİMARY DYSMENORRHEA: A RANDOMİZED CLİNİCAL STUDY

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Purpose: The aim of this study is to compare the effects of supervised aerobic exercise (AE) and yoga exercise (YE) on menstrual pain, menstrual distress, analgesic usage, anxiety-depression level, and uterine blood flow in Primary Dysmenorrhea (PD).
Methods: Forty individuals diagnosed with PD, with a Visual Analog Scale (VAS) pain score of ≥4 cm in the last six months, were included. Menstrual pain, menstrual distress, anxiety, and uterine blood flow were assessed using VAS, the Menstrual Distress Questionnaire, Depression Anxiety Stress Scale-Short Form (DASS-21), and Doppler ultrasound, respectively. AE, based on the Karvonen protocol, was

performed on a treadmill three times weekly for eight weeks, with progressive intensity. YE included breathing exercises, Suryanamaskar, asanas, and relaxation techniques, following the same schedule. Outcomes were assessed before and after interventions, analyzed using repeated-measures ANOVA and independent t-tests.
Results: Both groups showed significant improvements in all outcome measures over time ($p<0.05$). The YE group demonstrated greater reductions in analgesic use and uterine artery indices ($p<0.05$), but between-group differences were not statistically significant.
Conclusions: Both AE and YE effectively reduced menstrual pain, distress, analgesic use, anxiety, and uterine artery resistance. These exercises can serve as alternative non-pharmacological approaches for PD management, though further long-term studies are needed.
Keywords: Aerobic Exercise, Doppler Ultrasound, Menstrual Pain, Primary Dysmenorrhea, Yoga
Clinical trial number: NCT05623085

S045. EXAMİNİNG THE ATTİTUDES OF PHYSİOTHERAPİSTS İN TURKEY TOWARDS ARTİFİCİAL INTELLİGENCE

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Purpose: This study aims to examine the attitudes of physiotherapists in Turkey towards artificial intelligence (AI).
Methods: Conducted with support from TÜBİTAK 2209-A, the study was carried out between March 1, 2024, and February 1, 2025. A power analysis determined the sample size as 266, and the study was completed with 272 participants. Data were collected via Google Forms, with participants reached through social media announcements. A sociodemographic information form assessed gender, age, education level, work status, years of experience, and knowledge of AI in healthcare. The General Attitudes Towards AI Scale was used to evaluate participants' attitudes.
Results: The largest age group was 26-30 years (44.1%), followed by 21-25 years (28.3%). Women (65.8%) were the majority, while men constituted 34.2%. Scores for the Positive Attitude subscale ranged from 16 to 60, with a mean of 42.28±10.96. The Negative Attitude subscale scores ranged from 8 to 40, with a mean of 26.62±7.02. Internal consistency was $\alpha = 0.947$ for Positive Attitude and $\alpha = 0.905$ for Negative Attitude, indicating high reliability.
Conclusions: Findings suggest that physiotherapists generally have a positive attitude towards AI. However, female participants had lower positive attitude scores than males ($p=0.019$). A weak negative correlation was found between age and positive attitude scores ($p=0.024$), as well as work experience and positive attitude ($r=-0.147$, $p=0.015$).
Keywords: Artificial İntelligence, Attitude Towards AI, Physiotherapy, Rehabilitation.

S046. EFFECTS OF SIMULATION-BASED TRAINING ON LEARNING SATISFACTION AND SELF-CONFIDENCE IN MUSCULOSKELETAL PHYSIOTHERAPY TRAINING

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Purpose: Today, the integration of simulation into education has been accepted as an important educational strategy used in physiotherapy education, as in other healthcare disciplines. The aim of our study was to investigate the effect of the integration of a simulation-based educational approach into musculoskeletal case solving on the satisfaction and self-confidence of senior physiotherapy undergraduate students.

Methods: 50 senior undergraduate physiotherapy students were included in the study, and simulation training, including 6 different musculoskeletal case solutions, was applied to the students once a week for six weeks, and each training session was 1 hour. The satisfaction and self-confidence levels of the students were evaluated with the Student Satisfaction and Self-Confidence in Learning Scale and their feedback on the simulation design was evaluated with the Simulation Design Scale.
Results: The results of Student Satisfaction and Self-Confidence in Learning Scale (mean score 49.54 ± 5.12) and Simulation Design Scale (mean score 83.90 ± 7.89) were found to be high. In addition, a strong positive correlation was found between the Student Satisfaction and Self-Confidence in Learning Scale and the Simulation Design Scale results ($r=0.74$, $p<0.001$).
Conclusions: The integration of the simulation approach into musculoskeletal case solution in physiotherapy education positively affected the satisfaction and self-confidence of undergraduate students in the learning process. In addition, when students are educated with an educational approach they are satisfied with, their self-confidence increases. Considering its positive effects on students, this approach can offer an option that can be used to enrich physiotherapy education and curriculum.
Keywords: Education, Physiotherapy, Satisfaction, Self-confidence, Simulation

S047. THE IMPACT OF INTERPROFESSIONAL COLLABORATION DEVELOPMENT COURSE PHYSIOTHERAPY ANALYSIS SESSIONS ON MEDICAL STUDENTS

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Purpose: This study aims to evaluate the impact of physiotherapy and analysis sessions implemented within the scope of the interprofessional collaboration development course on the learning processes and professional collaboration skills of third-year medical students at Hacettepe University.
Methods: A total of 194 students in the spring semester of 2024, third-year medical students, enrolled participated in the study. The analysis sessions were conducted interactively using a video discussion method. The students' experiences from the sessions were evaluated using the "Analysis Experience Scale," and the obtained data were numerically analyzed using descriptive statistical methods.
Results: More than half of the students (51.5%) stated that the analysis sessions helped them establish connections in their learning process by selecting "strongly agree." Similarly, 49.5% expressed that the analysis sessions contributed to the simulation experience. However, 3.6% of students reported negative feedback with "strongly disagree," while 2.1% selected "disagree." The effect of the facilitator in supporting the team's behaviors varied due to the indecision of some students.
Conclusions: In the field of physiotherapy and rehabilitation, analysis sessions may serve as a valuable tool for improving patient-centered care practices. Such sessions can contribute to enhancing patient management and team coordination. This study indicates that analysis sessions support the development of medical students' interprofessional communication and collaboration skills. However, the necessity of structuring the facilitator's role more effectively has emerged. Therefore, it is recommended to improve the content of the sessions and implement strategies that encourage more student interaction.
Keywords: Interprofessional Relations, Physical Therapist, Physical Therapy Speciality, Problem-Based Learning

S048. THE EFFECTS OF CLASSICAL MASSAGE AND PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION TECHNIQUES ON MUSCLE TENSION, PAIN, FUNCTIONALITY AND QUALITY OF LIFE IN PATIENTS WITH CHRONIC NONSPECIFIC NECK PAIN

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Purpose: This study aimed to compare the effects of classical massage and proprioceptive neuromuscular facilitation (PNF) techniques on muscle tension, pain level, functional status, and quality of life in patients with chronic nonspecific neck pain.
Methods: Forty-three patients with chronic non-specific neck pain were included in the study. The patients were divided into three groups: the massage group (n=14), the PNF group (n=15) and the control group (n=14). All groups received conventional physiotherapy for 6 weeks. The massage and PNF groups used related techniques. Pain, muscle tension, range of motion, function and quality of life were assessed before and after the study.
Results: All groups showed improvements ($p<0.05$) in pain intensity, muscle tension, range of motion and functionality after treatment. The massage and PNF groups showed significant improvements ($p<0.05$). Significant decreases in pain intensity at rest and during activity, cervical paravertebral muscle tension, levator scapula and trapezius muscle tension were observed in the massage and PNF groups ($p<0.05$). Significant increases in range of motion, flexion, extension and lateral flexion were found in the massage and PNF groups ($p<0.05$). There were no differences between the groups ($p>0.05$).
Conclusions: Classical massage and PNF techniques are beneficial for patients with chronic neck pain. These techniques are beneficial if used alongside conventional physiotherapy.
Keywords: Classical Massage, Muscle Tension, Neck Pain, Proprioceptive Neuromuscular Facilitation, Quality of Life

S049. DOES FORWARD HEAD POSTURE AFFECT CRANIOFACIAL PAIN-RELATED DISABILITY AND MANDIBULAR FUNCTION SEVERITY IN YOUNG ADULTS?

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Purpose: Forward head posture is a common disorder in young adults marked by head displacement. It can cause craniofacial pain by disrupting cervical biomechanics. While neck pain's impact on cervical biomechanics has been studied, its influence on craniofacial pain and mandibular function is underexplored. This study compares craniofacial pain, mandibular dysfunction, and neck disability in those with and without forward head posture.
Methods: Ninety-two participants aged 18 to 34 were included in the study, divided into two groups: without FHP (n = 50) and with FHP (n = 42). Demographic data were recorded. Craniofacial pain and disability were assessed using the Craniofacial Pain and Disability Inventory (CFPDI), mandibular dysfunction was evaluated with the Mandibular Function Impairment Questionnaire (MFIQ), and neck disability was measured using the Neck Disability Index (NDI). FHP was determined by measuring the craniovertebral angle through lateral photographs analyzed with ImageJ software.
Results: The participants' mean age was 24.37±3.19 years. Comparisons showed that individuals with FHP had significantly higher craniofacial pain and disability scores ($p<0.001$) and mandibular dysfunction scores ($p<0.001$) than those without FHP. No significant difference in neck disability scores was found ($p=0.427$). Gender distribution and demographics were similar between groups ($p>0.05$).
Conclusions: Our results show that FHP increases craniofacial pain and mandibular dysfunction but does not affect neck disability. These findings stress the need for early diagnosis and intervention, suggesting ergonomic adjustments, posture training, and tailored exercise programs as effective strategies. Future studies with larger samples will improve understanding of these effects.
Keywords: Craniofacial Pain, Forward Head Posture, Pain, Mandibular Dysfunction

S050. RELATIONSHIP BETWEEN PELVIC FLOOR MUSCLE CONTRACTION ASSESSMENT METHODS IN HEALTHY WOMEN

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Purpose: The aim was to examine the relationship between Biofeedback-Electromyography (BF-EMG), transperineal Ultrasonography, digital vaginal palpation (Modified Oxford Scale, DVP), and perineometer in evaluating pelvic floor muscle contractions in healthy women.
Methods: The study involved 48 healthy women with an average age of 44.5 ± 5.1 years and a Body Mass Index of 27.2 ± 4.5 kg/m². Pelvic floor muscle contractions were assessed using BF-EMG, perineometer, DVP, and the anteroposterior measurement of hiatal narrowing during pelvic floor contraction using 2D ultrasound. Participants' gravida and parity, as well as the type of delivery, were also questioned. The relationship between these measurements was analyzed using Spearman correlation analysis.
Results: A moderate positive correlation was found between vaginal BF-EMG, perineometer, and DVP contraction measurement values ($p=0.00$; $r=0.612$, $r=0.638$). A low positive correlation was found between USG values and DVP values ($p=0.024$; $r=0.33$).
Conclusions: The relationship between vaginal BF-EMG, perineometer, and DVP measurements suggests that these measurements could be used as alternatives for each other. The lack of correlation between USG measurements and other measurements may be due to the inability of 2D ultrasound to fully capture pelvic floor contraction and to have high margin of error during measurement. Future studies could explore the relationship between these parameters using 3D or 4D ultrasound.
Keywords: Biofeedback, Electromyography, Pelvic Floor, Physiotherapy and Rehabilitation**,** Ultrasonography

S051. COMPARISON OF UPPER EXTREMITY FUNCTIONAL EXERCISE CAPACITY, RESPIRATORY MUSCLE STRENGTH, AND BALANCE STATUS IN PATIENTS WITH HYPERTENSION AND HEALTHY CONTROLS

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Purpose: Studies about upper extremity functional exercise capacity, balance status, and respiratory muscle strength in patients with hypertension are limited. The aim of the study was to compare the upper and lower extremity functional exercise capacity, peripheral and respiratory muscle strength, respiratory function, balance status, dyspnea and fatigue levels, quality of life, and physical activity levels between patients with hypertension and healthy individuals.
Methods: Thirty-five patients with hypertension and 36 healthy individuals were included in the study. Upper extremity functional exercise capacity [6-Minute Pegboard and Ring Test (6-PBRT)], lower extremity functional exercise capacity [6-Minute Walk Test (6-MWT)]. respiratory muscle strength (MIP, MEP), peripheral muscle strength (digital hand dynamometer), pulmonary function (spirometry), balance (Mini-BESTest and Timed Up and Go Test [TUGT]), dyspnea (MMRC Dyspnea Scale), fatigue

(Fatigue Severity Scale [FSS]), quality of life (Short Form-36 [SF-36]), and physical activity level (International Physical Activity Questionnaire [IPAQ]) were evaluated.
Results: In patients with hypertension had statistically significant lower 6-PBRT number of rings, 6-MWT distance, peripheral and respiratory muscle strength, FEV_1 (%), PEF (%), and FEF_{25-75} (%), higher Mini-BESTest score, TUGT duration, MMRC and FSS score ($p<0.05$).
Conclusions: Patients with hypertension exhibited lower upper and lower extremity functional exercise capacity, weaker respiratory and peripheral muscle strength, poorer respiratory function, balance, and quality of life, along with higher levels of dyspnea and fatigue. The assessment of upper extremity functional capacity should be integrated into cardiopulmonary rehabilitation evaluations for hypertensive patients to develop an appropriate treatment program.
Key words: Balance, Exercise Capacity, Hypertension, Muscle Strength

S052. EFFECT OF STRUCTURED MYOFASCIAL RELEASE TECHNIQUES ON PAIN AND PAIN THRESHOLD - PRIMARY DYSMENORRHEA EXAMPLE

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Purpose: To determine the effect of structured myofascial release techniques on pain and pain threshold in individuals with primary dysmenorrhea (PD).
Methods: Forty-one participants with PD randomized into three groups were included in the study. The groups were Structured myofascial release (MFR) (n:14), transcutaneous electrical nerve stimulation (TENS) (n:12) and education group (n:15). The TENS and MFR groups underwent 16 sessions over 8 weeks (2 sessions per week), with all participants being evaluated three times on the first day of the menstrual cycle following their gynecological examination—namely, a pre-treatment measurement, a post-treatment measurement 8 weeks later, and a follow-up measurement after a 4-week post-treatment period—with outcome measures including demographic data, the McGill Pain Questionnaire Short Form (SF-MPQ), and pain threshold assessments at six points using the Baseline method.
Results: In the MFR group, pairwise comparisons of all SF-MPQ parameters revealed significant differences between pre- and follow-up values. In contrast, the TENS and training groups showed significant pre–follow-up differences in sensory pain, total pain, and VAS scores ($p<0.05$). Additionally, the MFR group demonstrated statistically significant differences across all algometer values, while the TENS and training groups exhibited significant changes at three of six measurement points over the three time intervals (Pre, Post, Follow-up) ($p<0.05$).
Conclusions: MFR group showed superior efficacy in alleviating dysmenorrheic pain and raising the pain threshold compared to TENS and training groups. This effect continued in the follow-up period 4 weeks after treatment.
Keywords:; Myofascial Release, Pain İntensity, Primary Dysmenorrhea, TENS

S054. THE STATUS OF PALLIATIVE REHABILITATION IN POSTGRADUATE THESES IN THE FIELD OF PHYSIOTHERAPY AND REHABILITATION IN TURKEY

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Purpose: This study reviews how many Turkish postgraduate theses have addressed palliative rehabilitation, an approach that helps patients manage illness and preserve the best possible quality of life and summarizes their subject focus.
Methods: Data were drawn from the Council of Higher Education's National Thesis Centre. We screened physiotherapy-rehabilitation theses with the keywords "palliative," "end of life," "terminal period," "cancer," and "oncology" (hits: 572, 107, 109, 2000, and 2000, respectively). Duplicates across

keywords were merged. Cancer/oncology theses were excluded if participants were high-functioning and not in end-of-life care.
Results: A total of 4 postgraduate theses were found to be related to palliative rehabilitation. Two of them were scale translations related to quality of life and fatigue level in palliative care. The other one aimed to develop a guideline for exercise intervention in childhood cancers. The last study analysed the quality of life, cognitive functions, fatigue and physical activity levels of patients with lung cancer. It was determined that the 4 studies were conducted in the last 4 years at master's degree level.
Conclusions: Palliative rehabilitation was defined in the early 1980s and has a history of approximately 50 years. Although this field is considered to be new, the number of postgraduate theses on palliative rehabilitation in our country is quite limited. Studies in the field of palliative rehabilitation will contribute to both international literature and national awareness and palliative care service quality.
Keywords: Palliative Therapy, Rehabilitation, Physiotherapy(techniques)

S055.INVESTIGATION OF THE RELATIONSHIP BETWEEN THE IMPACT OF DYSKINESIA AND PARTICIPATION IN DIFFERENT DOMAINS IN CHILDREN WITH DYSKINETIC CEREBRAL PALSY

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Purpose: This study examines the impact of dyskinesia severity on participation in children with Dyskinetic Cerebral Palsy (DCP).
Methods: A total of 24 children aged 5–18 years (mean age: 9.75±3.55 years) with DCP were divided into two groups based on dyskinesia type (12 dystonic, 12 choreoathetotic). Dyskinesia severity was assessed using the Dyskinesia Impairment Scale (DIS), and participation with the Life Habits Assessment (Life-H). Life-H includes 11 subscales: nutrition, physical fitness, personal care, communication, housing, mobility, responsibilities, interpersonal relationships, social life, education, employment, and leisure, plus a total score. Data were analyzed using Spearman correlation. The study was approved by the Hacettepe University Ethics Committee (Decision No: 2023/13-07, KA-22031).
Results: In dystonic children, dyskinesia showed a negative correlation with nutrition ($r = -0.561$, $p < 0.01$) and physical fitness ($r = -0.443$, $p < 0.05$). In choreoathetotic children, a low-to-moderate negative correlation was found between dyskinesia and physical fitness ($r = -0.439$, $p < 0.05$). Total dyskinesia scores correlated negatively with nutrition ($r = -0.536$, $p < 0.01$), physical fitness ($r = -0.630$, $p < 0.01$), and personal care ($r = -0.632$, $p < 0.01$).
Conclusions: This study shows that dyskinesia severity affects participation. In dystonic children, dyskinesia correlated negatively with nutrition and physical fitness, while in choreoathetotic children, only physical fitness was affected. Total dyskinesia scores correlated negatively with nutrition, physical fitness, and personal care. Strong negative correlations in physical fitness and personal care indicate dyskinesia restricts activities. Findings emphasize individualized rehabilitation, multidisciplinary approaches to improve participation.
Keywords: Cerebral Palsy, Choreoathetosis, Dyskinesia, Dystonia, Participation,
*This study is derived from a doctoral dissertation.

S056. MULTIDIMENSIONAL EXAMINATION OF THE RELATIONSHIP BETWEEN FAMILY IMPACT LEVEL AND HEALTH-RELATED QUALITY OF LIFE BEFORE FAMILY-CENTERED PHYSIOTHERAPY AND REHABILITATION INTERVENTIONS IN CHILDREN WITH CEREBRAL PALSY

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Purpose: Cerebral palsy (CP) places a substantial burden on families, shaped by various family factors. This study examined how the degree of that family impact relates to the health-related quality of life of children with CP.
Methods: The study included 100 children aged 2-18 years with CP with their families. The Impact on Family (IPFAM) was used to assess the impact of CP on the family and the Nottingham Health Profile (NHP) questionnaire was used to assess the health-related quality of life of the family.
Results: Mean child age: 11.58 ± 4.37 years; mean parent age: 43.40 ± 8.33 years. GMFCS distribution: 23 % Level I, 22 % II, 25 % III, 17 % IV, 13 % V. Children's GMFCS levels differed significantly across IPFAM subscale scores ($p < 0.05$). Low-to-moderate positive correlations appeared between NSP and matching IPFAM subscales—general, pain, emotional reactions, sleep, social isolation, physical activity, and problems ($p < 0.05$). As NSP scores rose, IPFAM general, family/social impact, and personal-strain scores also increased.
Conclusions: The findings suggest that health-related quality of life variables are associated with financial burden, psychosocial effects and coping strategies in the care process of children with CP. As a result, an increase in the level of impact of CP on the family may lead to a decrease in the health-related quality of life of the family. For family-centered physiotherapy and rehabilitation practices, it is important to examine the family multidimensionally by taking it to the center.
Keywords: Cerebral Palsy, Family Impact, Functional Level, Quality of Life

S057.EXAMINING THE EFFECT OF EDUCATION ON THE BENEFITS OF EXERCISE ON PHYSICAL ACTIVITY LEVELS IN OLDER ADULTS

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Purpose: In recent years, education on the benefits of exercise has been highlighted as an important motivational factor for increasing physical activity levels. This study aims to examine the contribution of education on the benefits of exercise to the physical activity levels of older adults.
Methods: The study included 160 older adults with a mean age of 72.34±6.39 years (70% women). Participants' prior education on the benefits of exercise was determined by asking the question, "Have you ever received education on the benefits of exercise?" In the second part of the study, the "Leisure Time Physical Activity Questionnaire" was used. Results were defined as mean ± standard deviation. The Leisure Time Physical Activity Questionnaire scores of those who received education and those who did not were compared using the Mann-Whitney U test. The level of statistical significance was set at $p<0.05$.
Results: 50% of the participants reported having received education on the benefits of exercise. The total Leisure Time Physical Activity Questionnaire score was 13.55±11.8 units for those who received education, and 9.65±9.73 units for those who did not. A significant difference was found between the physical activity levels of participants who received education on exercise benefits and those who did not ($p=0.012$).
Conclusions: In light of the data obtained in our study, we believe that education on the benefits of exercise is effective in increasing physical activity levels in older adults. Increasing the number of such educational programs in the future would be beneficial.
Key words: Elderly, Exercise Training, Physical Activity

S058.TURKISH VALIDITY AND RELIABILITY OF THE BRIEF LOWER BODY FUNCTIONAL PERFORMANCE QUESTIONNAIRE (BRIEF-LBFPQ) FOR COMMUNITY-DWELLING OLDER ADULTS

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Purpose: The Brief Lower Body Functional Performance Questionnaire is short and enables the prompt detection of functional deficits in older persons residing in the community. The study evaluate the psychometric characteristics of the Brief Lower Body Functional Performance Questionnaire among Turkish older adults.
Methods: The psychometric characteristics of the Turkish version of the Brief-LBFPQ were evaluated in 85 older adults. Nineteen elderly individuals were re-evaluated one week apart to investigate test-retest reliability. The correlation among various outcome measures (Lower Extremity Functional Scale, 4-Meter Walk Test, Timed Up and Go Test, 30-second sit-to-stand test, and the Turkish version of the Brief Lower Body Functional Performance Questionnaire) was analyzed to assess validity.
Results: The Turkish version of the Brief Lower Body Functional Performance Questionnaire has notable internal consistency and test-retest reliability. The Brief Lower Body Functional Performance Questionnaire exhibited a good correlation with the Lower Extremity Functional Scale and a moderate correlation with the 4-Meter Walk Test, Timed Up and Go Test, and 30-second Sit-to-Stand Test. No floor or ceiling effects were seen.
Conclusions: The Turkish version of the Brief Lower Body Functional Performance Questionnaire is a valid and reliable instrument for evaluating lower body functionality in Turkish community-dwelling older people. Health professionals may utilize this questionnaire to evaluate the lower extremity functionality of older adults and plan a multidisciplinary treatment strategy.
Keywords: Geriatric, Physical Functional Capability, Physiotherapy, Questionnaire,

S060.THE RELATIONSHIP BETWEEN COGNITIVE FUNCTIONS, FALL RISK, AND BALANCE CONFIDENCE IN GERIATRIC INDIVIDUALS

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Purpose: Aging-related cognitive decline adversely affects balance control mechanisms, leading to an increased risk of falls. Moreover, activity-specific balance confidence may diminish due to these changes in cognitive and motor functions.
Methods: This study included 116 individuals (65 females, 51 males) residing in three different nursing homes. Cognitive function was assessed using the Montreal Cognitive Assessment (MoCA), fall risk was evaluated with the Tinetti Balance and Gait Test, and balance confidence was measured using the Activities-Specific Balance Confidence (ABC) Scale. Statistical analyses were conducted using IBM SPSS Statistics, with a significance threshold set at $p<0.05$.
Results: The participants had a mean age of 78.12±7.21 years and a mean body mass index (BMI) of 26.44±2.14 kg/m². The mean scores were as follows: MoCA, 23.67±4.28; Tinetti-Balance, 24.05±2.88; Tinetti-Gait, 8.38±1.13; Tinetti-Total, 32.09±4.90; and ABC Scale, 126.23±29.70. Statistical analysis revealed a weak correlation between MoCA and Tinetti-Balance scores ($p=0.027$, $r=0.223$) as well as Tinetti-Total scores ($p=0.042$, $r=0.205$). A moderate correlation was observed between Tinetti-Balance

scores and ABC Scale scores (p=0.006, r=0.399), as well as between Tinetti-Total scores and ABC Scale scores (p=0.033, r=0.316).
Conclusions: The findings indicate that cognitive decline negatively impacts balance and gait in geriatric individuals, thereby increasing the risk of falls. Additionally, these impairments contribute to a reduction in activity-specific balance confidence. Therefore, fall prevention interventions for geriatric individuals should adopt a comprehensive approach that integrates cognitive function support strategies and balance confidence enhancement techniques.
Keywords: Balance, Cognitive Function, Falling, Geriatrics

S061.COMPARISON OF SENSOR-BASED LOWER EXTREMITY REACTION TIME AND PHYSICAL PERFORMANCE TEST IN OLDER ADULTS WITH COMORBITY

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Purpose: Comorbidity among older adults poses significant health risks and leads to severe injuries and a decline in overall quality of life. The study aims to compare sensor-based lower extremity reaction time and physical performance tests in older adults with comorbidity.
Methods: In this cross-sectional study, 43 participants (72.20±7.25) were allowed two groups: older adults with comorbidity and older adults without comorbidity. Comorbidity was measured with a simple count of the number of chronic diseases for each older. Sensor-Based Lower Extremity Reaction Time was evaluated by BlazePod™ (Play Coyotta Ltd., Tel Aviv, Israel). Time Up Go Test (TUG), 30s Sit To Stand Test (30sSTS), and Berg Balance Scale (BBS) were used to evaluate the physical performance.
Results: Older adults with comorbidity had significantly increased reaction time (715.90 ± 115.23 ms and 508.60 ± 112.76 $p < 0.001$) and a lower number of hits (12.7 ± 4.5 and 17.5 ± 4.42 $p < 0.001$) compared with older adults and without comorbidity ($p < 0.001$). Furthermore, the TUG, BBS, and 30Ssts in the older adults with the comorbidity group were significantly lower than that of the older adults without the comorbidity ($p<0.001$).
Conclusions: This study found decreased reaction time and physical performance in older adults with comorbidities. With sensor-based technology, these functional impairments can be measured in a fair and accurate way, which helps doctors better understand how comorbid conditions affect people. The Research Ethics Committee of Tarsus University Faculty of Health Science approved the study (Protocol Number: 2024-10-105).
Keywords: Comorbidity, Older Adults, Reaction Time, Physical Performance,

S062.A COMPARISON OF THE EFFECTS OF 2D AND 3D VIRTUAL REALITY EXERGAMING ON REACTION TIME IN INDIVIDUALS WITH BENIGN PAROXYSMAL POSITIONAL VERTIGO: A RANDOMIZED CONTROLLED STUDY

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Purpose: To compare the effects of 2-dimensional (2D) and 3-dimensional (3D) virtual reality (VR) applications combined with vestibular rehabilitation on reaction time in individuals with Benign Paroxysmal Positional Vertigo (BPPV) suffering from residual dizziness.
Methods: A total of 42 individuals (2D-VR=14, 3D-VR=14, Control Group=14) between the ages of 25-65 who were diagnosed with BPPV within the last five years were included, who experienced dizziness due to postural hypotension, had visual impairments and used antihistamine drugs within the

last three months were excluded from the study. Demographic form and Choice Stepping Reaction Time Test (CSRT-reaction time) were used in the study.
Results: When the percentage changes post-treatment were examined, it was seen that the decision time, response time and total response time(TRT) of the 2D-VR group decreased more compared to the other groups in terms of the flashing and inhibitory reaction time measurement results. In the 3D-VR group, a more significant decrease in flashing and inhibitor average reaction time(ART) was observed compared to the other groups. In the 'Quade's Covariance' analysis, it was found that the inhibitor ART ($p4=0.033$) differed significantly between the groups ($p4<0.05$) and had a large effect size ($\eta^2=0.161$).
Conclusions: Improvements were observed in many parameters, especially ART and TRT, in the treatment groups. Patients had ART below the 1200 ms reported for healthy individuals in the literatüre. Patients are thought to develop the ability to respond more quickly to stimuli, particularly during a realistic 3D-VR game. This may be associated with improved visual scanning and attention skills.
Keywords: Benign Paroxysmal Positional Vertigo, Reaction Time**,** Residual Dizziness,

S063.EFFECTS OF CALISTHENIC EXERCISE ON COGNITIVE AND PHYSICAL FUNCTION IN INDİVIDUALS WITH ALZHEIMER'S DISEASE: A PILOT STUDY

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Purpose: Physical activity and exercise can reduce cognitive impairment, improve physical function in patients with Alzheimer's Disease (AD). When calisthenic exercise is performed regularly provides development of muscle strength, balance, coordination. Individuals perform it using own body weight. The aim of study is examine the effects of calisthenic exercise on cognitive function, depression, balance, gait in individuals with AD.
Methods: Eight people diagnosed with AD, aged between 44-80, participated in study. Physiotherapy and rehabilitation program including calisthenic exercises was applied 2 days a week for 9 weeks. Individuals were given exercises in standing position with resting opportunities, toe-up and reach, reciprocal hip-knee flexion, lateral half-squat, reciprocal hip abduction, trunk flexion-extension. Cognitive status of individuals was assessed with Montreal Cognitive Test (MoCA), depression status with Geriatric Depression Scale (GDS), balance with Berg Balance Scale (BBS), gait with Timed Up and Go Test (TUG), and lower extremity performance with 5 Time Sit-to-Stand Test (5XSST) by blinded evaluator.
Results: Five participants were female, two were using cane as assistive device. According to MoCA, before the exercise program, only two participants had normal score ($MoCA\geq21$). Significant improvements were found in total scores of MoCA ($p=0.038$), BBS ($p=0.035$), 5XSST ($p=0.012$). The change in GDS ($p=0.802$), TUG ($p=0.591$) scores were not significant.
Conclusions: Calisthenic exercise program applied by individuals with AD has potential to improve cognitive function, balance, lower extremity functions. For irreversible AD, emerges as serious problem with aging, calisthenic exercise can be used when creating physiotherapy and rehabilitation programs that take preventive measures, minimize functional disorders.
Keywords: Alzheimer's Disease, Balance, Cognitive Function, Depression, Gait

S064.EXAMINING THE EFFECT OF PHYSICAL ACTIVITY ON COGNITIVE FUNCTIONS IN ALZHEIMER'S PATIENTS AND COMPARING IT WITH THEIR HEALTHY PEERS: PILOT STUDY

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Purpose: This study examines the relationship between physical activity levels and cognitive functions in Alzheimer's patients and compares them with healthy peers.
Methods: Fourteen participants over 55 were included. They were evaluated at Hacettepe University, Faculty of Physical Therapy and Rehabilitation. The Turkish versions of the International Physical Activity Questionnaire-Short Form (IPAQ), Montreal Cognitive Assessment (MoCA), Geriatric Depression Scale (GDS), and Standardized Mini-Mental Test (MMSE) were applied to all participants, and their mental states were recorded.
Results: Seven Alzheimer's patients (mean age 68.00±7.21) and seven healthy individuals (mean age 64.14±6.26) participated. Gender, marital status, education level, GDS, and IPAQ scores were similar between groups ($p>0.05$). A weak but significant correlation was found between IPAQ and MMSE ($r=0.269$) and MoCA ($r=0.221$). MMSE ($p=0.040$) and MoCA ($p=0.018$) scores were significantly lower in the Alzheimer's group. A strong negative correlation was found between age and gender with depression levels ($r=-0.837$, $p=0.019$; $r=-0.805$, $p=0.029$). MMSE and MoCA scores showed a strong positive correlation ($r=0.836$, $p=0.019$).
Conclusions: Cognitive impairment in Alzheimer's patients may negatively impact physical activity. Social, cultural, and economic factors may limit physical activity in older adults. Simple and accessible exercises may improve cognitive function and physical activity in this population.
Keywords: Alzheimer's, Cognitive Function, Physical Activity

S065.DETERMINATION OF PHYSICAL ACTIVITY LEVELS AND THEIR RELATION TO BALANCE PERFORMANCE AND FALL RISK OF PEOPLE WITH MILD ALZHEIMER DISEASE

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Purpose: People with Alzheimer's Disease (AD) and mild cognitive impairment exhibit balance deficits. This cross-sectional study aims to investigate self-reported physical activity (PA) levels and to analyze whether there is an association between PA levels and balance performance, fall risk, and fear of falling in people with mild AD.
Methods: This observational cross-sectional study assessed 46 individuals (mean age:72,32±7,62) diagnosed with very early mild AD by a neurologist. After sociodemographic factors had been obtained, physical activity levels were assessed with the International Physical Activity Questionnaire (IPAQ), balance performance and fall risk were assessed with the Berg Balance Scale (BBS), and fear of falling was assessed with the Falls Efficacy Scale (FES).
Results: Total IPAQ score was 486.13±7,62; where 31(%67) had low-level PA, 12(%26) had moderate-level PA, and 3(%7) had high-level PA. PA score significantly correlates with balance and fall risk (r:0.446, p:0.05). and fear of falling (r:-0.555, p:0.00).
Conclusions: PA levels of patients with mild AD were low and associated with low balance performance, fall risk, and fear of falling at very early stages of AD. Although it is known that elderly people and also AD population have low PA levels compared to the younger population, this study reveals that some fall-related factors are associated with low levels of PA. This highlights the importance of increasing awareness about enabling them to adopt and maintain regular PA as soon as diagnosed. Preventing fall risk is inevitable as falls may have lots of physical and psychological consequences.
Keywords: Alzheimer's Disease, Balance, Falls, Physical Activity

S066.COMPARISON OF DUAL-TASK SKILLS IN CHILDREN WITH DEVELOPMENTAL MOTOR DISORDER, ACCORDING TO AGE AND GENDER

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Purpose: Dual task skill is an important skill needed in daily life. In children with developmental motor disorder (DMD), this skill should be evaluated from various aspects and interventions should be planned to improve it. The aim of this study is to investigate how the dual task skills of children with DMD are affected by age and gender variables.
Methods: Thirty children (Girl=13, Boy=17) with DMD due to different reasons were included in the study. After the 10-meter walking test was evaluated as a single task, the 10-meter walking test was repeated while carrying a bottle for the dual-task motor-motor and duration was recorded in seconds. In the dual task motor-cognitive evaluation, the Timed Up and Go (TUG) test was used as the motor task.
Results: According to the Kolmogorov-Smirnov test, the test data that was conducted for motor-cognitive measurement were not homogeneous, while other data were homogeneous. Motor-motor dual task duration was found to be statistically significantly longer than single task duration ($p<0.001$). While there was no difference in any skill according to gender ($p>0.05$), the number of four-legged animals counted during walking in the motor-cognitive dual task according to age was statistically significantly higher in the older group ($p=0.011$, $z=-2.535$).
Conclusions: While gender was not found to be important variables in dual task skills and age in motor-motor dual task in children with DMD, it was determined that age could be an important factor in motor-cognitive dual task.
Keywords: Motor Skills, Neurodevelopmental Disorders, Task Performance and Analysis

S067.EARLY MOBILITY AND CRAWLING: BELIEFS AND CLINICAL PRACTICES OF PEDIATRIC PHYSIOTHERAPISTS IN TURKEY: A PILOT STUDY

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Purpose: This study aims to examine Turkish pediatric physiotherapists' beliefs and practices about the role of crawling in infant development and their views on its removal from the CDC's 2022 "Learn the Signs. Act Early" developmental milestones.
Methods: A total of 50 physiotherapists participated in an online survey, “Pediatric Physiotherapists’ Perspectives on Crawling.” They rated beliefs about early mobility, crawling’s importance, clinical practices, and opinions on its removal using a 5-point Likert scale. The Spearman test analyzed correlations between beliefs, practices, and views on the CDC update.
Results: The CDC's removal of crawling from developmental milestone checklists saw 66% of participants disagree. 98% of the participants stated independent mobility is critical for infant development, crawling tied to motor, sensory, cognitive growth. 50% of the participants said not crawling has no lasting effect. 54% of the participants recommended an alternative movement method to crawling. 76% of the participants stated that they applied crawling training to the child using an alternative movement method to crawling. 44% of the participants provided crawling training to a child who walked but didn’t crawl. A statistically significant, positive correlation was found between clinical practice and beliefs in crawling’s importance ($p<0.05$).
Conclusions: Most pediatric physiotherapists in Turkey consider crawling a critical motor milestone for infant development. However, current scientific evidence is insufficient to confirm the specific effects of crawling on development. Therefore, future studies investigating the impact of crawling on motor, sensory, cognitive development and its importance in different cultures are needed
Keywords: Crawling, Mobility, Motor Milestones

S068.INVESTIGATION OF THE RELATIONSHIP BETWEEN LOWER EXTREMITY REACTION TIME AND KINESIOPHOBIA AND FEAR OF FALLING IN INDIVIDUALS WITH PARKINSON'S DISEASE

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Purpose: Although reaction time is affected in Parkinson's Disease (PD), information about the factors associated with it is limited. The aim of this study was to investigate the relationship between lower extremity reaction time and kinesiophobia and fear of falling in individuals with PD.
Methods: Forty-three individuals with PD (mean age: 64.12±8.74 years; BMI: 27.86±4.06 kg/cm2) in stages 1-3 according to the Modified Hoehn & Yahr Staging Scale were included in our study. Reaction time was assessed by Blazepod Trainer, kinesiophobia was assessed by Tampa Kinesiophobia Scale (TKS), and fear of falling was assessed by Falls Efficacy Scale International (FES-I).
Results: Right and left lower extremity reaction times were 2.02±0.63 and 1.92±0.57 msec, respectively. The total score of TKS and FES-I were 37.70±12.70 and 22(18-29) points, respectively. A moderate correlation was observed between the reaction time of the right and left lower extremities and TKS, respectively ($p<0.001$, $r=0.56$); ($p=0.004$, $r=0.43$). Right and left lower extremity reaction time were found to be moderately correlated with FES-I ($p=0.003$, $r=0.44$); ($p=0.020$, $r=0.35$). In addition, there was a moderate correlation between TKS and FES-I ($p<0.001$, $r=-0.68$).
Conclusions: The relationships between reaction time and kinesiophobia and fear of falling in individuals with PD showed that kinesiophobia and fear of falling may affect parameters such as kinesiophobia and fear of falling, which significantly affect the quality of life of patients. This study may raise awareness about the consideration of reaction time in disease management.
Keywords: Gait, Parkinson Disease, Reaction Time

S069.THE EFFECT OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION TECHNIQUES ON PAIN, MOTOR FUNCTIONS, FATIQUE AND HEALTH RELATED QUALITY OF LIFE IN INDIVIDUALS WITH MULTIPLE SCLEROSIS: A RANDOMIZED, SINGLE-BLIND STUDY

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Purpose: This study aimed to assess how PNF techniques targeting trunk, scapula, and pelvic patterns affect pain, motor function, fatigue, and quality of life in individuals with MS.
Methods: The study involved 44 patients randomly assigned to PNF Group (PNFG, n=22, 16 female) or Control Group CG, n=22, 16 female). PNFG received supervised combined aerobic and PNF training three times weekly for 8 weeks, while CG followed a home exercise regimen. Both groups were assessed using various measures including the Visual Analogue Scale (VAS) for pain severity, the Multiple Sclerosis Quality of Life-54 (MSQoL-54), the Fatigue Severity Scale (FSS), the Fatigue Impact Scale (FIS), the Timed Up and Go (TUG) test, the Functional Reach Test (FRT), the Six-Minute Walk Test (6-MWT), and the Dexterity Questionnaire-24 (DextQ-24).
Results: PNFG showed significant improvements in VAS, FRT, TUG, 6-MWT, FSS, FIS, DextQ-24 (dressing and tool use), and MSQoL-54 scores ($p<0.05$). CG also improved significantly in VAS, TUG, 6-MWT, FSS, psychosocial function (FIS), MSQoL-54, and DextQ-24 (activities of daily living) scores ($p<0.05$). PNFG had better outcomes in DextQ-24 (activities of daily living) and MSQoL-54 (emotional well-being, energy, and health perception) subscales compared to CG ($p=0.038$, $p=0.007$, $p=0.037$, $p=0.044$, respectively), despite similar improvements in motor function and fatigue.

Conclusions: Supervised and home-based exercises guided by physiotherapists can equally improve pain, motor function, fatigue, and quality of life in people with MS. A supervised home program offers a safe alternative for those without access to formal rehabilitation.
Keywords: Fatigue, Multiple Sclerosis, Pain, Proprioceptive Neuromuscular Facilitation, Quality of Life

S070.INTEGRATION OF THE WINGATE TEST INTO VIRTUAL REALITY BASED SYSTEM

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Purpose: The aim of this study was to evaluate the effects and differences between the classic Wingate Anaerobic Test (WAnT) and a Virtual Reality-Based Wingate Test (VR-WAnT) on the test performance of athletes and to investigate their applicability to athletes.
Methods: 30 male professional football players were included in the study. The athletes' demographic characteristics, scores on the system usability scale and satisfaction were assessed. A scenario covering all phases of the WAnT and requiring no external cues was prepared by the researchers and integrated into the virtual reality headset. Athletes were evaluated in the same environment, first with WAnT applied with the classical method and two days later with VR-WAnT. Maximum power, minimum power, average power and fatigue index data from the test system were recorded for analysis.
Results: The results of the study showed no statistically significant differences in maximum power, minimum power, average power and fatigue index values between the two methods($p>0.05$). However, according to the satisfaction measurement, the results of the VR-WAnT were statistically significantly higher compared to the classic WAnT($p=0.026$).
Conclusions: Our study showed that the results of WAnT and VR-WAnT are similar and that the athletes prefer VR-WAnT. The VR-WAnT evaluation scenario provided similar feedback during the test to the classic WAnT, and VR-WAnT may offer additional advantages in terms of fatigue index. It is believed that the test could be more comfortable for both the practitioner and the athlete, and could also add a new dimension to physiotherapy and rehabilitation assessment processes.
Keywords: Anaerobic Performance, Evaluation, Football Player, Virtual Reality, Wingate Test

S071.INVESTIGATION OF THE EFFECT OF DUAL TASK ON FUNCTIONAL MOBILITY IN INDIVIDUALS WITH OPIATE USE DISORDER

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Purpose: The aim of our study was to investigate the effect of dual task on functional mobility in individuals with opiate use disorder(OUD).
Methods: Our study was conducted in Ankara AMATEM. Participants included individuals aged between 18-50 years, diagnosed with substance use and healthy individuals. The Mini Mental Test was administered to assess cognitive status. Demographic characteristics of the participants were recorded. Functional mobility was measured with the Timed Up and Go Test. The test was repeated with cognitive and motor secondary tasks. The results were analysed with appropriate statistical methods.
Results: A total of 61 individuals (29 OUD and 32 healthy) were evaluated in our study. There was a difference between healthy individuals and OUD's in terms of cognitive and motor task performance ($p<0.05$). It was determined that cognitive task performance was lower in both groups compared to the

single task, and motor task performance was additionally worse in the OUD's ($p<0.001$). When the calculated dual task performance values were compared, it was found that both cognitive and motor dual task performance were more affected in the OUD's ($p<0.01$).
Conclusions: In our study, cognitive and motor task performance was found to be significantly lower in individuals with opiate use disorder compared to healthy individuals. These results support that opiate use has negative effects on executive functions and functional mobility. The findings underscore the significance of approaches that target cognitive and motor functions within the context of addiction treatment and rehabilitation.
Keywords: Postural Balance, Substance Use Disorder, Task Performance

S072.INVESTIGATION OF THE RELATIONSHIP BETWEEN SIMPLE AND SELECTIVE REACTION TIME AND MANUAL DEXTERİTY IN PEOPLE WİTH PARKİNSON DİSEASE AND COMPARISON WITH HEALTHY INDIVIDUALS

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Purpose: The purpose of this study is to compare individuals with Parkinson's Disease (pwPD) and healthy individuals (HI) in terms of manual dexterity (MD) and reaction time (RT) and to investigate whether RT is an alternative method for evaluating MD in pwPD.
Methods: Twelve pwPD and 8 HI were included in this cross-sectional pilot study. Demographic information, disease duration, and clinical stage according to the Modified Hoehn-Yahr Scale (MHYS) were recorded. Blazepod® reaction system was used to assess RT, and Jebson-Taylor hand function test (JTHFT) and 9-hole peg test (9DPT) were used to assess MD.
Results: The year of diagnosis of pwPD was 5.83±3.99, and the MHYS stage was 2.41±0.46. Demographic information of the two groups was similar ($p>0.05$). It was observed that pwPD were slower in RT, 9HPT and JTHFT ($p<0.05$). No difference was found in the some items of the JTHFT ($p>0.05$). It was seen that there was no relationship between RT and JTHFT, but a high level of relationship between RT and 9HPT ($r=0,643$-0.773, $p<0.05$). The highest relationship was found between selective RT and dominant hand 9HPT ($r=0.773$, $p=0.005$).
Conclusions: The high level of correlation found between 9HPT, which is frequently used in clinical practice, and RT shows that it can be used to evaluate MD in pwPD. In addition, we think that selective RT is a prominent method compared to other tests in evaluating movement initiation ability, cognitive dual-task and bilateral upper extremity function in pwPD. More samples are needed for better results.
Keywords: Manual Dexterity, Parkinson's Disease, Reaction Time

S073.THE IMMEDIATE EFFECT OF CRANIO-CERVICAL FLEXION TRAINING ON CERVICAL SPINE MOBILITY DURING COMPUTER USE IN YOUNG INDIVIDUALS WİTH CHRONIC NECK PAIN: A CASE SERIES

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Purpose: To investigate the immediate effects of craniocervical flexion (CCF) training on cervical range of motion in young individuals with chronic neck pain.
Methods: Four cases with chronic neck pain were included in the study. Two cases (a 22-year-old female, Neck Disability Index (NDI): 17, and a 21-year-old male, NDI: 9) received CCF training, while the other two cases (a 21-year-old female, NDI: 7, and a 19-year-old male, NDI: 13) did not receive any intervention. Participants were evaluated using the XSENS motion analysis system while using a computer. Functional joint range of motion for lateral flexion, axial rotation, and flexion-extension at T1-C7 and C1 levels were assessed.

Results: For those who received CCF training, T1-C7 lateral flexion was 2.34°-4.63°, axial rotation 2.17°-8.50°, and flexion-extension 2.14°-4.96°. At C1 level, lateral flexion ranged from 3.81°-6.57°, axial rotation 4.40°-16.61°, and flexion-extension 3.99°-7.46°. For the control group, T1-C7 lateral flexion was 0.91°-3.06°, axial rotation 1.11°-4.95°, and flexion-extension 1.26°-4.96°, while at C1 level, lateral flexion was 1.50°-5.22°, axial rotation 2.24°-8.09°, and flexion-extension 2.39°-7.28°.
Conclusions: After CCF training, participants using computers showed greater cervical range of motion, particularly in axial rotation and flexion-extension movements. Maintaining postural alignment during common activities can enhance range of motion and facilitate smoother neck movements, reducing strain on muscles and joints. This case series should be supported by larger samples and the inclusion of different activities.
Keywords: Activities of Daily Living, Exercise Training, Joint Range of Motion, Neck Pain, Wearable Devices

S074.INVESTIGATION OF THE RELATIONSHIP BETWEEN MOTOR FUNCTIONS OF CHILDREN WITH NEUROMUSCULAR DISEASES AND THE CARE EXPERIENCES OF THEIR CAREGIVERS

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Purpose: The aim of this study was to examine the relationship between motor skills of ambulatory and non-ambulant children with pediatric neuromuscular disease (NMD) and the caregiving experiences of their caregivers**.**
Methods: 89 individuals with NMD and their caregivers between the ages of 4-18 were included in the study. After the demographic information of the participants was recorded, the experiences of the caregivers were assessed with the Assessment of Caregiver Experience With Neuromuscular Disease (ACEND); and the motor functions of the children were assessed with the Motor Function Scale (MFM-32).
Results: The mean age of the children was 11.03±3.95, and the caregivers were 39.15±5.33. The mean MFM-32 score of the children was 78.94±20.34, and the ACEND score of the caregivers was 78.08±15.46. A strong positive correlation ($r=0.715$; $p<0.001$) was observed between MFM-32 and ACEND.
Conclusions: This study has shown that the caregiving experiences of caregivers of children with NMD are related to the motor functions of the children. For physiotherapists working with neuromuscular patients, improving motor skills in the rehabilitation of children with NMD is one of the main goals. The results of this study indicate that while physiotherapists are advancing rehabilitation programs focused on motor functions, it is also important for the success of the rehabilitation to guide families for approaches (psychological and social) to improve the caregiving experiences of caregivers.
Keywords: Caregiver Burden, Caregiving Experience, Family Impact, Neuromuscular Diseases

S075.THE EFFECT OF REACTIVE UPPER EXTREMITY TRAINING ON TRUNK CONTROL AND FUNCTIONALITY IN INDIVIDUALS WITH STROKE: A PILOT STUDY

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Purpose: In limited research involving reactive upper limb training (RULT) of stroke patients, trunk control was not the main outcome measure, and light systems were not used. Our study aimed to examine

the effects of neurorehabilitation intervention involving RULT on trunk control, balance, gait, falls, and spasticity.
Methods: Reactive reaching exercises with Fitpodz Light Trainer®, integrated into Bobath-based neurorehabilitation program, were applied for 21 sessions to cognitively healthy stroke patients (≥3 months post-stroke) with elbow flexor spasticity ≤2 on the Modified Ashworth Scale (MAS) and ability to walk on flat surfaces without manual assistance. In pre- and post-treatment evaluations, the Trunk Impairment Scale (TIS), Mini-Balance Evaluation Systems Test (Mini-BESTest), Functional Reach Test (FRT), Modified Falls Efficacy Scale (MFES), and MAS were used. The project was supported by Pamukkale University Scientific Research Projects Coordinatorship (2024SABE002).
Results: Participants' (n=5) age was 55.6±15.91 and diagnostic period was 7.5±11.53 years, on average. Significant improvements were obtained in the total Mini-BESTest, Dual Task Timed Up and Go test, and MFES scores ($p<0.05$). Spasticity decreased in 20% of the patients for shoulder adductor-internal rotator, in 40% for elbow, finger flexor and thumb adductor, in 60% for wrist flexor spasticity. The mean TIS score increased, and the mean FRT distance decreased. These changes were statistically non-significant ($p>0.05$).
Conclusions: RULT with light sensors, thought to especially accelerate the body's response to sudden balance changes, reduces balance disorders, fall risk, and fear of falling in stroke patients. Repetitive functional motor movements can help regulate muscle tone by supporting neuroplasticity.
Keywords: Balance, Falls, Hemiplegia, Postural Control

S076.INVESTIGATION OF THE RELATIONSHIP BETWEEN UPPER EXTREMITY PHYSICAL PERFORMANCE AND COGNITIVE SKILLS IN CHRONIC STROKE PATIENTS: PRELIMINARY REPORT

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Purpose: Stroke can affect both motor and cognitive functions, leading to significant limitations in individuals' level of independence. Losses in upper extremity functions make fine motor skills and daily living activities more difficult, while impairments in cognitive functions may also play a decisive role in motor performance and functional independence. There are limited studies about the effect of these two factors together on upper extremity performance. This study aims to examine the relationship between upper extremity physical performance and cognitive skills in chronic stroke patients.
Methods: Stroke patients (n=9) who participated in the study were assessed using the Montreal Cognitive Assessment (MoCA) and the Stroop test for cognitive skills, while the Functional Independence Measure (FIM) and the Box and Block Test were used for motor performance evaluation.
Results: A strong negative correlation was found between MoCA and Stroop-B (rho=-0.765, p=0.016). A strong positive correlation was identified between MoCA and FIM-cognitive (rho=0.808, p=0.009). The Box and Block Test on the non-hemiplegic side showed a positive correlation with FIM-motor (rho=0.740, p=0.023) and FIM-total (rho=0.795, p=0.010). Additionally, the Box and Block Test on the hemiplegic side was positively correlated with FIM-total (rho=0.697, p=0.037).
Conclusions: Upper extremity performance appears to influence functional independence levels in stroke patients. The findings of preliminary report of the study are expected to contribute to the literature by demonstrating the relationship between motor and cognitive functions. Additionally, the study highlights the necessity of a holistic rehabilitation approach.
Keywords: Cognitive Function, Motor Performance, Stroke, Upper Extremity

S077.THE EFFECT OF ATTENTION DEFICIT AND HYPERACTIVITY DISORDER (ADHD) ON IMPULSIVITY, SLEEP QUALITY AND DUAL TASK-ORIENTED MANUAL SKILLS IN YOUNG ADULTS

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Purpose: To examine the effect of different ADHD affectivity probabilities on motor-cognitive dual task skills in adults.
Methods: Subjects aged between 18-35 years with possible ADHD were included in the study. After an initial assessment, the Adult ADHD Self-Report Scale (ASRS), Barrat Impulsivity Scale-11 (BIS-11) and Pittsburgh Sleep Quality Index (PSQI) were administered. Then, participants' time on the 9 Hole Peg Test (9HPT) with single and dual task was recorded. According to the ASRS results, participants were categorized as having high and very high probability of having ADHD.
Results: The study included 96 participants (77 women, 19 men). In terms of ADHD risk, there were 37 participants with high probability of ADHD and 59 participants with very high probability of ADHD. Statistically significant differences were found between the ADHD groups in Cumulative Grade Point Average ($p=0.02$), BIS motor ($p=0.01$), BIS attention ($p=0.01$) and PSQI total ($p=0.01$). There was no significant difference between the groups in terms of single and dual task performances ($p>0.05$).
Conclusions: The results of this study show that impulsivity and sleep quality of individuals with ADHD are negatively affected. However, it was observed that ADHD had no effect on dual task performance. It is thought that it would be useful to take this into consideration in the evaluation and treatment approaches for the relevant population.
Keywords: Attention Deficit Hyperactivity Disorder, Dual Task, Impulsivity, Sleep Quality

S078.ICF-BASED ASSESSMENT OF MULTIPLE SCLEROSIS SYMPTOMS FROM THE PATIENT PERSPECTIVE: A QUALITATIVE STUDY

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Purpose: This research aimed to assess Multiple Sclerosis (MS) issues from the patients' perspective and classify the findings using the International Classification of Functioning, Disability, and Health (ICF).
Methods: Eight MS patients (mean age 36.75 years, 4 females, 4 males) were interviewed with six open-ended questions based on ICF. Demographic and clinical data were collected, and Expanded Disability Status Scale scores (stage 1.5: 4 individuals, stage 3.5: 2, stage 6-7: 2) were recorded. The reported issues were categorized into ICF domains: “body functions,” “body structures,” “activities and participation,” and “environmental and personal factors.” Two researchers independently classified the responses, with consensus reached on final classifications and frequency calculations.
Results: The responses were mapped to 110 ICF categories: 1 in step 1, 40 in step 2, and 69 in steps 3 and 4. High consistency was observed in categories like "s730-Upper extremity structure," "b4552-Fatigue," "d4551-Stair climbing," and "e1101-Medications." Most responses were related to "body functions," while fewer were associated with "environmental factors." Notably, "mental fatigue" was not covered by the ICF framework. Comparison with the MS ICF core set showed significant overlap, with the greatest discrepancy in "environmental factors."
Conclusions: The overlap suggests that the ICF is adequate for assessing MS patients' health. However, the uncovered responses could inform updates to the ICF, enhancing understanding of MS patients' needs and guiding improvements in rehabilitation services.
Keywords: Disability and Health, International Classification of Functioning, Multiple Sclerosis

S079.INVESTIGATING THE RELATIONSHIP BETWEEN INTEROCEPTION AND BODY IMAGE AND FATIGUE, PHYSICAL PERFORMANCE, PHYSICAL ACTIVITY, DEPRESSION AND QUALITY OF LIFE IN PATIENTS WITH MULTIPLE SCLEROSIS

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Purpose: This study examines the relationship between interoception and body image with fatigue, physical performance, physical activity, depression, and quality of life in individuals with Multiple Sclerosis (MS).
Methods: Seventy-nine individuals with MS (EDSS <6, no relapse in the past three months) participated. Their mean age was 37.22±11.11 years, and mean BMI was 25.20±4.73 kg/m². Interoceptive awareness was assessed using the Multidimensional Assessment of Interoceptive Awareness-2, and body image with the Body Image Scale. Fatigue severity and impact were measured with the Fatigue Severity Scale and Fatigue Impact Scale. The Short Physical Performance Battery assessed physical performance, and the International Physical Activity Questionnaire-Short Form measured physical activity. Depression and quality of life were evaluated using the Beck Depression Inventory and MS Quality of Life Questionnaire. Correlations between variables were analyzed using Spearman's correlation.
Results: Interoceptive awareness showed weak negative correlations with fatigue severity (r_s=-0.283, $p<0.05$) and moderate negative correlations with depression (r_s=-0.446, $p<0.05$). A weak positive correlation was found between interoceptive awareness and physical activity (r_s=0.225, $p<0.05$), but no significant correlation with fatigue impact or quality of life. Body image was weakly negatively correlated with fatigue severity (r_s=-0.280, $p<0.05$) and moderately with depression (r_s=-0.446, $p<0.05$). It also showed weak positive correlations with quality of life (r_s=0.260, $p<0.05$) and physical activity (r_s=0.338, $p<0.05$).
Conclusions: Interoception and body image are associated with fatigue, depression, and physical activity in MS. Improving these factors may reduce depression and fatigue while enhancing physical activity, suggesting the potential benefits of body awareness interventions.
Keywords: Body Image, Fatigue, Interoception, Multiple Sclerosis, Physical Performance

S080.EVALUATION OF THE FEASIBILITY AND PATIENT SATISFACTION OF TELE-REHABILITATION-BASED DUAL-TASK TRAINING IN PATIENTS WITH PARKINSON'S DISEASE

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Purpose: This study aimed to evaluate the feasibility and patient satisfaction of synchronous tele-rehabilitation dual-task programs with three motor-cognitive pairings [Motor-Motor (MM), Motor-Cognitive (MC), Combined Activity (CA)] in Parkinson's Disease (PD).
Methods: Individuals with Idiopathic PD (Hoehn and Yahr stages I-III) and a Montreal Cognitive Assessment score ≥ 21 were included. The 30 participants (11F/19M, mean age: 59.80 ± 7.02 years, disease duration: 4.00 ± 3.36 years) completed a 4-week, 3-day/week, 45-minute online dual-task

exercise program supervised by a physiotherapist. Feasibility was assessed via adherence, fatigue (Borg Scale), and difficulty (Visual Analog Scale). Patient satisfaction was evaluated with the Patient Satisfaction Questionnaire.
Results: The participation rate was 100% in all groups. Mean fatigue levels were MM: 9.19 ± 1.83, MC: 8.02 ± 1.69, CA: 8.32 ± 1.78, while mean difficulty levels were MM: 2.34 ± 1.75, MC: 2.29 ± 1.32, CA: 2.88 ± 1.89. No significant differences were found between groups in fatigue and difficulty ($p = 0.324$; $p = 0.686$). After treatment, 96.7% reported feeling better, would recommend the program, and wanted to continue. All participants found it beneficial, 93.3% believed it was appropriately tailored, and 96.7% stated technical issues did not affect participation. Additionally, 96.7% preferred tele-rehabilitation for its time and travel efficiency, even beyond the pandemic.
Conclusions: Tele-rehabilitation-based dual-task exercise programs supervised by physiotherapists demonstrated high feasibility and satisfaction, making them a valuable option for PD patients.
Keywords: Cognition, Motor skills, Parkinson's Disease, Telehealth

S081.MOTOR LEARNING-BASED CLINICAL PILATES TRAINING FOR THE PARKINSON'S DISEASE REHABILITATION @PARKINSONPILATES: A PARALLEL-GROUP, RANDOMIZED CONTROLLED TRIAL WITH 3-MONTH FOLLOW-UP

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Purpose: Parkinsonpilates(PP) is a clinical pilates training designed to improve motor learning, postural stability, and gait, which may benefit individuals with Parkinson's disease (iwPD). This study aims to provide evidence for the acceptability of the Parkinsonpilates as a new approach and to investigate the clinical outcomes.
Methods: Thirty-two iwPD with Hoehn & Yahr stage 2-3, mean age 70.19±8.88 years, were randomised to Parkinsonpilates (PP) and Conventional Physiotherapy (CP). Outcomes were measured at baseline, 6 weeks, 12 weeks, and 12 weeks post-treatment. The Timed Up and Go Test(TUG) assessed functional mobility, Functional Reach Test(FRT) measured dynamic balance, and Berg Balance Scale evaluated postural control and fall risk. Gait and Balance Scale(GABS) examined gait and balance abnormalities, while Nelson Foot Reaction Test(NFRT) measured foot reaction time and cadence was recorded.
Results: At post-test, PP showed greater improvements than CP in gait and balance ($p=.003$), reaction time ($p=.001$), functional mobility ($p=.010$), static ($p=.004$), and dynamic balance ($p=.003$), while motor examination remained similar ($p=.251$). At follow-up, functional mobility ($p=.067$) was similar, but caddence ($p=.031$) improved significantly in PP. Pairwise comparisons showed PP had consistently better cadence and reaction time across all four measurements.
Conclusions: Our study found that PP training led to a higher recovery rate than CP, with significant improvements in gait and balance, cadence, dynamic balance, and reaction time. Additionally, Parkinsonpilates supported motor learning in cadence and reaction time. Further research is needed to confirm the program's effectiveness.
Keywords: Parkinson's Disease, Physiotherapy, Pilates-Based Exercises.

S082.COMPARISON OF THE EFFECTS OF ROBOT-ASSISTED TREATMENT AND TRADITIONAL TREATMENT ON UPPER LIFE MOTOR PERFORMANCE, ACTIVITIES OF DAILY LIVING AND QUALITY OF LIFE IN STROKE PATIENTS

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Purpose: Aim of the study is to investigate UE motor disorders, activities of daily living (ADL) and quality of life (QOL) results of the Robot Group(RG) receiving robot-assisted treatment and the Control Group(KG) receiving traditional exercise training.
Methods: The study included RG, 20 stroke patients (7F/13M), KG, 7 stroke patients (3F/4M). All patients received 60 minutes of treatment, 3 days a week, for 8 weeks. RG received 30 minutes of treatment with the Assist-On Arm Exeskeleton Robot and 30 minutes of rehabilitation protocol. Evaluations were made before and after treatment. UE motor performance was assessed with Fugl-Meyer Assessment UE (FMUE), Arm Action Research Test (ARAT), Box and Block Test (KBT) and 9-Hole Peg Test (9-DÇT). ACTIVLIM and ABİLHAND scales were used in ADL assessment, and Stroke Impact Scale (İEÖ) was used in QOL assessment. Data were analyzed using Wilcoxon Test and Mann-Whitney U Test. Statistical significance was accepted as $p<0.05$.
Results: The mean age of patients in RG was 58.40 ± 14.95, and the mean age of CG patients was 50.00 ± 22.80. According to motor performance results between groups, a statistically significant difference was determined in the RG, FMUE, ARAT, 9-DÇT values($p<0.05$).
Conclusions: Our study showed that neurological rehabilitation protocol applied together with robotic treatment in stroke patients may be more effective in improving UE motor performance compared to traditional rehabilitation program.
Keywords: Activities of Daily Living, Motor Performance, Robotics, Stroke

S083.EXAMINING THE ABILITY OF DUAL-TASK PERFORMANCE TO PREDICT THE RISK OF FALLING IN PATIENTS WITH MULTIPLE SCLEROSIS

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Purpose: The objective of this study was to comprehensively evaluate the ability of dual-task skills in the upper and lower extremities to predict fall risk from the patient's perspective.
Methods: The study was conducted at Hacettepe University, Faculty of Physical Therapy and Rehabilitation. The Timed Up and Go Test (TUG) and Nine-Hole Peg Test (9HPT) were utilised for single-task assessments. The dual-task assessments included a motor task (carrying a cup) and cognitive tasks (phonetic, semantic, and subtraction tasks from series 3 and 7). Falls were prospectively recorded over three months using a falls diary. Fear of falling was assessed with the Falls Efficacy Scale-International (FES-I) and the impact of dual-task performance on daily activities was evaluated using the Dual-task Impact on Daily-living Activities (DIDA-Q). The predictive value for falls was analysed through Receiver Operating Characteristic (ROC) curve analysis.
Results: The study included 36 patients (mean EDSS: 3.36±1.17, mean age: 44.8±9.8), of whom 75% (n=27) were female and 25% (n=9) were male. According to the results of the ROC analysis, TUG+semantic task (Cut-off value=12.33; AUC=0.674; sensitivity=0.64; specificity=0.78), TUG+serial 7 subtraction (Cut-off value=11.97; AUC=0.616; sensitivity=0.70; specificity=0.57), 9DPT+semantic task (Cut-off value=39.46; AUC=0.662; sensitivity=0.58; specificity=0.89), 9DPT+serial 7 subtraction (Cut-off value=40.5; AUC=0.664; sensitivity=0.64; specificity=0.63), FES-I (Cut-off value=24; AUC=0.647; sensitivity=0.76; specificity=0.52), DIDA-Q (Cut-off value=23; AUC=0.657; sensitivity=0.64; specificity=0.68) was found.
Conclusions: According to the preliminary findings, in addition to the semantic and serial 7 subtraction task in all tests, the patient's perspective on dual task performance and fear of falling data moderately predict fall risk.
Keywords: Fall, Dual Task, Multiple Sclerosis

S084.KINEMATIC ANALYSIS OF TRUNK COMPENSATION PATTERNS OCCURRING DURING UPPER LIMB MOVEMENTS IN CHILDREN WITH OBSTETRIC BRACHIAL PLEXUS PALSY

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Purpose: It is known that compensatory movements of the trunk occur in children with Obstetric Brachial Plexus Palsy (OBPP) due to inadequate glenohumeral function. However, these measurements are mostly based on observations and non-standardized movement patterns. The aim of our study was to determine the specific trunk compensatory patterns that occur during specified upper extremity movements in children with OBPP using a motion capture system.
Methods: The children performed the Modified Mallet Scale (MMS), which consists of six movements. Nine inertial measurement units were used to measure the participants' head, trunk, and arm movements. The differences between the trunk movements occurred during the unaffected arm movements and those occurred during the affected arm movements were compared using the Wilcoxon Signed-Rank Test.
Results: Twenty-four children (12 girls, 12 boys; mean age 7.30± .41 years) with OBPP participated in the study. In MMS1, trunk compensation was observed in both the sagittal (23.07±13.35)° and transverse (12.81±7.60)° planes. Similarly, MMS2 exhibited movement in the sagittal (23.36±12.68)° and transverse (17.89±9.47)° planes. MMS3 showed movement exclusively in the sagittal (21.77±12.66)° and transverse (15.8±8.44)° planes. In MMS4, compensation was limited to the transverse plane (16.24±12.73)°. In MMS5, trunk compensation occurred in the frontal plane (6.08±4.94)°. Finally, in MMS6, movement was observed in the transverse plane (6.95±4.59)°.
Conclusions: Trunk compensation, developed to compensate for inadequate arm movements, was objectively demonstrated in the transverse, frontal and sagittal planes. The observed asymmetrical patterns may predispose long-term spinal deformities. Therefore, rehabilitation strategies should be determined by considering compensatory strategies related to the trunk.
Keywords: Brachial Plexus, Kinematics, Motion Capture, Upper Extremity,

S085.RELIABILITY OF PLANTAR FLEXOR STIFFNESS ASSESSMENT WITH ISOKINETIC DYNAMOMETER IN TYPE 2 DIABETICS

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Purpose: The aim of our study is to investigate the reliability of plantar flexor stiffness measurement with isokinetic dynamometry in subjects with type-2 diabetes.
Methods: The study included 74-subjects with Type-2 Diabetes. Isokinetic dynamometry was used to assess plantar flexors stiffness. Subjects were evaluated in the prone position, 60°/sec CPM-mode. Subjects were allowed 10° dorsiflexion, while plantar flexion was limited to 5°. It was found by subtracting the 0° torque value from the peak torque value and dividing it by the angular change. Isokinetic Intra-rater reliability was examined by the same physiotherapist twice, and inter-rater reliability was examined by a test performed by a second physiotherapist. Intra-rater reliability was examined for 2-times by the same physiotherapist, and inter-rater reliability was examined with a test performed by a second physiotherapist. For relative reliability analysis, Intraclass Correlation Coefficients of intra-rater (ICC3,1) and inter-rater (ICC2,1) were calculated using a two-way mixed model. ICC values were interpreted as follows: moderate: 0.50-0.75; good: 0.75-0.90 and excellent reliability:>0.90. For absolute reliability, the Standard Error of Measurement (SEM) and Minimal Detectable Change (MDC) were calculated using the following formulas:[SEM=SD average x$\sqrt{1-ICC}$], [MDC =1.96 x SEM x$\sqrt{2}$].
Results: The mean plantar flexor stiffness values were 0.51±0.17 and 0.51±0.16 N/angle^0 (first rater), and 0.48±0.15 N/angle^0 (2.rater). The reliability of the stiffness measurement was found to be excellent for both intra-rater (ICC=0.947, 95%CI=0.916-0.966, SEM=0.038, MDC=0.107 N/angle^0) and inter-rater (ICC=0.931, 95%CI=0.882-0.958, SEM=0.043, MDC=0.119 N/angle^0), ($p<0.001$).

Conclusions: The plantar flexor stiffness assessment with isokinetic dynamometer is a reliable method that can be used in diabetic patients.
Key words: Isokinetic, Stiffness, Type 2 Diabetes

S086.RELIABILITY OF THE MASTICATION OBSERVATION AND EVALUATION (MOE) IN AUTISM: AN INSTRUMENT FOR ASSESSMENT OF CHEWING FUNCTION

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Purpose: One of the most prevalent oral-motor problems in children with autism (CwA) is chewing disorders which may result in food refusal, food selectivity, as well as gagging or choking during feeding. Due to these complications, appropriate assessment is crucial in planning suitable interventions regarding chewing disorders for CwA. However, there is currently a lack of reliable tools to assess chewing in this population. The aim of this study is to investigate the reliability of the Mastication Observation and Evaluation (MOE) in CwA.
Methods: A total of 40 CwA aged 5-15 years were included in the study. Chewing videos of children was evaluated by using MOE. The MOE was scored 8 items including movement of the tongue, jaw, and chewing duration; loss of food or saliva; the number of swallows; and swallowing coordination. As reliability measures, intra-rater reliability and inter-rater reliability were tested. The analysis examined the correlation between the MOE scores assigned by two different raters for inter-rater reliability. One rater re-evaluated the video recordings after a 2-week interval to determine intra-rater reliability.
Results: The Intraclass correlation coefficient (ICC) of MOE ranged from 0.61 to 0.83 for inter-rater reliability, which is deemed moderate to good agreement, and ranged from 0.67 to 0.96 for intra-rater reliability, which is deemed moderate to excellent agreement.
Conclusions: The MOE demonstrates acceptable levels of reliability in children with CwA, with high levels of agreement between raters and within the same rater over time.
Keywords: Assessment, Autism, Chewing, Mastication, Reliability

S087.EVALUATION OF NEUROGENIC DYSPHAGIA IN INDIVIDUALS WITH DIFFERENT NEUROLOGICAL DISORDERS: EFFECTS ON SWALLOWING FUNCTION AND QUALITY OF LIFE

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Purpose: Aims to evaluate neurogenic dysphagia in individuals with different neurological disorders.
Methods: Cross-sectional, prospective study included adults diagnosed with multiple sclerosis (MS), stroke, and Parkinson's disease (PD) who presented with complaints of dysphagia. Assessments included Functional Oral Intake Scale (FOIS) to determine dietary status, Penetration-Aspiration Scale (PAS), Flexible Endoscopic Evaluation of Swallowing (FEES) to assess swallowing function, Turkish Eating Assessment Tool (T-EAT-10) to determine dysphagia severity, Turkish Swallowing Quality of Life Questionnaire (T-SWAL-QOL) to evaluate eating-related quality of life (QoL). Differences between groups were analyzed using ANOVA test.
Results: Total of 120 individuals (MS: 40, stroke: 40, PD: 40) were included. T-SWAL-QOL scores were significantly higher in MS and PD groups compared to stroke group ($p = 0.002$). Most severe swallowing difficulties were observed in stroke group, whereas the highest aspiration rate was found in MS group (37%). Fatigue levels were significantly higher in MS and PD ($p = 0.003$), while social

function scores were lowest in stroke group (p = 0.038). No significant differences were found between the groups in terms of eating desire, fear of eating, sleep quality, communication, and EAT-10 scores.
Conclusions: This study highlights different effects of neurogenic dysphagia on swallowing function and eating-related QoL. While dysphagia is well-known issue following acute neurological conditions such as stroke, individuals with progressive diagnoses like MS should be referred to swallowing clinics at an early stage to mitigate the risk of dysphagia development. Dysphagia may lead to serious consequences that can significantly impact QoL.
Keywords: Multiple Sclerosis, Neurogenic Dysphagia, Parkinson's Disease, Stroke, Swallowing Disorder

S088.DIGITAL HEALTH SOLUTIONS IN VISUAL-MOTOR DISORDERS: NEUROPLASTICITY-BASED APPROACHES

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Purpose: This review aims to examine the role of digital health solutions in the rehabilitation of visual-motor disorders. It specifically focuses on how eye-tracking, virtual reality (VR), augmented reality (AR), and artificial intelligence-based rehabilitation applications are integrated with neuroplasticity-based approaches.
Methods: This study reviews recent research on the use of digital health technologies in physiotherapy and neuro-rehabilitation. Systematic reviews, clinical studies, and case reports from the literature were analyzed to assess the effectiveness and application areas of digital solutions.
Results: Research indicates that digital health technologies provide significant advantages in visual-motor rehabilitation. Eye-tracking systems analyze patients' eye movements to improve attention, reading skills, and hand-eye coordination. VR and AR applications enhance movement and perception skills in a virtual environment, supporting neuroplasticity. AI-based rehabilitation systems optimize treatment processes by offering personalized exercise programs, leading to faster recovery. Neurofeedback and brain-computer interfaces (BCIs) regulate brain activity to improve motor and cognitive functions.
Conclusions: Digital health technologies offer effective and innovative solutions for the rehabilitation of visual-motor disorders. These neuroplasticity-supporting approaches accelerate patients' recovery through personalized treatment plans while also increasing access to healthcare services via remote monitoring and tele-rehabilitation. As digital rehabilitation applications become more widespread in the future, more comprehensive and effective solutions for treating visual-motor disorders are expected to emerge.
Keywords: Digital Health, Neurofeedback, Neuroplasticity, Virtual Reality, Visual Motor Disorders

S089.THE RELATIONSHIP BETWEEN NEUROLOGICAL PATIENTS' PERSPECTIVES ON ROBOTIC REHABILITATION APPLICATIONS, THEIR CYNESIOPHOBIA, AND FUNCTIONAL LEVELS

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Purpose: The aim of this study was to investigate the relationship between kinesiophobia and functional status in individuals receiving robotic rehabilitation for neurological conditions, as well as their perspectives on robotic rehabilitation.
Methods: The study included 153 individuals (57 females / 96 males) aged 18 years and older with a neurological diagnosis. Participants' functional level was assessed using the Functional Ambulation Scale, while kinesiophobia was evaluated with the Tampa Kinesiophobia Scale. Additionally, their

perspectives on robotic rehabilitation were assessed using the Usability, Satisfaction, and Ease of Use (USE) Questionnaire .
Results: The mean age of the individuals participating in the study was 46.08 ± 17.79 years. A statistically significant relationship was found between kinesiophobia and the perspectives of individuals receiving robotic rehabilitation ($p < 0.05$). On the other hand, no statistically significant relationship was found between individuals' perspectives on robotic rehabilitation and their functional level ($p > 0.05$).
Conclusions: Robotic rehabilitation applications have been rapidly increasing over the last decade, and studies evaluating their effectiveness are being conducted more frequently. In our study, which evaluated patients' perspectives on robotic rehabilitation, we found that patients' functional levels did not affect their perspectives, whereas kinesiophobia did influence them. The study is still ongoing, and as the number of participants increases, the results can be discussed and generalized in greater detail.
Keywords: Functional Level, Kinesiophobia, Neurological Rehabilitation, Physiotherapy, Rehabilitation, Robotic Rehabilitation

S090.EFFECTS OF DNS EXERCISES ON THE POSTERIOR MYOFASCIAL CHAIN

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Purpose: This study aimed to examine the effects of diaphragm-controlled exercises performed in a supine position at 4-6 months, based on the principles of Dynamic Neuromuscular Stabilization (DNS), on posterior myofascial chain flexibility, endurance, and dynamic balance.
Methods: The study included 14 healthy individuals aged between 18-35 years. Participants were randomly assigned to either the DNS exercise group or the conventional exercise group. Both groups performed designated exercise protocols for 8 sessions. Endurance was assessed using the Biering-Sorensen test, flexibility with the Sit-and-Reach test, and dynamic balance with the Y Balance test. Measurements were taken before and after the intervention, and statistical analysis was conducted using SPSS 26 software. Independent t-tests and paired t-tests were applied to calculate p-values.
Results: Statistically significant differences were observed between the DNS and conventional exercise groups in terms of flexibility, endurance, and dynamic balance. Significant improvements were found in the DNS group in the Biering-Sorensen ($p=0.021$) and Sit-and-Reach ($p=0.003$) tests.
Conclusions: Exercises based on DNS principles were observed to be effective in increasing posterior myofascial chain flexibility, endurance, and dynamic balance. The integration of DNS-based exercises into rehabilitation programs may contribute to improved physical performance.
Keywords: Dynamic Balance, Dynamic Neuromuscular Stabilization, Endurance, Flexibility, Posterior Myofascial Chain.

S091.EFFECT OF COGNITIVE REHABILITATION WITH TELEREHABILITATION IN PARKINSON'S DISEASE

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Purpose: The study aims to examine the effects of cognitive rehabilitation via telerehabilitation in patients with Parkinson's disease (PD). PD is a neurodegenerative disorder characterized by motor symptoms but cognitive impairments are also frequently observed. Cognitive rehabilitation is a potential method to support cognitive functions in PD. This study evaluates the effectiveness of cognitve rehabilitation through telerehabilitation.
Methods: Ten Parkinson's patients participated in the study. Cognitive rehabilitation was

administered twice a week for 30 minutes over a period of 6 weeks under the supervision of a physiotherapist. The first session included an initial assesment, followed by psychoeducation. At the end of the treatment, the patients were re-evaluated. Assesments included the Montreal Cognitive Assesment (MoCA), Clock Drewing Test, Number Range Test, Verbal Fluency Tests and Geriatric Depression Scale.
Results: Neuropsychometric test results showed significant improvement in attention and executive functions ($p<0.05$). In addition, a significant decrease in depression levels was observed.
Conclusions: It has been observed that telerehabilitation can be an effective method to support cognitive functions in Parkinson's patients. Especially in cases where access to health services is limited, telerehabilitation can be an important alternative that increases the applicability of cognitive rehabilitation.
Keywords: Telerehabilitation, Parkinson's Disease, Cognitive Rehabilitation, Physiotherapy

S092. INVESTIGATION OF THE RELATIONSHIP BETWEEN SLEEP DISTURBANCES AND FATIGUE IN CHILDREN WITH SPINAL MUSCULAR ATROPHY

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Purpose: The aim of this study was to investigate the relationship between sleep disturbance and fatigue in children with Spinal Muscular Atrophy (SMA).
Methods: 19 children with Spinal Muscular Atrophy (age: 11,89±3,66 years; BMI: 18,77±4,46 kg/m^2) were included in the study. Children's sleep was assessed using the Sleep Disturbances Scale for Children (SDSC) and fatigue using the Pediatric Quality of Life Inventory™ Multidimensional Fatigue Scale (PedsQL™ MFS).
Results: The SDSC T-scores of the children were 55,79±6,57 points. The child self-report and parent proxy-report scores of according to PedsQL™ MFS were 81,06±12,42 and 83,03±10,36 points, respectively. A moderate correlation was observed between the SDSC and the child self-report and the parent proxy-reported of the PedsQL™ MFS (p=0,013, r=-0,55), (p=0,040, r=-0,47).
Conclusions: The relationships between sleep disturbance and fatigue in children with SMA showed that sleep disturbance in SMA is not an isolated problem but may lead to different symptoms. Assessment of sleep parameters and, if necessary, approaches to improve sleep quality in SMA can improve children's quality of life by affecting many parameters.
Keywords: Spinal muscular atrophy, Sleep disorders, Fatigue

S093.COMPARISON OF THE EFFECTS OF OROFACIAL TREATMENT AND THERAPEUTIC YOGA ON SWALLOWING FUNCTIONALITY AND QUALITY OF LIFE IN CHILDREN WITH DOWN SYNDROME. RANDOMIZED CONTROLLED TRIAL

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Purpose: The aim of this study was to compare the effects of orofacial therapy and therapeutic yoga on swallowing functionality in children with Down syndrome (DS).
Methods: A total of 51 children with DS were included in the study, with an average age of 8.23 ± 2.10 years and an average body mass index (BMI) of 16.83 ± 4.90 kg/cm². To determine the severity of dysphagia symptoms in children aged 5–12 years diagnosed with Down syndrome and attending special education centers, the Pediatric Eating Assessment Tool (pEAT-10) was used. Children who scored >4 on the pEAT-10 questionnaire were included in the study. Tongue strength and endurance were evaluated using the Iowa Oral Performance Instrument (IOPI) device. The participants were randomly

assigned to one of three groups Control, Orofacial Therapy, or Yoga Therapy with 17 children in each group. Pre- and post-treatment evaluations were conducted and compared.
Results: In all groups, there was an increase in IOPI endurance values within the group ($p<0.05$), improvement in dysphagia symptoms ($p<0.05$) and a significant difference in anterior and posterior tongue strength increases ($p<0.05$). In the comparison between the groups, it was determined that the difference in tongue endurance values was in favor of the orofacial group.
Conclusions: According to the results obtained from our study, the orofacial group was found to be superior to the yoga and control groups in increasing tongue endurance values.
Keywords: Down Syndrome, Swallowing

S094. EFFECTS OF TRUNK CONTROL TRAINING ON MOTOR FUNCTION AND CAREGIVER BURDEN IN CHILDREN WITH SPINAL MUSCULAR ATROPHY

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Purpose: Spinal muscular atrophy (SMA) is a genetic neuromuscular disorder characterized by progressive muscle weakness and motor function loss. Motor function impairment leads to reduced trunk stability and restricted mobility, making daily activities more challenging and increasing the burden on caregivers. This study aims to evaluate the effects of trunk control exercises on motor function and caregiver burden in children with SMA.
Methods: A total of 45 children diagnosed with SMA were included in the study. Participants underwent an 8-week trunk stabilization exercise program, five days per week. The program consisted of stabilization exercises designed to improve postural control, strengthen trunk muscles, and enhance functional independence. Motor function was assessed using the Hammersmith Functional Motor Scale Expanded (HFMSE), while caregiver burden was evaluated using the Zarit Caregiver Burden Scale (ZCBS). Assessments were conducted before and after the 8-week intervention.
Results: The mean age of the children included in the study was 9.04±0.70. Among the participants, 26 were diagnosed with Type 1, 14 with Type 2, and 5 with Type 3 SMA. After eight weeks of trunk training, there was a significant increase in the children's HFMSE score (1.68±2.27, $p<0.001$) and a substantial decrease in their ZCBS score (-4.35±6.47, $p<0.001$).
Conclusions: Our findings suggest that trunk training may be an effective rehabilitation approach for enhancing functional independence in children with SMA while alleviating caregiver burden. Future studies with larger sample groups and longer-term follow-up sessions will contribute to the literature.
Keywords: Caregiver Burden, Pediatrics, Rehabilitation, Spinal Muscular Atrophy

S095.THE EFFECT OF SPINAL ORTHOSIS ON THE DEVELOPMENT OF SCOLIOSIS AND CHEST DEFORMITY IN CHILDREN WITH TYPE 1 SPINAL MUSCULAR ATROPHY

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Purpose: This study examines the impact of spinal bracing alongside pulmonary care (PC), individualized pulmonary rehabilitation (IPR), and trunk exercises (ITE) on spinal and chest deformities in children with Type 1 spinal muscular atrophy (SMA), a condition causing severe muscle weakness.
Methods: The study included 20 children with Type 1 SMA aged 2-6 years, with a scoliosis angle ranging between 20° and 40°. Participants were stratified using a randomization method and divided into two groups: Group 1 (PC, IPR, ITE) and Group 2 (PC, IPR, ITE & spinal orthosis), followed by an 8-week treatment program. Before and after treatment, all children were assessed using radiographic imaging for Cobb angle, chest X-ray for basal upper-lower chest wall ratio, and the Supine Trunk Rotation Angle Test (SATR) for chest deformity.
Results: The demographic and clinical characteristics, as well as baseline measurements of the children, were similar between the groups ($p>0.05$). Both groups showed significant improvement in Cobb angle and bell-shaped chest deformity ($p<0.05$). However, Group 2 demonstrated greater effect sizes in all assessment parameters. Group 2 was superior to Group 1 in terms of improvement differences in Cobb angle and bell-shaped chest deformity ($p<0.05$). There was no significant difference between the groups after treatment ($p>0.05$).
Conclusions: The combination of PC, IPR, ITE and spinal orthosis showed greater effectiveness in Type 1 SMA, making this the first study to demonstrate its benefits. Larger-scale studies with long-term follow-ups are needed to further validate these findings.
Keywords: Scoliosis, Rehabilitation, Spinal Orthosis, Trunk Deformity, Type 1 SMA

S096. INVESTIGATION OF RESPIRATORY MUSCLE STRENGTH AND TRUNK CONTROL ACCORDING TO FUNCTIONAL LEVELS IN INDIVIDUALS WITH CEREBRAL PALSY

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Purpose: This study aimed to investigate and compare respiratory muscle strength and trunk control according to the functional levels of individuals with cerebral palsy (CP).
Methods: This cross-sectional study included 40 individuals with CP with an average age of 8.1 years, 55% male and 45% female, classified at levels 1, 2, and 3 according to the Gross Motor Function Classification System (GMFCS). Demographic data (age, gender, height, body weight, and birth-related information) were recorded. Participants were divided into three groups based on their functional levels (GMFCS levels 1, 2, and 3). Respiratory muscle strength was assessed using maximal intra-oral pressure measurements (maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP)). Trunk control was evaluated using the Trunk Control Measurement Scale (TCMS).
Results: The groups were similar in terms of age, gender, and height ($p>0.05$). However, significant differences were found in body weight and body mass index ($p=0.025$, $p=0.018$, respectively), with the highest values observed in level 3 participants. Significant differences were found among the groups in MIP values and TCMS scores ($p=0.044$, $p<0.001$, respectively), with the highest values observed in level 1 participants. However, no significant differences were found in MEP values among the groups ($p>0.05$). No statistically significant correlation was found between MIP, MEP values, and TCMS scores ($p>0.05$).
Conclusions: This study demonstrated that individuals with CP at GMFCS level 1 had better inspiratory muscle strength and trunk control compared to those at levels 2 and 3. These findings may serve as a reference for designing rehabilitation interventions aimed at improving respiratory muscle strength in individuals with CP.
Keywords: Cerebral Palsy, Respiratory Muscle Strength, Trunk Control

S097. CURRENT CLINICAL TESTS USED IN THE EVALUATION OF BALANCE AND GAIT IN INDIVIDUALS WITH MULTIPLE SCLEROSIS

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Purpose: Multiple Sclerosis (MS) is a progressive neurological disease affecting the central nervous system. Balance and gait disorders are common symptoms in individuals with MS and significantly impact functional independence. Accurate assessment of these impairments is crucial for treatment planning and disease monitoring.
Methods: This study reviews current clinical tests used to assess balance and gait in individuals with MS. These tests are categorized into objective and subjective measurements. Common objective tests include the Tandem Stance Test, Timed Up and Go Test (TUG), Six-Minute Walk Test (6MWT), 10-Meter Walk Test, Berg Balance Scale (BBS), Functional Reach Test, 3-Meter Backward Walk Test, 25-Step Walk Test, Five-Repetition Sit-to-Stand Test, Figure-8 Walking Test, L-Test, Modified Walking and Remembering Test (mWART), Four-Meter Walk Test, Fullerton Advanced Balance Scale (FAB), and Four-Step Square Test (FSTS). The Multiple Sclerosis Walking Scale (MSWS-12) is a disease-specific measure for gait assessment. Subjective tests, such as the Functional Independence Measure (FIM), evaluate patients' perceptions of functional status.
Results: Various studies have demonstrated that these tests are valid and reliable for assessing balance and gait impairments in individuals with MS.
Conclusions: Clinical balance and gait tests play a crucial role in monitoring disease progression, guiding treatment interventions, and personalizing rehabilitation strategies for individuals with MS. Their appropriate use can enhance clinical decision-making and improve functional outcomes. Further research is needed to refine these assessments and integrate emerging technologies into MS rehabilitation.
Keywords: Balance, Gait, Multiple Sclerosis

S098.INVESTIGATION OF THE ACUTE EFFECTS OF WEARABLE ELECTRICAL STIMULATION APPLICATION ON SPASTICITY, MOTOR FUNCTIONS, AND GAIT IN STROKE PATIENTS

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Purpose: The aim of our study was to investigate the acute effects of the EXOPULSE Mollii Suit Wearable Electrical Stimulation system on upper and lower extremity spasticity, pain, fatigue, motor functions, fall risk, gait, and hand functions in stroke patients.
Methods: Individuals who had experienced a stroke at least 3 months prior were included in the study. The EXOPULSE Mollii system was applied for 1 hour, with stimulation intensity adjusted based on spasticity assessment results. Evaluations were conducted before and after the session using the Modified Ashworth Scale (MAS) for spasticity, Visual Analog Scale (VAS) for pain and fatigue, STREAM Scale for motor function, 5 Times Sit-to-Stand Test for lower extremity function, Timed Up and Go Test (TUG) for fall risk, 10-Meter Walk Test (10mWT) for gait, and 9-Hole Peg Test for hand function
Results: The study was completed with 9 stroke patients (2 females, 7 males; mean age: 55.89 ± 6.62 years). After one hour of stimulation, statistically significant differences were observed in the patients' lower extremity spasticity ($p=0.08$) and STREAM scores evaluating motor functions ($p=0.011$). However, no statistically significant differences were observed in upper extremity spasticity, pain, fatigue, lower extremity functions, hand functions, fall risk, or gait scores ($p>0.05$).
Conclusions: The results of our study suggest that the EXOPULSE Mollii system may enhance the success of rehabilitation in subacute-chronic stroke patients when evaluating its acute effects on spasticity and motor functions. Future studies with larger sample sizes and control groups are needed to confirm these findings.

Keywords: Electrical Stimulation, Spasticity, Stroke

S099. COMPREHENSIVE CLINICAL CASE ANALYSIS WITH BOBATH CONCEPT AFTER STROKE

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Purpose: This case study aims to examine the effect of an individually designed rehabilitation program based on the Bobath concept on motor function, balance and activities of daily living after ischemic stroke. An eighty-three year old man, at high risk of falls due to post-stroke motor loss, balance impairment and mobility limitation, was included in an intensive, motor learning-based rehabilitation process.
Methods: The patient underwent an individualized Bobath-based rehabilitation program for 8 weeks focusing on postural control, upper limb functionality, weight transfer and dynamic balance. The treatment included manual mobilization and facilitation techniques with sensory stimuli aimed at both sensory-motor integration and inhibition of non-neural mechanisms, functional task training for quality movement, and exercises aimed at improving balance and gait mechanics. Motor improvement was assessed by Fugl-Meyer Scale(FM-UE) and STREAM, balance by Berg Balance Scale and independence by Functional Independence Scale (FIM).
Results: After eight weeks of rehabilitation, the patient showed significant improvement in motor skills, balance, and daily independence. FM-UE increased from 21 to 25, Berg Balance from 20 to 30, STREAM from 27 to 40, and FIM from 88 to 96. These gains were achieved through individualized functional exercises based on sensory-motor integration and neuroplasticity within the Bobath concept.
Conclusions: Significant improvement in upper extremity motor skills, stability, and mobility was observed after treatment. This case study shows that individualized rehabilitation based on the Bobath concept provides an effective, holistic approach to accelerating recovery after stroke, enhancing motor skills, balance, and independence in daily activities.
Keywords: Bobath, Exercise, Stroke, Rehabilitation

S100. EFFECTS OF PELVIC PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION (PNF) EXERCISES ON STRENGTH, BALANCE AND GAIT IN PATIENTS WITH MULTIPLE SCLEROSIS: A RANDOMIZED CONTROLLED SINGLE-BLIND STUDY

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Purpose: It is known that strengthening exercises for lower extremity muscles are effective in patients with Multiple Sclerosis (MS). However, the results of pelvic pattern exercises, which are crucial for lower extremity movements, have not been specified. The aim of this study is to examine the effects of Pelvic Proprioceptive Neuromuscular Facilitation (PNF) exercises on strength, balance, and walking abilities.
Methods: A total of 31 patients with Relapsing-Remitting MS (19 females, 12 males) were included in the study. Patients were randomly assigned to two groups. The first group received pelvic PNF exercises, while the second group received lower extremity strengthening training. The exercises were conducted 3 days/ a week for six weeks. Lower extremity muscle strength was measured with a digital

dynamometer (Knect), balance was assessed using the Figure of 8 walk test, and walking ability was evaluated using the 12-item MS Walking Scale.
Results: Lower extremity muscle strength increased in the PNF group ($p<0.05$). The 12-item MS Walking Scale showed a decrease in both groups ($p<0.05$). When comparing the groups, it was found that the strength of hip extensors and adductors increased more in the PNF group, and the Figure of 8 walk test decreased more in the PNF group ($p<0.05$).
Conclusions: The study found that pelvic PNF exercises, targeting the key point of the lower extremity, were more effective than strengthening exercises in increasing muscle strength improving balance.
Keywords: Balance, Gait, Multiple Sclerosis, Proprioceptive Neuromuscular Facilitation, Strength

S101. INVESTIGATION OF THE EFFECTS OF VIRTUAL REALITY GAMES SPECIALLY DEVELOPED FOR REHABILITATION ON BALANCE, TRUNK PERFORMANCE, FALL RISK, GAIT, AND FATIGUE IN ATAXIC PATIENTS

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Purpose: This study aimed to investigate the effects of a virtual reality game (Upper Extremity Smart Exercises Innovative Treatment - USE-IT), designed for rehabilitation, on balance, trunk performance, fall risk, gait, and fatigue in ataxic individuals when combined with routine physiotherapy.
Methods: Participants received 18 treatment sessions over 6 weeks (3 sessions/week). Each 1-hour session included 40 minutes of routine physiotherapy and 20 minutes of virtual reality game therapy. Among the 6 games available in the USE-IT smart physiotherapy game system, those suitable for the patients were selected and incorporated into the treatment program. Assessments were conducted before the treatment and immediately after the 6-week treatment program using the Berg Balance Scale (BBS) for balance, Trunk Impairment Scale (TIS) for trunk performance,Timed Up and Go Test (TUG) for dynamic balance and fall risk, 10-meter Walk Test (10mWT) for gait speed, and Fatigue Severity Scale (FSS) for fatigue.
Results: Six individuals (2 women, 4 men; age: 49.83±11.34 years; disease duration: 232.00±60.08 months) completed the study. At the end of the 6-week treatment, statistically significant improvements were observed in the Berg Balance Scale ($p=0.027$), while statistically significant decreases were noted in the TUG ($p=0.046$) and 10MWT ($p=0.028$) results. No significant differences were found in the TIS and FSS ($p>0.05$).
Conclusions: The results of our study suggest that adding virtual reality games to physiotherapy sessions for ataxic individuals can enhance the success of balance rehabilitation by improving dynamic and static balance, increasing walking speed, and reducing the risk of falls.
Keywords: Ataxia, Rehabilitation, Virtual reality

S103. INVESTIGATION OF THE EFFECTS OF FUNCTIONAL EXERCISES PERFORMED WITH MUSIC ON INDIVIDUALS WITH DEMENTIA LIVING IN NURSING HOMES

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Purpose: This study aims to examine the effects of physical exercise and music therapy on balance, physical performance, and fall efficacy in individuals diagnosed with dementia.
Methods: The study included 40 individuals aged 60 and over, diagnosed with mild to moderate dementia, residing in nursing homes in Istanbul. Participants were randomly divided into two groups: the first group participated in a functional exercise program only (n=20), while the second group performed the same program accompanied by music (n=20). The exercise program lasted for eight weeks, with two sessions per week, including warm-up, strength, and balance exercises, as well as a cool-down phase. In the music-accompanied exercise group, instrumental compositions of Turkish music were used. Participants' dynamic balance and physical function were assessed using the Timed Up and Go Test (TUG), balance and flexibility were measured using the Functional Reach Test (FRT), and fear of falling was evaluated with the Falls Efficacy Scale-International (FES-I).
Results: After the eight-week exercise program, statistically significant improvements were observed in both groups ($p<0.05$). A statistically significant difference was found between the groups in the FRT results ($p=0.001$), whereas no significant differences were observed in the FES-I ($p=0.398$) and TUG ($p=0.335$) results.
Conclusions: The findings of this study suggest that functional exercises performed with music may more effectively contribute to certain functional improvements in individuals with dementia. In particular, exercises accompanied by music were found to have more positive effects on balance and fall efficacy compared to exercises performed without music.
Keywords: Dementia, Exercise, Music Therapy

S104.THE EFFECT OF UPPER LIMB REHABILITATION ROBOT ON FUNCTIONALITY AND ACTIVITIES OF DAILY LIVING IN ACUTE STROKE REHABILITATION

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Purpose: This study aimed to evaluate the effectiveness of using a hand robot in acute stroke rehabilitation on functionality, fine motor skills, and activities of daily living (ADLs).
Methods: A total of 30 individuals aged 40-60 years with hemiplegia participated. Participants were divided into two groups: one received neurodevelopmental therapy combined with hand robot training (n=15), while the other received only neurodevelopmental therapy (n=15). The therapy program was applied three times per week for 8 weeks, including strengthening, stretching, and fine motor exercises. The hand robot group also underwent robotic rehabilitation following neurodevelopmental therapy.
Results: The study used various evaluation tools to assess outcomes. Hand functions were assessed with the ABILHAND Stroke Questionnaire, activities of daily living were measured using the Barthel Index (BI), functionality was evaluated with the Disabilities of the Arm, Shoulder, and Hand (DASH) Questionnaire, fine motor activities were assessed using the Nine-Hole Peg Test (NHPT), and spasticity levels were determined with the Modified Ashworth Scale (MAS).
Conclusions: Both groups showed significant improvements in ADLs, fine motor skills, NHPT, and ABILHAND scores ($p<0.05$). However, the hand robot group showed superior outcomes in BI and NHPT compared to the neurodevelopmental therapy group ($p<0.05$). In conclusion, hand robot training is an effective complementary method alongside neurodevelopmental therapy in acute stroke rehabilitation, significantly improving ADLs and fine motor skills.
Keywords: Fine Motor Activity, Hand Robot, Motor Function, Stroke

S105. THE RELATIONSHIP BETWEEN PAIN AND AWARENESS OF AGE-RELATED CHANGES IN GERIATRIC INDIVIDUALS

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Purpose: This study was conducted to examine the relationship between musculoskeletal pain levels and awareness of age-related changes in elderly individuals.
Methods: The study included individuals aged 65–93 with musculoskeletal pain. The socio-demographic and physical characteristics of the participants were recorded. Pain levels were assessed using the Geriatric Pain Scale, and perceptions of changes experienced during the aging process were evaluated with the Awareness of Age-Related Change Scale (AARC-50). Relationships between variables were tested using Spearman Correlation Analysis.
Results: The participants had a mean age of 71.66 ± 7.51 years (F= 60%, n=72; M= 40%, n=48), with 45.8% (n=55) experiencing mild pain, 40.8% (n=49) moderate pain, and 13.3% (n=16) severe pain. The AARC-50 gain score was 90.88 ± 21.61 (min-max: 25–173), while the loss score was 73.36 ± 27.84 (min-max: 33–247). A statistically significant positive correlation was found between the total score of the Geriatric Pain Scale and the AARC-50 loss score (rho=0.518, $p<0.001$). However, no significant correlation was detected between the gain score (rho= -0.17, p=0.058).
Conclusions: As pain levels increase, individuals tend to associate aging more with loss. This suggests that pain perception may trigger a focus on the negative aspects of aging, while positive aging experiences may not be directly linked to pain. The wide distribution of gain and loss scores indicates the role of individual differences. Reducing pain in geriatric individuals may enhance positive perceptions of age-related changes. It is recommended that future studies also examine other factors related to pain.
Keywords: Awareness, Elderly, Pain

S107. DUAL TASK IN MULTIPLE SCLEROSIS REHABILITATION: A LITERATURE REVIEW

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Purpose: To review current studies involving dual tasks in Multiple Sclerosis (MS) rehabilitation and to evaluate the results.
Methods: Randomized controlled trials, systematic reviews and meta-analyses published between 2020 and 2025 using the keywords “multiple sclerosis” and “dual task” in Pubmed were reviewed.
Results:12 randomized controlled trials, 8 systematic reviews and 7 systematic reviews and meta-analyses were reviewed. In randomized controlled trials, dual tasks were used in training and assessments. The training programs were implemented either directly with dual task training or in combination with strengthening exercises. A very limited number of studies have examined the effects of technology-assisted approaches such as virtual reality applications on dual task performance. Dual task performance is usually assessed by performing motor and cognitive tasks together with treadmill, gait and balance tests. The results of systematic reviews and meta-analyses suggest that dual task interventions including motor and cognitive tasks may have positive effects on balance, functional mobility and executive functions in patients with MS.
Conclusions: It is thought that integrating dual tasks into MS rehabilitation may improve functional independence. When planning dual tasks, it is very important to create and test protocols for motor and cognitive tasks suitable for daily life in line with the needs of patients. It is thought that integrating technology-supported applications into dual task trainings and evaluations would be beneficial, especially in terms of diversity. To clearly demonstrate the effects of dual tasks, more studies are needed that apply and test standardized protocols and objectively assess long-term effects in relation to neuroplasticity.
Keywords: Cognitive, Dual task, Motor, Multiple Sclerosis, Rehabilitation

S108.EFFECT OF WEEKLY INSTRUMENT PLAYING TIME ON HAND AND FINGER GRIP STRENGTH IN YOUNG VIOLINISTS

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Purpose: The study investigated the effect of weekly instrument playing time on hand and finger grip strength in young violinists.
Methods: A total of 100 violinists with a mean age of 22.78±3.94 were included in the cross-sectional study. Since the literature reports that playing the instrument for 15 hours or more per week is a risk factor for musculoskeletal problems in musicians, the violinists were divided into two groups: those playing the instrument for 15 hours or more per week (n=50) and those playing the instrument for less than 15 hours (n=50). Right and left-hand grip strength was assessed with a hydraulic hand dynamometer, and right and left-finger grip strength was assessed with a pinch meter in violinists.
Results: There was no statistically significant difference between the groups regarding hand and finger grip strength according to weekly instrument playing time ($p>0.05$).
Conclusions: Since the degree of loading on the musculoskeletal system of each instrument is different, instrument playing times, which may affect hand and finger grip strength, may vary depending on the instrument groups. In addition to the weekly instrument playing time, investigating the difficulty level of the pieces played, and the techniques used may be important in evaluating hand and finger grip strength. In the future, it is recommended that preventive and rehabilitative physiotherapy approaches for musician health be developed by designing studies that question the difficulty level of the pieces played and the techniques used for them, as well as include different age and instrument groups.
Keywords: Finger, Grip Strength, Hand, Health, Rehabilitation

S109. COMPARISON OF THE EFFECTS OF MANUAL THERAPY AND BETY ON HEADACHE AND QUALITY OF LIFE IN PATIENTS WITH TEMPOROMANDIBULAR DISORDERS ASSOCIATED HEADACHE

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Purpose: Studies investigating interventions to improve symptoms of headache associated with temporomandibular disorders (TMD-HA) from a biopsychosocial perspective are limited. The aim of the study was to investigate and compare the effectiveness of manual therapy (MT) and cognitive exercise therapy approach (CETA) on headache and quality of life in TMD-HA patients.
Methods: 42 patients with TMD-HA, with a mean age of 38.83 ± 9.06 years, were randomly divided into the MT group (n=22), the BETY training group (n=20). Treatment protocols were applied for 8 weeks and included specific interventions. The MT Group received cranio-mandibular, cervical soft tissue and joint mobilizations. The BETY Group underwent function-focused core stabilization exercises, dance therapy-authentic movements and pain information management. At the end of 8 weeks; Headache Impact Test(HIT-6), Pain intensity using the Visual Analog Scale(VAS), Trigger point sensitivity using algometer measurement device (Wagner Instruments, Greenwich, USA), Temporomandibular joint(TMJ) range of motion(mm) and Oral Health Impact Profile-14(OHIP-14) were evaluated.
Results: At the end of treatment (8th week), within-group comparisons showed significant improvements in all measures ($p<0.05$). However, in the between-group comparison, the MT group showed greater improvement in all measurements compared to the BETY group ($p<0.05$).
Conclusions: This study showed that both MT and BETY effectively reduced pain, improved quality of life. However, when MT was compared with BETM, all measures were more effective in TMD-HA

patients. Furthermore, BETY, a biopsychosocial-based exercise model, offers a valuable contribution to the international literature on its effects on TMD-HA patients.
Keywords: Biopsychosocial, Headache, Manual Therapy, Temporomandibular

S110. INVESTIGATION OF THE PREVALENCE OF TEMPOROMANDIBULAR DISORDERS AND BRUXISM IN PSYCHIATRIC DISEASES

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Purpose: The aim of this study was to investigate the prevalence of TMDs and bruxism in individuals with any psychiatric disorder who applied to psychiatric outpatient clinic.
Methods: This study was conducted on individuals who applied to Mersin City Training and Research Hospital Psychiatry Outpatient Clinics between 1 October 2024 and 30 December 2024. The study included 705 individuals (399 males, 306 females) aged 18-60 years who were diagnosed to have any psychiatric disorder according to Diagnostic and Statistical Manual of Mental Disorders. The presence of TMDs were analysed using Fonseca Anamnestic Index. The presence of bruxism in the participants was examined using Standardised Tool for the Assessment of Bruxism-STAB Axis A.
Results: TMDs was detected in 533 (75.6%) of 705 participants. 72.8% of the participants reported nocturnal bruxism. The 5 disease groups with the highest prevalence of TMED were obsessive-compulsive disorder (91.6%), eating disorders (91.3%), borderline personality disorder (89.5%) and substance abuse (88.6%) and somatoform disorders (86.2%). The 5 disease groups with the highest prevalence of nocturnal bruxism were post-traumatic stress syndrome (90.9%), borderline personality disorder (89.4%), gender dysphoria (85.7%), trichotillomania (83.3%) and cluster B personality disorders (80%).
Conclusions: The results obtained show that the prevalence of TMED and bruxism is quite high in individuals with psychiatric disorders. Considering negative effects of TMDs and bruxism on quality of life and oral functions, it is thought that it is important to routinely evaluate psychiatric patients in terms of TMDs and bruxism and to make necessary interventions in this direction.
Keywords: Bruxism, Mental Disorders, Prevalence, Temporomandibular Joint Disorder

S111. OPTIMAL STARTING TIME FOR UNIPEDAL EXERCISES IN THE REHABILITATION OF CHRONIC ANKLE INSTABILITY: A RANDOMIZED CONTROLLED PILOT STUDY

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Purpose: Chronic ankle instability (CAI) is a condition characterized by pain, a sense of insecurity, and avoidance behavior, which can limit weight-bearing on the affected limb. Traditional rehabilitation protocols recommend unipedal exercises following bipedal training. However, reluctance to weight-bearing on the unstable limb may hinder recovery. This study aims to compare the effectiveness of early-stage unipedal versus bipedal exercise interventions in individuals with CAI.
Methods: Twelve individuals with CAI (mean age: 30.25 ± 9.01 years) were randomly assigned to one of two groups: (i) Early Unipedal Exercise Group (EUEG, n=6) or (ii) Late Unipedal Exercise Group (LUEG, n=6). Both programs included exercises targeting joint mobility, muscle strengthening, neuromuscular control, proprioception, balance, and gait training, following either an early or late unipedal progression. Participants underwent 16 supervised sessions over eight weeks. Outcome measures included the Visual Analog Scale (VAS), Tampa Scale of Kinesiophobia (TSK), Single-Leg

Jump Test (SLJT), and Cumberland Ankle Instability Tool (CAIT). Assessments were conducted at baseline, week 8, and week 24 by an independent evaluator.
Results: No statistically significant differences were observed between groups regarding pain, fear-avoidance behavior, functional status, or disease severity at weeks 8 and 24 ($p>0.05$). However, the EUEG demonstrated higher effect sizes in TSK ($\eta^2=0.16$), SLJT ($\eta^2=0.17$), and CAIT ($\eta^2=0.19$).
Conclusions: Incorporating unipedal exercises early in CAI rehabilitation produced outcomes comparable to conventional approaches. Larger-scale studies are needed to confirm these preliminary findings.
Keywords: Instability, Lateral Ankle Ligament Injury, Physiotherapy, Rehabilitation.

S112. COMPARISON OF THE EFFECTS OF MYOFASCIAL RELEASE AND FACIAL INDUCTION THERAPY TECHNIQUES ON PAIN, FLEXIBILITY AND FASCIA ARCHITECTURE: A PILOT STUDY

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Purpose: The aim of this study was to investigate and compare the effectiveness of Myofascial Release (MFR) and Myofascial Induction Technique (MIT) in chronic low back pain.
Methods: A total of 25 female and 15 male patients aged 35-60 years with chronic low back pain were included. The individuals were divided into two groups as Myofascial Release (MFR) (n=20) and Myofascial Induction Therapy (MIT) (N=20) by applying simple randomization method. The myofascial release group underwent a 3-minute myofascial application in the direction of the Erector Spina, Latissimus Dorsi and Quadratus Lumborum muscles, right and left. Induction of the lumbar interfascial triangle region (Stroke Application) (3 min), Deep induction application of the lumbar interfascial triangle region (3 min), Cross-hands myofascial induction (3 min) were applied to the myofascial induction therapy group. Visual Analog Scale (VAS), Modified Shober Test, Thoraculobal Fascia Thickness Measurement (with USG) and Global Change Scale (GDS) were used to evaluate patient satisfaction before and after treatment.
Results: Considering the intra-group comparisons, a statistically significant difference was observed in both groups in the direction of decrease in VAS and fascia thickness and in the direction of increase in Modified Schober parameter ($p<0.05$). When the groups were compared after the treatment, it was seen that the MFR group was statistically superior to the MIT group in the Modified Schober parameter ($p<0.05$), while there was no statistically significant difference in the other parameters ($p>0.05$).
Conclusions: Both treatments were found to be effective in patients with chronic low back pain. However, the short-term flexibility was found to be superior in the MFR group.
Keywords: Fascia, Low back pain, Myofascial Treatment

S113. INVESTIGATION OF THE EFFECT OF BRUXISM ON NECK PAIN, DISABILITY, AND JOINT POSITION SENSE

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Purpose: Bruxism, affecting millions of people worldwide, is considered one of the most harmful activities for the stomatognathic system. The temporomandibular joint is connected to the cervical

region through muscles and ligaments, linking bruxism with cervical spine issues. This study aimed to investigate the effect of bruxism on neck pain, disability, and position sense.
Methods: The study included 84 individuals: 42 symptomatic and 42 asymptomatic, all with sleep bruxism, based on the Diagnostic Criteria List for Sleep Bruxism. Neck pain was assessed using the Visual Analogue Scale, disability with the Neck Disability Index, and position sense through the target angle test using a digital inclinometer (JTECH Medical, Midvale, UT, USA). Mann-Whitney-U tests were used to compare the groups for severity of neck pain, disability, and angular deviation in position sense, with statistical significance set at $p < 0.05$.
Results: The study found that the severity of neck pain ($p=0.001$) and neck disability ($p<0.001$) were significantly higher in individuals with bruxism compared to the asymptomatic control group. Furthermore, target angle test results showed significantly higher deviation values in neck position sense during flexion ($p=0.042$) and extension ($p=0.023$) in individuals with bruxism compared to the control group.
Conclusions: This study observed that individuals with bruxism experienced higher levels of neck pain and disability compared to asymptomatic individuals. Additionally, bruxism was associated with deviations in neck position sense. These findings highlight the importance of physiotherapists thoroughly evaluating neck pain, disability, and position sense in patients with bruxism and grinding habits.
Keywords: Bruxism, Neck, Pain, Proprioception, Temporomandibular Joint

S114. THE EFFECT OF SCAPULAR DYSKINESIS ON FUNCTIONAL SHOULDER PERFORMANCE IN INDIVIDUALS WITH FORWARD HEAD POSTURE

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Purpose: Forward head posture (FHP) and scapular dyskinesis (SD) are reported to negatively affect shoulder girdle biomechanics and muscle activation. Although FHP and SD are related, both conditions can be present together or independently in individuals. This study aims to examine the effect of FHP and SD on functional shoulder performance.
Methods: The study included four groups: individuals with both FHP and SD (n=12), only FHP (n=12), only SD (n=10), and those without FHP or SD (n=12), totaling 46 participants (Age: 21 ± 4 years; Gender: 33 women and 13 men VKI for women:24,79±7,4 kg/m^2 and VKI for men:26,32±6,88). Functional shoulder performance was assessed using the "Timed Functional Arm and Shoulder Test." Kruskal-Wallis and post-hoc tests were used to determine differences between groups.
Results: The group with both FHP and SD had significantly lower total scores ($p=0.01$) and dominant shoulder functional performance scores ($p=0.01$) compared to the group without FHP or SD. However, no statistically significant difference in shoulder performance was found between the groups with only FHP or only SD compared to the group without these conditions ($p>0.05$).
Conclusions: The coexistence of forward head posture and scapular dyskinesis negatively impacts functional shoulder performance. In shoulder rehabilitation, corrective and stabilization exercises targeting both the cervical and scapular regions may be more effective in improving shoulder performance.
Keywords: Head, Scapula, Shoulder, Posture

S115. COMPARISON OF THE EFFECTIVENESS OF NEUROSCIENCE-BASED PAIN EDUCATION AND MYOFASCIAL INDUCTION TECHNIQUE IN PATIENTS WITH CHRONIC NECK PAIN: A PILOT STUDY

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Purpose: The study aims to investigate and compare the effectiveness of Neuroscience Based Pain Education (NBPE), a current approach, and Myofascial Induction Technique (MIT) in chronic neck pain, a common musculoskeletal disorder**.**
Methods: The study included 38 female and 6 male patients aged 18-50 with chronic neck pain. The subjects were divided into two groups as NBPE (n=22) and MIT (n=22) by applying simple randomisation method. While patients in the NBPE group received NBPE and home exercises in face-to-face sessions of 35-45 minutes, once a week, for 8 weeks, patients in the MIT group received myofascial therapy and home exercises. Visual Analogue Scale (VAS), Pain Catastrophising Scale (PCS) and Central Sensitisation Inventory (CSI) values were recorded before and after treatment. Global Rating of Change (GROC) was used to evaluate patient satisfaction after treatment.
Results: After the treatment, significant improvements were detected in all measurements in both groups ($p<0.05$). In the intergroup comparison, VAS and patient satisfaction scores were found to be significantly different in favour of the MIT group, and SSI and PCS scores were found to be significantly different in favour of the NBPE group ($p<0.05$).
Conclusions: Both treatments were found to be effective in patients with chronic neck pain. However, in our short-term (week 8) results, the MIT group was superior in pain reduction and patient satisfaction, and the NBPE group was superior in central sensitisation and pain catastrophising values. For the long-term results of our study, the subjects will be re-evaluated within six months.
Keywords: Education, Myofascial treatment, Neck Pain,

S116. DOES TELEREHABILITATION INFLUENCE SHORT-TERM ARTIFICIAL JOINT AWARENESS AND KINESIOPHOBIA AFTER TOTAL KNEE ARTHROPLASTY COMPARED TO THE STANDARD HOME PROGRAMME?

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Purpose: Despite existing research on telerehabilitation in total knee arthroplasty (TKA), evidence on its short-term effects on kinesiophobia and joint awareness is limited. The objective of this study was to investigate the short-term effect of telerehabilitation on kinesiophobia and artificial joint awareness in patients with TKA.
Methods: The study included TKA patients over 50, with 18 in both the telerehabilitation and standard home programme groups. The telerehabilitation group had weekly video, voice, and text check-ins, while the standard home programme relied on voice calls and exercise sheets. Kinesiophobia was evaluated using the Brief Fear of Movement Scale (BFoM) at 1^{st},4^{th}, and 8^{th} weeks, while artificial joint awareness was assessed using the Forgotten Joint Score (FJS-12) at 4^{th} and 8^{th} weeks. The statistical analysis was performed using SPSS 26.0. $p>0.05$ was considered statistically significant.
Results: A comparison of BFoM scores demonstrated that participants in the telerehabilitation group exhibited significantly lower levels of kinesiophobia than those in the standard home programme group ($p<0.001$). The difference in kinesiophobia scores was statistically significant both within and between groups ($p<0.001$). However, no significant differences were observed in FJS-12 over time ($p=0.080$) or between groups ($p=0.019$).
Conclusions: Our study demonstrated that telerehabilitation could be an effective method for managing kinesiophobia after TKA; however, it did not have a short-term effect on artificial joint awareness. This may be due to the distinct psychometric characteristics of kinesiophobia and artificial joint awareness. Furthermore, we believe that long-term studies are needed to evaluate the effectiveness of telerehabilitation on these parameters
Keywords: Digital Health, Telerehabilitation, Total Knee Arthroplasty.

S117. TEST-RETEST RELIABILITY AND CONCURRENT VALIDITY OF THE 3-METER BACKWARD WALKING TEST IN PATIENTS WITH KNEE OSTEOARTHRITIS

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Purpose: Osteoarthritis of the knee (KOA), which is a common condition in modern times, increases the risk of falls and causes the injuries. Therefore, development and implementation of fall risk assessment tests for patients with KOA, who represent a significant proportion of population, is very important. Some tests are available to assess fall risk, but these tests cannot assess backward walking, which requires more neuromuscular control and reveals mobility deficits relatively early. This study aimed to determine concurrent validity and test-retest reliability of 3-Meter Backward Walking Test (3MBWT) in patients with KOA.
Methods: A total of 41 patients with KOA (61.18±10.61 years), 37 of whom were women, participated in the study. In order to examine test-retest reliability, 3MBWT was administered twice during first evaluation, and mean score was recorded. One week later, same procedure was repeated. The results were analysed using intraclass correlation coefficient and Bland Altman analysis. To determine validity, relationship between Timed-Up and Go-Test (TUG), Knee Injury and Outcome Score (KOOS), Modified Fall Efficacy Scale (MFES), and 3MBWT were evaluated by spearmen correlation test.
Results:Test-retest reliability was found to be 'good'(ICC:0.890). A strong correlation(r=0.810) was found between 3MBWT and TUG, whereas a moderate negative correlation was found between 3MBWT and MFES(r=-0.678). Negative correlations ranging from -0.717(KOOS-pain) to -0.527(KOOS-recreation) were found between KOOS-subscales and 3MBWT.
Conclusions: 3MBWT is a valid and reliable performance test for people with KOA. Clinical use of this test can provide important and practical information about functional status and fall risk of patients.
Keywords: Gait, Falls, Knee Osteoarthritis, Performance-based test, Reliability, Validity

S118. INVESTIGATION OF THE EFFECT OF DIFFERENT FOCUS STRATEGIES ON PERISCAPULAR MUSCLE ACTIVATION LEVELS AND RATIOS IN SCAPULAR Y EXERCISE

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Purpose: In shoulder rehabilitation, functional exercises are used to enhance normal muscle activation and motor control. During exercises, different focus strategies and feedback methods are used to achieve optimal muscle activation. The aim of this study is to investigate the effect of different focus strategies on periscapular muscle activation levels during *scapular Y(SY) exercise*.
Methods: The study included 18 healthy, physically active male participants (Age: 19.1 ± 2.4). The participants performed the SY exercise with internal and external focus strategies in a randomized manner. The activation of the upper trapezius (UT), middle trapezius (MT), lower trapezius (LT), and serratus anterior (SA) muscles was assessed using surface EMG during the SY exercise. Repeated Measures Analysis of Variance (ANOVA) was used to compare muscles activation levels and UT/MT, UT/LT, and UT/SA ratios.
Results: The activation of the SA muscle was observed to be higher with the external focus strategy in all phases of the SY exercise (p=0.02). SA muscle activation was achieved with the SY exercise using the external focus strategy (%29.9 MVIC).
Conslusions: The results of this study will provide clinical insights regarding exercise selection and focus strategies for optimal muscle activation ratios in the periscapular muscles.
Keywords: Electromyography, Exercise, Muscle Activation

S119. THE EFFECTS OF CORE AND SHOULDER STABILIZATION EXERCISES ON THE 50-M FREESTYLE SWIM TEST AND INJURY RISK IN MASTER SWIMMERS

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Purpose: Land training and stabilization exercises enhance performance and reduce injury risk in master swimmers. Core stabilization improves swimming by increasing strength and endurance, while shoulder stabilization aids in injury prevention. This study investigates the impact of core and shoulder stabilization exercises on swimming speed and injury risk.
Methods: Thirty-five healthy and active swimmers aged 25-50 years were included in the study. The participants were divided into two groups: an experimental group (n=18), which underwent a six-week exercise program (2 days/week), and a control group (n=17). While the control group continued routine swimming training, the experimental group additionally performed a core and shoulder stabilization program. All participants followed the program for six weeks. Swimming speed and injury risk were assessed using the 50-M Freestyle Swimming Test and the Functional Movement Screening (FMS) test. Evaluations were conducted pre-exercise, at week 6, and at week 12 for long-term follow-up.
Results: The 50-M Swimming Test scores of the master swimmers in the experimental group showed a significant change across the three different measurement points ($p<0.05$). Swimming times at weeks 6 and 12 were shorter compared to pre-exercise values. The FMS scores of the experimental group were found to be higher than those of the control group and showed a statistically significant increase ($p<0.05$). In contrast, no significant change was observed in the control group across the three time points ($p>0.05$).
Conclusions: These findings showed that core and shoulder stabilization exercise program improves swimming speed and reduces the risk of injury.
Keywords: Athletic Performance, Injury Risk Assessment, Stabilization Exercises,

S120. COMPARISON OF TWO DIFFERENT REHABILITATION APPROACHES AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Purpose: The present study aimed to examine and compare the effects of a rehabilitation programme (CP+DT) including conventional physiotherapy and dual-task exercises versus another rehabilitation programme (CP+DT+FR) including conventional physiotherapy and dual-task exercises in addition to foam roller on pain, range of motion, functional status, balance, quality of life, and kinesiophobia in patients who underwent anterior cruciate ligament reconstruction.
Methods: A total of 28 patients who underwent unilateral arthroscopic anterior cruciate ligament reconstruction with hamstring tendon graft participated in the present study. All patients were randomly divided into two groups as CP+DT (n=14, 27.64±6.51 years) and CP+DT+FR (n=14, 23.07±3.97 years). All participants were treated three days a week for 8 weeks. Baseline and follow-up tests included pain, range of motion, functional status, balance, quality of life, and kinesiophobia.
Results: When comparing the pre- and post-treatment scores, statistically significant improvements in pain, range of motion, functional status, balance, quality of life and kinesiophobia were found in both

groups ($p<0.05$). When comparing the difference scores, no statistically significant difference was found in any parameter between the two groups ($p>0.05$).
Conclusions: The findings of the study indicated that both treatment protocols were effective in terms of rehabilitation; however, no statistically significant superiority was observed between the groups. Furthermore, the addition of foam roller exercises to conventional physiotherapy and dual-task exercises did not provide any additional advantage in terms of pain, range of motion, functional status, balance, quality of life or kinesiophobia outcomes.
Keywords: Anterior Cruciate Ligament Reconstruction, Rehabilitation, Exercise, Foam Roller, Dual-Task

S121. THE EFFECTS OF DIFFERENT AUTOGRAFT USES ON MUSCLE ARCHITECTURE AND STRENGTH IN ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Purpose: This study aimed to compare self-reported function, lower extremity muscle architecture and knee strength in patients who had anterior cruciate ligament reconstruction (ACLR) with different autografts.
Methods: Patients who were operated on using semitendinosus (ST), ST+gracilis (ST+GC) and peroneus longus (PL) autografts were divided into three groups. International Knee Documentation Committee (IKDC) subjective knee evaluation form, Lysholm Knee Scoring Scale and Foot and Ankle Ability Measure were used in functional assessment. Pennation angle, muscle thickness and fiber length of vastus lateralis (VL), rectus femoris (RF), tibialis anterior (TA), biceps femoris longus (BFL), gastrocnemius medialis (GM) and gastrocnemius lateralis (GL) were evaluated using ultrasound. Strength measurements of the knee extensor and flexor muscle groups at angular velocities of 60^0/sec and 180^0/sec were obtained using an isokinetic dynamometer.
Results: The pennation angle of the injuried side GM muscle was significantly higher in the PL group compared to the ST group ($p=0.025$). Strength measurements were higher in the ST group compared to the PL group, for peak torque flexion/extension at 60^0/sec and peak torque and peak work flexion/extension at 180^0/sec ($p<0.05$). Apart from these, there was no difference between the groups in terms of muscle architecture, strength and self-reported function parameters ($p>0.05$).
Conclusions: Patients undergoing ACLR using ST, ST+GS and PL autografts have largely similar results in terms of self-reported function, muscle structure and knee strength. These grafts can be considered as alternatives to each other.
Keywords: Knee Injuries, Rehabilitation, Ultrasonography.

S122. ACUTE EFFECT OF CLASSICAL MASSAGE APPLICATION WITH MENTHA PIPERITA ESSENTIAL OIL (MPEO) ON EXPLOSIVE POWER AND FLEXIBILITY IN PROFESSIONAL FOOTBALL PLAYERS

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Purpose: Topical menthol activates TRPM8 ion channels, inducing a cooling sensation and vasodilation via vascular smooth muscle hyperpolarization. This mechanism regulates ion flow, sensory nerves, and endothelial-derived relaxing factors, potentially enhancing circulation, muscle function, and athletic

performance. Accordingly, this study was designed to investigate the acute effects of classical massage with MPEO on flexibility and lower extremity explosive power in football players.
Methods: The study included 18 athletes aged 18-35 from a professional football team in the Turkish Republic of Northern Cyprus. Lower extremity explosive power was assessed using vertical jump and double-leg horizontal jump tests, while flexibility was evaluated using the sit-and-reach test. Following the initial assessment, a classical massage was applied to both lower extremities using a 5% MPEO mixture in a coconut oil base. After the massage application, assessments were repeated following a 20-minute passive rest period.
Results: The participants' mean age was 24.55 ± 1.53 years, mean height was 178.38 ± 7.13 cm, and mean weight was 75.61 ± 9.28 kg. Following the classical massage with MPEO, a statistically significant increase was observed between the initial and post-intervention assessments in flexibility ($p = 0.037$), vertical jump ($p = 0.019$), and horizontal jump ($p = 0.016$) scores.
Conclusions: This study demonstrated that classical massage with MPEO positively affects flexibility and lower extremity explosive power. While MPEO may contribute to short-term improvements in sports performance parameters, further controlled and long-term studies should examine its effectiveness thoroughly.
Keywords: Athletic Performance, Massage, Mentha Piperita

S123. DOES SCAPULAR DYSKINESIS AFFECT THE RESPONSE TO REHABILITATION IN ROTATOR CUFF-RELATED SHOULDER PAIN? PROSPECTIVE CLINICAL STUDY WITH ONE-YEAR FOLLOW-UP

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Purpose: Although scapular dyskinesis (SD) is frequently observed in individuals with rotator cuff-related shoulder pain, its clinical relevance remains controversial. This study aimed to investigate the effect of SD on rehabilitation outcomes.
Methods: Thirty patients with rotator cuff-related shoulder pain were included and categorized into a dyskinesis group (DG, n=16, age=36.12±2.42 years, BMI=25.43 kg/m²) and a control group (CG, n=14, age=36.92±2.37 years, BMI=24.63 kg/m²) based on observational SD test results. All participants underwent a 12-week rehabilitation program consisting of scapular stabilization and shoulder strengthening exercises and were followed for one year. Outcomes were assessed using the Shoulder Pain and Disability Index (SPADI), Global Rating of Change (GRC) scale, and patient satisfaction scores. Two-way ANOVA and independent t-tests were used for statistical analyses.
Results: Baseline SPADI scores were 48.22±5.93 (DG) and 42.73±5.41 (CG), while at one year they were 51±5.19 (DG) and 7.22±3.91 (CG). Both groups showed significant improvements at post-treatment ($F(1,28)=84.99$, $p<0.001$) and one-year follow-up ($F(1,28)=90.27$, $p<0.01$). No clinically meaningful between-group differences were found (mean difference: 5.03 [95% CI=-8.06 to 18.77] post-treatment, 4.89 [95% CI=-8.18 to 17.96] at one year). SD had no significant effect on SPADI ($p=0.96$, $p=0.87$), GRC (DG: 3.06±0.35 to 4.00±0.32; CG: 3.28±0.32 to 3.92±0.47, $p=0.64$), or satisfaction scores (DG=81.87±3.53, CG=80.00±6.24, $p=0.79$).
Conclusion: These findings suggest that scapular dyskinesis does not influence rehabilitation outcomes in rotator cuff-related shoulder pain. Further studies involving different pathologies are warranted to clarify its clinical significance.
Keywords: Scapular Dyskinesis, Rotator Cuff Injuries, Shoulder Pain, Rehabilitation.

S124. ASSESSMENT OF AVOIDANCE BEHAVIOR DURING SPORTS ACTIVITIES IN ATHLETES WITH SHOULDER PAIN; DEVELOPMENT OF A TOOL AND INVESTIGATING ITS PSYCHOMETRIC PROPERTIES

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Purpose: Shoulder injuries and sport-related shoulder pain are common among overhead athletes. The aim of this study is to develop a tool to assess avoidance behavior during sports activities due to shoulder pain in athletes and to examine the psychometric properties of this scale.
Methods: A total of 162 athletes with shoulder pain participated. Shoulder-related strength, conditioning, and sport-specific activities were selected from the ICF's activities and participation domain by an expert panel. Test-retest reliability was assessed using the intra-class correlation coefficient (ICC), with measurement errors evaluated using the standard error of measurement (SEM) and minimal detectable change (MDC). Validity was tested using the Avoidance Daily Activities Photo Scale (ADAP), Kerlan-Jobe Orthopaedic-Clinic Shoulder-Elbow Score (KJOC), Shoulder Pain and Disability Index (SPADI), Fear Avoidance Beliefs Questionnaire (FABQ), Pain-Catastrophizing Scale (PCS), and Tampa Scale for Kinesiophobia (TSK).
Results: The scale, consisting of 8 activities and 16 photographic representations, was approved by the expert panel with an 80% acceptance rate and demonstrated excellent reliability with a Cronbach's alpha of 0.95, SEM of 20.1, MDC of 55.8, and an ICC of 0.88. The scale showed significant correlations with ADAP, SPADI, FABQ, PCS, TSK, and with correlation coefficients ranging from 0.183 to 0.750 ($p<0.05$).
Conclusions: The scale is a reliable and valid tool for assessing shoulder pain-related avoidance behaviors in athletes with shoulder pain.
Keywords: Assessment, Avoidance Behavior, Reliability, Validity

S125.EVALUATING THE INFLUENCE OF PLAYING POSITIONS ON MUSICIANS' POSTURAL PARAMETERS

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Purpose: Although musicians state that they prefer to play their instruments in standing while practicing on their own, they have to play sitting during concert rehearsals and concerts. Aim of our study was to evaluate the effect of different playing positions on spinal parameters in musicians by objectively assessing angular changes the spine.
Methods: Nine-teen music students (15 female, 4 male; mean age=20.52±1.2 years; mean years of playing= 9.31±2.6 years) including 11 violin and 8 viola players were participated in the study. We examined postural parameters—such as trunk length, coronal and sagittal imbalance, pelvic and vertebral rotation, fleche cervicale, kyphotic and lordotic angle—using the DIERS Formetric 4D scanner in three different positions; habitual standing (HS), playing while standing (PS) and playing while sitting (PST). Data were analyzed using Wilcoxon Signed Rank Test.
Results: Comparing postural parameters between PS and HS, significant differences ($p<0.01$) were found in sagittal imbalance ($z=-3.260$, $p=0.001$), vertebral rotation ($z=-3.267$, $p=0.001$), coronal imbalance ($z=-3.159$, $p=0.002$), fleche cervicale ($z=-2.938$, $p=0.003$) and pelvic rotation ($z=-2.614$, $p=0.009$). All these values were higher in PS. Comparing postural parameters between PST and PS, differences ($p<0.01$) were found in trunk length ($z=-3.401$, $p<0.001$), sagittal imbalance ($z=-2.254$, $p=0.024$), kyphotic angle ($z=-3.827$, $p<0.001$), lordotic angle ($z=-3.703$, $p<0.001$), and pelvic inclination ($z=-3.300$, $p=0.001$). Sagittal imbalance, pelvic inclination, lordotic and kyphotic angle values were higher in PS, trunk length value was higher in PST.

Conclusions: Objective assessment of postural parameters in musicians during playing positions will contribute to our understanding of their injury mechanisms, postural loads and physiotherapeutic strategies to be developed.
Keywords: Musculoskeletal Diseases, Music, Posture, Prevention

S126.INVESTIGATION OF THE RELATIONSHIP BETWEEN QUADRICEPS FEMORIS MUSCLE FORCE SENSE AND POSTURAL STABILITY, DYNAMIC BALANCE, AND FUNCTIONAL PARAMETERS IN INDIVIDUALS WITH PATELLOFEMORAL PAIN SYNDROME

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Purpose: This study aimed to investigate the relationship between quadriceps femoris muscle force sense and dynamic balance, postural stability, functional parameters, and quadriceps muscle strength in individuals with patellofemoral pain syndrome (PFPS). Additionally, it examined the difference in quadriceps muscle force sense between individuals with PFPS and healthy individuals.
Methods: The study included 12 individuals with PFPS and 27 healthy individuals aged 18-40 years. Quadriceps femoris muscle force sense error was measured using a digital pneumatic pressure device. Dynamic balance was evaluated with the Y-balance test, postural stability was assessed with a balance platform, and functional parameters were analyzed using the step-down test and Kujala Patellofemoral Scale (KPS). Quadriceps femoris muscle strength was measured with a manual dynamometer at 60° knee flexion.
Results: The mean quadriceps femoris muscle force sense error was 1.25±0.7 kg in individuals with PFPS and 1.09±0.69 kg in healthy individuals, showing no significant difference between the groups ($p>0.05$). A strong negative correlation was found between quadriceps femoris muscle force sense and the posterolateral and posteromedial directions of the Y-balance test ($r=-0.603$, $p=0.038$; $r=-0.601$, $p=0.039$, respectively). However, no significant correlation was observed between force sense and postural stability or quadriceps muscle strength ($p>0.05$).
Conclusions: The study results indicate that as the mean error in quadriceps femoris muscle force sense increases, dynamic balance deteriorates in individuals with PFPS. We believe that assessing force sense errors in individuals with PFPS will be important in shaping rehabilitation programs.
Keywords: Patellofemoral Pain Syndrome, Postural Balance, Proprioception

S127.ANALYSIS OF POSTURAL CHANGES IN INDIVIDUALS WITH DIFFERENT HIP PATHOLOGIES

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Purpose: Spinopelvic parameters, which interact with the pelvis and spine, are known to be important criteria affecting both diagnosis and treatment progression in different hip pathologies. Depending on the severity of hip joint degeneration, spinopelvic parameters (pelvic incidence, pelvic tilt, lumbar lordosis, sagittal vertebral axes) may be affected. This study investigates postural differences between individuals with hip pathology and healthy controls.
Methods: The study included 100 participants (55 with hip pathology, 45 healthy). Those with scoliosis, neurological disorders, inflammatory arthritis, or prior surgery were excluded. Postural and pelvic parameters, including trunk length, kyphotic and lordotic apex, cervical and lumbar fleche, and pelvic obliquity, thoracolumbal and lumbosacral inflection points were assessed using the Diers Formetric 4D system. Data were analyzed using the Independent Sample T-Test, Mann-Whitney U Test, and One-Way ANOVA.

Results: Individuals with hip pathology had higher lordotic apex ($p=0.5$) and lordotic angle ($p<0.05$) than healthy participants. Although not statistically significant ($p>0.05$), trunk length, kyphotic apex, thoracolumbal inflection point and cervical fleche were high. Additionally, lumbar fleche and lumbosacral inflection points were lower, while pelvic torsion and obliquity were higher ($p>0.05$).
Conclusions: The findings show that postural parameters in individuals with hip pathology are different compared to healthy individuals. Regular monitoring of posture and the establishment of preventive approaches may help prevent progressive complications and plan rehabilitation processes more effectively. It is thought that further studies with larger sample groups will contribute to the determination of statistically significant relationships and further development of treatment approaches.
Keywords: Hip Joint, Pelvis, Posture, Spine

S128.VALIDATION OF A NEW MOBILE APPLICATION (ANGLE METER) IN THE ASSESSMENT OF ELBOW JOONT POSITION SENSE

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Purpose: The purpose of this study was to determine the validity of the Angle Meter mobile application for evaluating elbow joint position sense and to examine its agreement with the traditional universal goniometer.
Methods: 74 healthy individuals between the ages of 18-25 participated in the study. The elbow joint position sense of the participants was evaluated using the universal goniometer and the Angle Meter mobile application at 45°, 60° and 75° flexion angles. The relationship between the methods was analyzed with the Pearson correlation coefficient, and the agreement was examined with the Bland-Altman analysis.
Results: The correlation between the Angle Meter and the goniometer was found as $p=0.000$, $r=0.985$ at 45° flexion; $p=0.000$, $r=0.943$ at 60° flexion; and $p=0.000$, $r=0.925$ at 75° flexion. The Bland-Altman analysis results showed that the two methods were compatible for all three angles.
Conclusions: In the evaluation of elbow joint position sense, it was determined that the Angle Meter mobile application showed a high degree of correlation with the universal goniometer and the two methods were compatible. These results support that the Angle Meter application can be used in clinical and research areas.
Keywords: Elbow, Mobile Application, Proprioception

S129.CONTRALATERAL EFFECT OF BLOOD FLOW RESTRICTED EXERCISES ON LOWER EXTREMITY MUSCLE STRENGTH, BALANCE AND PHYSICAL FUNCTION

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Purpose: This study investigates the effects of blood flow restriction training (BFRT) on contralateral extremity muscle strength, balance, and physical function in healthy individuals.
Methods: Fifteen healthy individuals aged 18-30 years (21.40±3.38) were included. Participants underwent BFRT for 2 sessions/6 week. Accordingly, muscle strength of knee flexors and extensors was assessed twice—before the exercise training and at the end of the six-week training—using a hand-held isometric muscle strength dynamometer. Balance was evaluated using the Y-Balance Test (YBT) and the Single-Leg Stance Test, while lower extremity physical function was assessed using the Single-Leg Hop Test (SLHT). Assessment results were statistically analyzed using the SPSS program, and

Related Samples Wilcoxon-Signed Rank Test was used for analysis. $p<0.05$ was considered statistically significant.
Results: As a result, a significant change was found in the contralateral extremity in YBT - Anterior direction and total score ($p<0.00$; $p=0.006$), while no significant change was observed in YBT-PM and PL directions. In terms of muscle strength, it was determined that knee extensor muscle strength also increased in the contralateral extremity, whereas flexor muscle strength did not change significantly ($p=0.002$; $p=0.268$). At the functional level, the SLHT yielded significant results ($p<0.001$).
Conclusions: In conclusion, BFRT has positive effects not only on the extremity where it is applied but also on the contralateral extremity in terms of muscle strength, balance, and physical function. Its clinical use may be considered in cases where loading on the extremity is contraindicated, not possible, or not tolerated due to conditions such as kinesiophobia.
Keywords: Blood Flow Restriction, Contralateral Effect, Lower Extremity

S130.FUNCTIONAL EFFECTS OF TENDON NEUROPLASTIC TRAINING IN ATHLETES WITH SHOULDER TENDINOPATHY

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Purpose: The aim of this study is to use Tendon Neuroplastic Training (TNT) in Wrestlers with shoulder tendinopathy between the ages of 14-25; To investigate its effects on balance, coordination, mental performance and shoulder functionality.
Methods: The athletes were randomly divided into two groups, and the experimental group was given 4 weeks of TNT training protocol and the control group was given 4 weeks of standard eccentric training. Both groups were given exercises for the Supraspinatus, Infraspinatus, Subscapularis and Biceps muscles. The athletes' balance was evaluated with "Upper Quarter Y Balance", coordination with "Alternate Hand Wall Toss", and mental performance with Stroop Color-Word tests. “Kerlan-Jobe” and “WORC” scales were used to evaluate shoulder functionality and pain. All assessments were administered before and after exercise training. The data were analyzed statistically with the "IBM SPSS 25" package program.
Results: There was an increase in the balance test and coordination test scores of both groups after the training compared to before the training ($p<0.05$). There was an improvement in the mental performance test results of both groups ($p<0.05$). There was more improvement in mental performance and balance parameters in the TNT training group compared to the control group ($p<0.05$). There was no difference between the groups for the "Kerlan-Jobe" and "WORC" scales in both groups ($p>0.05$).
Conclusions: 4-week eccentric training and TNT training improves balance, coordination and mental performance in wrestlers with shoulder tendinopathy. TNT is more effective than standard eccentric training for improving mental performance and upper extremity balance.
Keywords: Athlete, Mental Test, Shoulder, Tendinopathy

S131.THE RELATIONSHIP BETWEEN LOWER EXTREMITY DYNAMIC BALANCE AND SIDE KICK REACTION TIME IN ADOLESCENT TAEKWONDO ATHLETES

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Purpose: The aim of our study was to examine the relationship between the dynamic balance of the lower extremities and kick reaction time and hit count in adolescent Taekwondo athletes.
Methods: Fifty healthy, elite level adolescent Taekwondo athletes (age: 15.02±1.61 years; height: 170.12±7.57 cm; BMI: 19.78±2.87 kg/m2) participated in the study (23 females, 27 males). The dynamic balance of the participants was assessed using the Y-Balance Test and side kick reaction time was assessed using the BlazePod™ device.
Results: No significant relationship was found between dominant-side reaction time and dynamic balance ($p>0.05$). In contrast, a weak negative correlation was observed between non-dominant-side reaction time and both dominant ($r=-0.35$, $p=0.01$) and non-dominant ($r=-0.31$, $p=0.02$) balance. Dominant hit count showed a moderate positive correlation with dominant balance ($r=0.44$, $p=0.001$) and a weak positive correlation with non-dominant balance ($r=0.28$, $p=0.04$). Similarly, non-dominant hit count had a weak positive correlation with both dominant ($r=0.34$, $p=0.01$) and non-dominant ($r=0.28$, $p=0.04$) balance.
Conclusions: The findings indicate that there is a weak but significant relationship between non-dominant-side reaction time and balance variables. However, no significant relationship was found between dominant-side reaction time and dynamic balance in both extremities. The observed relationship between hit count and balance suggests that better balance ability may enhance an athlete's kicking performance. These results highlight that the relationship between balance and reaction time may vary between extremities, emphasizing the need for greater focus on improving reaction time and balance in the non-dominant limb in Taekwondo training.
Keywords: Adolescent, Martial Arts, Reaction Time

S132.ACUTE EFFECTS OF PLANTAR FASCIA RECOVERY TRAINING ON DORSAL CHAIN BIOMECHANICS IN ADOLESCENT LONG-DISTANCE RUNNERS

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Purpose: This study aimed to examine the acute effects of post-run plantar fascia recovery training (PFRT) on dorsal kinetic chain performance (DKCP) in adolescent long-distance runners.
Methods: A randomized controlled trial included 34 adolescent runners, with 17 in the PFRT group and 17 in the control group. After training, the PFRT group received bilateral PFRT. Assessments were conducted pre-training, post-training, and post-PFRT on the dominant side. DKCP was evaluated using the Bunkie Test for the posterior power line (PPL) and posterior stabilization line (PSL), Myoton measurements for latissimus dorsi (LD), erector spinae, hamstrings, and gastrocnemius, the Sit-and-Reach Test for hamstring flexibility, and the Modified Schober Test for lumbar flexor flexibility.
Results: Following PFRT, PPL performance improved compared to pre-training ($p=0.016$), while PSL showed no significant difference ($p=0.113$). The Modified Schober Test and Sit-and-Reach Test results improved significantly between groups ($p<0.05$, $p=0.008$). LD stiffness was lower in the PFRT group for both dominant and non-dominant sides ($p<0.001$). Erector spinae tone was higher in the PFRT group at all time points ($p=0.013$), with a post-PFRT decrease in stiffness ($p<0.05$). Hamstring and gastrocnemius stiffness was lower in the PFRT group than in controls ($p<0.001$).
Conclusions: PFRT may enhance PPL performance and lumbar flexibility in adolescent runners. It also improves hamstring flexibility and may aid in recovery training. LD stiffness decreased after PFRT, while erector spinae tone increased, suggesting higher muscle activation. The reduction in hamstring and gastrocnemius stiffness may help prevent injuries in young athletes.
Keywords: Adolescent, Elastic Modulus, Fascia, Running, Superficial Back Muscles

S133.THE EFFECT OF VERBAL COMBINED FOCUS OF ATTENTION AND VIDEO INSTRUCTION TRAINING ON KNEE JOINT POSITION SENSE ERROR IN SEMI-PROFESSIONAL FEMALE ATHLETES: A SINGLE-BLIND, RANDOMIZED CONTROLLED CLINICAL TRIAL

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Purpose: Joint position sense is a somatosensory system component associated with the biomechanics of anterior cruciate ligament (ACL) injuries in athletes. Current studies suggest incorporating attention focus instructed motor learning principles into neuromuscular programs for ACL injury prevention. This study aims to investigate the acute and one-week post-training effects of verbal combined focus of attention instruction and video instruction training on knee joint position sense error (KJPS) in semi-professional female athletes.
Methods: Thirty female athletes (mean age 19.20±1.40 years) with a DKV angle greater than 10° were randomly assigned to three groups: combined verbal attentional focus instructed group (VFIG) (n=10), video instructed group (VIG) (n=10) and control group (CG) (n=10). KJPS of the dominant extremities was assessed using an inclinometer application during open kinetic chain movements. Participants performed two training blocks with vertical jump landings and group specific instructions, followed by KJPS measurements. Follow-up measurements were taken one week later.
Results: Data were analyzed using IBM SPSS Statistics V26. Group comparisons were made using Independent Samples T-tests and Chi-square tests. The CG and VIG groups showed significantly higher pre-test and follow-up scores compared to post-test, while VFIG showed no significant change. The CG's means were statistically higher than those of the VIG (CG, $F=7.934$, $p=0.002$, $\eta2=0.379$; VT, $F=4.037$, $p=0.030$, $\eta2=0.237$). No significant differences were found in KJPS results during follow-up ($p>0.05$).
Conclusions: In semi-professional female athletes with DKV, both visual training and motor learning based solely on repetition positively affected knee joint position sense; however, this improvement was not permanent. Further research in this field is needed.
Keywords: ACL Injuries, Preventive Programs, Proprioception

S134.AUTONOMIC RESPONSES OF AMATEUR CHILD ATHLETES TO AEROBIC EXERCISE TESTING

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Purpose: The aim of our study was to investigate autonomic responses to aerobic exercise test in amateur child athletes interested in different sports branches (boxing, taekwando, weightlifting).
Methods: Demographic data of 34 children and adolescents aged 6-18 years were recorded. Participants were divided into 3 groups as boxing, taekwondo and weightlifting. Blood pressure, respiratory functions and 5-minute heart rate variability (HRV) were measured in all groups before and after the 20-meter shuttle run test. HRV was assessed with a 3-way bipolar extremity derivation with remote Bluetooth connection (poly-spectrum-8/ex), blood pressure with sphygmomanometer and respiratory functions with Contec SP10 Spirometer.
Results: Statistically significant difference was found between the sport branch and VO_2max, total distance run and total time run values ($p<0.001$). VO_2max, total distance run and total time run were significantly higher in boxing and taekwando group than in weightlifting group ($p<0.01$). When changes

in systolic and diastolic blood pressure between boxing and weightlifting groups and only systolic blood pressure between the weightlifting and taekwando groups were found to change significantly ($p<0.05$). In SDNN value, there was significant difference between groups in measurements taken at 5th minute ($p<0.05$). SDNN weightlifting score was significantly higher than boxing ($p<0.05$).
Conclusions: As a result of our study, it was found that aerobic capacity of child athletes who practised boxing and taekwando sports was higher than children who practised weightlifting. The differences in some autonomic responses to acute stress between groups depending on nature of sport performed may be result of different recovery levels specific to sport.
Keywords: Blood Pressure, Child, Heart Rate, Sport

S135.INVESTIGATION OF THE EFFECTS OF FUNCTIONAL FATIGUE ON QUADRICEPS FEMORIS MUSCLE STRENGTH PERCEPTION, POSTURAL STABILITY, AND DYNAMIC BALANCE

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Purpose: This study aimed to examine the effects of functional fatigue on quadriceps femoris muscle force sense, postural stability, and dynamic balance in asymptomatic individuals.
Methods: Sixteen participants (mean age: 26.87±0.88 years) were included. Demographic data, including age, height, and body weight, were recorded. Quadriceps femoris muscle force sense was assessed using a digital device measuring pneumatic pressure changes in a long-seated position for both lower extremities. Postural stability was evaluated using a balance platform, while dynamic balance was assessed with the Y-balance test. Functional fatigue was induced with the Modified Shuttle Walking Test, and all measurements were conducted pre- and post-fatigue.
Results: Following functional fatigue, a significant decrease in quadriceps femoris muscle force sense error was observed on the dominant side ($p=0.002$), whereas no significant change occurred on the non-dominant side ($p=0.065$). Postural stability showed a significant decline ($p=0.003$). In the Y-balance test, significant reductions were noted in the anterior ($p=0.050$) and posteromedial ($p=0.027$) directions on the dominant side post-fatigue. However, no significant differences were detected in the non-dominant side or the posterolateral direction of the dominant limb ($p>0.05$).
Conclusions: The findings indicate that functional fatigue, which may arise during sports training, competitions, daily activities, or recreational exercises, negatively impacts postural stability. Moreover, in the dominant limb, both force sense, as a subcomponent of proprioception, and dynamic balance were also adversely affected. Given that these alterations may increase the risk of injury, it is crucial to monitor fatigue levels and consider its effects when planning physical activities.
Keywords: Fatigue, Postural Balance, Proprioception

S136.COMPARING LIMB SYMMETRY INDEX IN ACL-RECONSTRUCTED PATIENTS WITH DOMINANT AND NON-DOMINANT LIMB INJURIES

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Purpose: The limb symmetry index (LSI) is considered a crucial indicator for monitoring rehabilitation progress by identifying asymmetries in muscle strength and functional capacity. Although numerous studies have evaluated LSI following anterior cruciate ligament (ACL) reconstruction, the impact of injury location—whether in the dominant or non-dominant leg—on LSI remains insufficiently explored. Injury location may influence muscle strength, movement strategies, and rehabilitation outcomes. This study aims to examine the effect of injury in the dominant versus non-dominant leg on LSI in patients undergoing ACL reconstruction.

Methods: A total of 36 participants (27 males, 9 females) who underwent ACL reconstruction surgery were included in the study. Isokinetic muscle strength assessments were performed using a Cybex isokinetic dynamometer (Cybex NORM®, Humac, CA, USA). Knee extension and flexion strength were measured at angular velocities of 60°/s and 180°/s in concentric mode and 60°/s in eccentric mode using a standardized protocol.
Results: In patients with ACL injury in their dominant limb, quadriceps LSI values at 60°/s and 180°/s in concentric mode were significantly higher compared to those with non-dominant leg injuries ($p<0.05$).
Conclusions: Our study found that individuals with ACL injuries in their non-dominant limb had lower limb symmetry index values. This finding aligns with existing literature on the effects of limb dominance in ACL injuries. The observed differences may be attributed to the more efficient motor neuron recruitment, reduced presynaptic inhibition, and greater use of the dominant leg in daily activities. Our results emphasize the need for rehabilitation programs tailored specifically for patients with non-dominant leg injuries.
Keywords: Anterior Cruciate Ligament, Leg Dominance, Limb Symmetry Index

S137.CHARACTERISTICS OF PATIENTS WITH THUMB OSTEOARTHRITIS: A CROSS-COUNTRY COMPARISON BETWEEN TURKIYE AND SPAIN

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Purpose: This study compares the demographic and clinical characteristics of patients with thumb osteoarthritis (OA) in Türkiye and Spain, evaluating the impact of cultural, occupational, and lifestyle differences. The findings aim to improve thumb OA management.
Methods: This cross-sectional study was conducted in clinics in Bilbao, Spain, and Ankara, Türkiye, with ethical approval (No: 2023-1238). Demographic and clinical data, physical activity, pain levels, and grip strength were assessed. Pain was measured using the visual analog scale, grip strength with the Jamar® Hydraulic Hand Dynamometer, and pinch strength with a pinch meter.
Results: The study included 24 patients, 12 from each country. The median age of Spanish patients was 60 (52-74) years, with 91% female; 66.7% reported symptoms in their dominant hand, 75% were employed, and 66.7% engaged in sports. The median age of Turkish patients was 63 (50-70.5) years, with 66% female; 41.7% reported dominant-hand symptoms, 50% were employed, and 33.3% participated in sports. Significant differences were found in body weight ($p=0.013$) and resting pain ($p=0.048$); Turkish patients had higher body weight, while Spanish patients reported higher resting pain.
Conclusions: Patients with thumb OA in Türkiye and Spain share characteristics, but differences in body weight and resting pain suggest cultural and lifestyle influences. Higher body weight in Turkish patients may relate to lower physical activity and employment, whereas higher resting pain in Spanish patients could stem from lifestyle or occupational factors. These findings highlight the importance of cultural and lifestyle factors in thumb OA management.
Keywords: Cultural Characteristics, Grip Strength, Hand, Osteoarthritis, Pain

S138.RELIABILITY OF THE GYKO INERTIAL SENSOR SYSTEM IN ASSESSING JUMP AND POSTURAL STABILITY PARAMETERS IN ADOLESCENT BASKETBALL PLAYERS

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Purpose: The aim of this study was to evaluate the reliability of the GYKO inertial sensor system, a low-cost and easily accessible tool designed to facilitate the assessment and monitoring of jump performance and postural stability parameters in rehabilitation, in adolescent basketball players.
Methods: This study was conducted at Sakarya University of Applied Sciences, Physiotherapy and Rehabilitation Application and Research Center. The participants were adolescent basketball players from Alaağaç Sports Club. Vertical jump and squat jump tests were performed to assess jump performance. Postural stability was evaluated using the GYKO device during a 30-second single-leg stance test with eyes open.
Results: The GYKO inertial sensor system demonstrated high reliability in assessing postural stability in adolescent male basketball players (for the dominant limb: area ICC = 0.76, mediolateral length ICC = 0.88, anteroposterior length ICC = 0.86, mediolateral mean length ICC = 0.80, anteroposterior mean length ICC = 0.77; for the non-dominant limb: area ICC = 0.87, mediolateral length ICC = 0.89, anteroposterior length ICC = 0.80, anteroposterior mean length ICC = 0.74). Moderate reliability was found for mediolateral mean length on the non-dominant limb (ICC = 0.64). The system also showed high reliability in evaluating jump performance (vertical jump ICC = 0.95, squat jump ICC = 0.94).
Conclusions: The GYKO inertial sensor system is a reliable tool for assessing postural stability and jump performance in adolescent male basketball players.
Keywords: Adolescents, Basketball, Postural Control, Sports Performance

S139.THE EFFECT OF OSCILLATION EXERCISES PERFORMED IN DIFFERENT GRIP PATTERNS ON THE ACTIVATION OF SHOULDER MUSCLES: COMPARISON OF INDIVIDUALS WITH ROTATOR CUFF TENDINOSIS AND HEALTHY INDIVIDUALS

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Purpose: The aim of this study was to investigate the effects of oscillation exercises performed with different grips on shoulder muscle activation in individuals with rotator cuff (RC) tendinosis.
Methods: The study included 18 individuals with RC tendinosis and 18 healthy individuals. Diagnostic clinical tests were performed, and RC tendons were examined using ultrasonography. Oscillation exercises were performed in a 90° shoulder abduction position with three different grips, randomized for each participant. A flexible-bar was used for the oscillation. Muscle activation of the upper trapezius (UT), lower trapezius (LT), infraspinatus (IS), middle deltoid (MD), and serratus anterior (SA) was measured using surface electromyography during the exercises. Muscle activation was recorded as a percentage of maximal voluntary isometric contraction. Statistical analyses were performed using repeated measures ANOVA.
Results: The muscle activation levels of UT, LT, IS, MD, and SA were similar in both the RC tendinosis and healthy control groups ($p>0.05$). The highest activation of the UT, MD, and SA muscles was observed during superior-inferior oscillation with a horizontal grip ($p\leq0.001$); while the highest activation of the LT and IS muscles occurred during anterior-posterior oscillation with a vertical grip ($p>0.05$). The lowest activation of all muscles was observed during medial-lateral oscillation with a vertical grip ($p\leq0.031$).
Conclusions: Muscle activations during oscillation were similar between individuals with RC tendinosis and healthy individuals, with a significant increase in both groups. In individuals with RC

tendinosis, oscillation can be safely incorporated into shoulder rehabilitation, starting with medial-lateral oscillations in a vertical grip and progressing to other positions.
Keywords: Electromyography, Rehabilitation, Shoulder, Tendinopathy

S140.SYSTEMATIC REVIEW OF POSTGRADUATE THESES ON SPORTS INJURIES: A SYSTEMATIC REVIEW AND META-ANALYSIS STUDY

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Purpose: The aim of this study was to evaluate postgraduate theses related to sports injuries between 2000 and 2024 according to various parameters and to examine the publication status of the theses in the literature.
Methods: In the detailed scanning section of the YÖK National Thesis Centre, theses entitled Physiotherapy and Rehabilitation between 2000 and 2024 were scanned with the keywords 'sport', 'sports injury', 'sports physiotherapy'. The dissertations included in the study were categorised under different subheadings using Microsoft Office Excel.
Results: In Turkey, undergraduate physiotherapy and rehabilitation education is offered in 114 universities, master's education in 68 universities and doctoral education in 32 universities. The study included 32 postgraduate theses. The theses were mostly written at Hacettepe University, mostly in 2021, 2019 and 2017, and mostly used a randomised controlled study design. The most commonly used data collection tool was physical fitness performance testing, the most commonly assessed parameters were strength and body composition, and the most commonly used treatment method was exercise. Of the dissertations, 9 were published as articles and 2 as papers.
Conclusions: It is believed that the publication rate of dissertations (34.3%) is low, more studies should be conducted on sports injuries, the results of the study will provide information on current approaches and new treatment methods in the field of sports injuries in Turkey and will provide researchers with different perspectives in this field.
Keywords: Meta-Analysis, Physiotherapy Modalities, Sport, Sports Injury

S141.DYNAMIC NEUROMUSCULAR STABILIZATION TRAINING FOR CHRONIC ANKLE INSTABILITY IN AMATEUR ATHLETES

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Purpose: Chronic ankle instability (CAI) is frequently seen in athletes and is characterized by recurrent ankle giving way sensations, impaired neuromuscular control, and balance losses. While traditional rehabilitation programs target strength and postural control, Dynamic Neuromuscular Stabilization (DNS) stands out as an innovative approach that targets motor control patterns and allows for the regaining of functional stability. This study aims to evaluate the effects of DNS training on functional instability, balance, reaction time, and performance.
Methods: Twenty-eight amateur athletes diagnosed with CAI were included in this study. DNS-based progressive exercises were applied for six weeks. Primary outcome measures were Cumberland Ankle Instability Test (CAIT) and Y Balance Test (YBT); secondary measurements were determined as Balance Error Scoring System (BESS), BlazePod™ Reaction Time (RT) Test, side hop test (SHT). Evaluations were made at three time points: baseline, after 6 weeks of training and follow-up test at 12 weeks.

Results: DNS training provided significant improvements over time in all measurements ($p<0.001$) and high effect sizes ($\eta p^2=0.95$-1.00 range) were obtained. CAIT scores showed a significant increase after training ($p<0.001$, $\eta p^2=0.99$). BESS-Total scores showed a significant decrease over time ($p<0.001$, $\eta p^2=0.97$). Increases were detected in YBT anterior ($p<0.001$, $\eta p^2=0.99$), posterolateral ($p<0.001$, $\eta p^2=1.00$), and posteromedial direction ($p<0.001$, $\eta p^2=0.99$) scores, significantly. The effect of the time factor was found to be statistically significant ($p<0.001$).
Conclusions: DNS is an effective rehabilitation method for improving and maintaining functional instability, balance, reaction time, and performance in athletes with CAI. These findings support the integration of DNS into rehabilitation programs for athletes with chronic ankle instability.
Keywords: Ankle Injuries, Exercise Therapy, Motor Activity, Postural Balance

S142.THE RELATIONSHIP OF CERVICAL PROPRIOCEPTION SENSATION WITH SPORTIVE PERFORMANCE IN ADOLESCENT SOCCER PLAYERS

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Purpose: The aim of this study was to investigate the relationship between cervical proprioception sense and sportive performance in adolescent soccer players.
Methods: The study included 45 volunteers aged between 12 and 17 years. Demographic information of the participants was collected with a form. Joint position error test was used to evaluate cervical proprioception sense. Sit-to-stand test, vertical jump test, 20-meter sprint test, 10-meter walk test, 30-second push-up test, 30-second sit-up test, Biering-Sorenson test, flamingo test and burpee test were used for the evaluation of sportive performance. Statistical analysis of the data was performed with SPSS 26 package program.
Results: The mean age of the participants was 13.87±1.27 years. The duration of playing soccer varied between 1 and 7 years with a mean of 2.67±1.41 years. In the cervical proprioception evaluation of the participants, a negative correlation was found between right rotation deviation angle and flexibility ($r=-0.329$, $p=0.027$), endurance ($r=-0.316$, $p=0.034$) and agility ($r=-0.393$, $p=0.008$), while no significant correlation was found between the other parameters ($p>0.05$). In the left rotation deviation angle, there was a negative correlation with flexibility ($r=-0.372$, $p=0.012$), but no significant correlation was found between the other parameters ($p>0.05$).
Conclusions: The results of the study are consistent with the relevant literature. It is thought that cervical proprioception exercises added to the training programs of adolescent soccer players may positively affect sportive performance.
Keywords: Athletic Performance, Football, Neck, Proprioception

S143.COMPARISON OF HAND AND FOOT REACTION SPEED IN TAEKWONDO AND VOLLEYBALL ATHLETES

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Purpose: Reaction speed is crucial for athletes in many sports because it directly affects their ability to respond quickly and effectively to dynamic situations. The aim of this study was to compare hand and foot reaction speeds in taekwondo and volleyball, where reaction speed is important.
Methods: The study included 11 volleyball players (age±SD: 28.7±6.4, BMI±SD: 21.5±1.8) and 16 taekwondo athletes (age±SD: 24.7±3.2, BMI±SD: 20.9±3.6) with similar demographic characteristics. Reaction speeds were assessed using the Optojump visual stimulus system. Dominant/non-dominant hand, foot reaction speeds, and dual hand-foot reaction speeds were evaluated.

Results: Taekwondo athletes had significantly faster dominant ($p<0.01$), non-dominant ($p=0.01$) hand, and dual hand reaction speeds ($p<0.01$) compared to volleyball players. Dual foot reaction speed was found to be significantly faster in volleyball players ($p=0.03$). There was no statistically significant difference in the right foot and left foot reaction speeds between taekwondo and volleyball players ($p>0.05$).
Conclusions: The faster hand reaction speeds in taekwondo athletes suggest that taekwondo enhances hand reflexes in defense and attack, speeding up reaction time. The faster dual foot reaction speed in volleyball players indicates that volleyball, with its emphasis on jumping, blocking, and sudden direction changes, improves lower extremity reflexes. The lack of a significant difference in single foot reaction speeds may be related to the balance and loading movements on one foot in taekwondo and volleyball.
Keywords: Athletic Performance, Reaction Time, Sports

144.THE RELATIONSHIP BETWEEN LEISURE-TIME PHYSICAL ACTIVITY LEVEL, PAIN, KINESIOPHOBIA, AND PSYCHOLOGICAL FACTORS IN INDIVIDUALS WITH THORACIC OUTLET SYNDROME

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Purpose: The aim of this study was to investigate the relationship between physical activity level, pain, kinesiophobia and psychological factors in individuals diagnosed with Thoracic Outlet Syndrome (TOS).
Methods: 39 individuals (19-55 years old, 31 women and 8 men) diagnosed with TOS were included in the study. The physical activity level of the individuals was assessed using the Global Physical Activity Questionnaire (GPAQ). One of the sub-parameters of the questionnaire, 'Recreational and Leisure Time Activities', questioned the sportive activities of the individuals. In this context, the total weekly moderate and vigorous physical activity levels of the individuals were calculated and these values were recorded in metabolic equivalents (MET). Pain level was assessed by Visual Analogue Scale (VAS) at rest and during activity, and kinesiophobia level was measured by NeckPix scale. Depression, Anxiety and Stress Scale (DASS-21) was used to evaluate psychological factors. Spearman correlation test was used to analyse the relationships between variables.
Results: VAS rest ($r=-0,423$, $p=0,007$), VAS activity ($r=-0,437$, $p=0,005$), kinesiophobia ($r=-0,359$, $p=0.025$), stress ($r=-0,358$, $p=0,028$) and depression ($r=-0,478$, $p=0,002$) scores decreased with increasing leisure time physical activity level. There was no relationship between activity level and anxiety ($r=-0,250$, $p=0,125$).
Conclusions: This study shows that the level of physical activity in leisure time positively affects pain, kinesiophobia and psychological factors in individuals with TOS. Accordingly, designing rehabilitation programmes in TOS to focus on increasing the physical activity level of individuals may provide contribution by supporting pain management and psychological factors.
Keywords: Kinesiophobia, Pain Management, Physical Activity, Thoracic Outlet Syndrome

S145.COMPARISON OF THE VALIDITY AND RELIABILITY OF THE FACE-TO-FACE AND ONLINE APPLICATION METHODS OF THE TURKISH VERSION OF THE "REGICOR SHORT PHYSICAL ACTIVITY QUESTIONNAIRE"

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Purpose: This study aimed to compare the validity and reliability of the face-to-face and online application methods of the Turkish-adapted REGICOR Short Physical Activity Questionnaire, developed to assess physical activity in adults.
Methods: A total of 273 healthy individuals (126 men, 147 women) aged 18-65 participated. The translation and cultural adaptation followed a standardized procedure. After recording demographic data, the questionnaire was administered face-to-face to 99 participants and online to 174 participants. The International Physical Activity Questionnaire-Short Form (IPAQ-SF) was used to assess concurrent validity. Reliability was evaluated using the test-retest method, with the questionnaire re-administered one week later to 32 face-to-face and 36 online participants.
Results: The face-to-face REGICOR-TR demonstrated moderate to good reliability (ICC=0.618-0.711) across all activity intensities, while its validity with IPAQ-SF was weak to moderate for total, light, and vigorous activity levels. The online REGICOR-TR showed higher reliability (ICC=0.752-0.956) and a moderate correlation with IPAQ-SF. In both methods, no correlation was found between moderate-intensity physical activity and IPAQ-SF.
Conclusions: Both face-to-face and online applications are reliable tools for assessing physical activity. However, their validity remains limited to weak or moderate levels, requiring cautious interpretation. Findings indicate that the application method influences validity and reliability, with online administration offering advantages over the face-to-face method.
Keywords: Physical Activity, Questionnaire, Reliability and Validity

S146.RESPONSIVENESS OF THE ADAP SHOULDER SCALE AND ITS EFFECTIVENESS IN MEASURING TREATMENT RESPONSE: A PRELIMINARY STUDY IN INDIVIDUALS WITH SHOULDER PAIN

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Purpose: The ADAP-Shoulder Scale is a self-reported questionnaire utilised for the evaluation of pain-avoidance behaviours in daily activities among patients with shoulder pain. The scale, has been validated for reliability and validity in Turkish (ICC: 0.88) (3). In this study, the responsiveness of the ADAP scale will be evaluated.
Methods: Ten participants with shoulder pain were included in the study. ADAP and SPADI scales were assessed before treatment (BT) and at 6 and 12 weeks post-treatment. All participants received 12 weeks of multimodal rehabilitation. F-test assessed score changes over time, and Spearman test evaluated the relationship between mean differences (MD) in ADAP and SPADI scores. Wilcoxon tests analyzed score differences, and standardized response mean (SRM) and effect size (ES) were calculated to assess responsiveness.
Results: ADAP scores (F:5.192, p=0.04; BT, 44.5±21.6; 33.3±21.69 at week 6; 25.92±17.86 at week 12) and SPADI scores decreased significantly over time (F:19.763, p=0.001; BT, 56.27±5.07; 37.36±7.9 at week 6; 21.29±3.81 at week 12). No significant relationship was found between MD changes in SPADI and ADAP. Between 0-6 weeks, ADAP had SRM:0.52 and ES:0.51, while SPADI had SRM:0.91 and ES:0.91. Between 0-12 weeks, ADAP had SRM:0.72 and ES:0.31, and SPADI had SRM:2.50 and ES:0.90.
Conclusions: ADAP and SPADI scores decreased during treatment. SPADI showed high responsiveness, both short and long term, while ADAP had lower responsiveness. SPADI seems more responsive for assessing recovery. Further studies with larger sample sizes are needed to confirm its effectiveness.
Keywords: Assessment, Pain, Questionnaire, Shoulder

S147.INVESTIGATION OF THE RELATIONSHIP BETWEEN SUBJECTIVE SPINE VALUE, PATIENT-REPORTED OUTCOMES, AND FUNCTIONAL PERFORMANCE IN INDIVIDUALS WITH ADOLESCENT IDIOPATHIC SCOLIOSIS: A PILOT STUDY

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Purpose: Single-question patient-reported outcome measures (PROMs) have gained popularity for their simplicity and efficiency in clinical assessment. Condition-specific single-item PROMs have emerged, including the Subjective Spine Value (SSV), which has been utilized in spinal disorders. However, SSV has never been applied in scoliosis evaluation. Moreover, single-question PROMs in the literature have predominantly been correlated with subjective scales but not with objective functional performance measures. This study aims to evaluate the correlation of SSV with both subjective and objective parameters in surgically treated adolescent idiopathic scoliosis (AIS) patients.
Methods: This pilot study included thirteen surgically treated AIS patients. Subjective outcomes were assessed using the SRS-22r, Spinal Function Index (SFI), and Spinal Appearance Questionnaire (SAQ). Objective functional performance was measured via the Extended Timed Up and Go (E-TUG) and Functional Reach tests. Spearman's correlation analysis was used to determine the relationship between SSV and the measured parameters. This is a preliminary analysis of an ongoing study.
Results: SSV showed a significant positive correlation with SRS-22r total score ($r = 0.578$, $p = 0.038$), spinal function index ($r = 0.683$, $p = 0.010$), and SAQ total score ($r = -0.728$, $p = 0.005$). Among objective measures, SSV had a strong negative correlation with E-TUG ($r = -0.690$, $p = 0.009$) and a positive correlation with the Functional Reach Test ($r = 0.683$, $p = 0.010$).
Conclusions: SSV is a valid and practical tool for evaluating postoperative outcomes in AIS, correlating with both subjective PROMs and objective functional performance. Future studies with larger cohorts should further investigate its clinical utility.
Keywords: Function, Questionnaire, Scoliosis

S148.EXAMINATION OF THE COMPATIBILITY OF THE GAIT ANALYZER MOBILE APPLICATION WITH THREE-DIMENSIONAL GAIT ANALYSIS

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Purpose: The gold standard in gait analysis is three-dimensional computerized gait analysis (3D-CGA). However, the high cost and equipment support required for 3D-CGA systems are barriers to this evaluation method. The aim of this study is to investigate the compatibility of the mobile application-based Gait-Analyzer with 3D-CGA in gait analysis.
Methods: The study included 40 healthy individuals aged 18-30. Participants took part in two different gait assessments, separated by a seven-day interval: i) 3D-CGA; ii) Gait-Analyzer. Each assessment was conducted in five laps along a 10-meter straight walking path. The Gait-Analyzer was downloaded onto an Android-operated phone, which was then securely attached to the participants' waist at the L5 level. For the 3D-CGA, markers were placed on body regions, and gait was recorded using six infrared cameras. Spatiotemporal gait parameters such as step length, step time, cadence, and walking speed were measured in both evaluations. Compatibility was evaluated using the Bland-Altman method, and reliability was assessed using Pearson's Correlation Coefficient.
Results: High compatibility was observed between the spatiotemporal gait parameters of the 3D-CGA and Gait-Analyzer methods ($ICC_{step\ length}=0.97$; $ICC_{step\ time}=0.87$; $ICC_{cadence}=0.90$; $ICC_{walking\ speed}=0.85$). Additionally, high reliability was found between the Gait-Analyzer and 3D-CGA ($r_{step\ length}=0.94$; $r_{step\ time}=0.77$; $r_{cadence}=0.82$; $r_{walking\ speed}=0.74$).
Conclusions: The gait analyses conducted using the mobile application-based Gait-Analyzer were found to be highly compatible and reliable with 3D-CGA. The findings suggest that the Gait-Analyzer

application can be used as an alternative method in clinical evaluations and can accurately measure spatiotemporal gait parameters in healthy young adults.
Keywords: Gait Analysis, Smartphone Application, Three-Dimensional Computerized Gait Analysis

S149.INVESTIGATION OF THE RELATIONSHIP BETWEEN SCHOOL BAG WEIGHT AND HAND GRIP STRENGTH AND POSTURE IN ADOLESCENTS

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Purpose: The aim of the study was to investigate the effect of school bag weight on hand grip strength and posture in adolescents.
Methods: Healthy individuals aged 10–17 were included. Those with neurological, orthopedic, chronic systemic diseases, or upper extremity/spine trauma or surgery in the past 6 months were excluded. Participants carrying unilateral or bilateral bags were included. School bag weights were recorded over 5 days and averaged. Hand grip strength was assessed using a Jamar dynamometer, and posture was evaluated using the New York posture analysis.
Results: 60 adolescents (29 female, 31 male), aged 10-17 years, participated. They averaged 160 cm in height (136-192) and 50 kg in weight (28-108). Dominant hand grip strength averaged 18.20 kg (10.26-54.13), non-dominant hand grip strength averaged 16.68 kg (7.5-43.60), school bag weight averaged 4.30 kg (1.50-9.11), and New York Posture Analysis results averaged 57.63 (43-65). According to the correlation analysis results between the bag weight and hand grip strength parameters, a weak negative relationship was found between the non-dominant hand grip strength and the bag weight ($r = -0.264$, $p = 0.042$). No significant relationship was found between the bag weight and posture ($p > 0.05$).
Conclusions: In adolescents, an increase in the weight of a school bag leads to a decrease in hand grip strength. Heavy bags can create pressure on the shoulder, disrupting circulation and nerve conduction, which can lead to fatigue in the hand and a decrease in grip strength.
Keywords: Adolescent, Hand Grip Strength, Posture

S150.EFFECTIVENESS OF TELEREHABILITATION EXERCISES IN LOW BACK PAIN: A SYSTEMATIC REVIEW

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Purpose: Low back pain (LBP) is a common cause of disability worldwide, requiring effective and accessible treatments. Telerehabilitation, which delivers exercise interventions via telecommunication technologies, has emerged as a promising alternative, particularly for individuals with limited access to conventional treatment. This systematic review aims to evaluate the effects of telerehabilitation exercises on pain, disability, and quality of life (QoL) in adults with LBP.
Methods: A systematic search was conducted across Scopus, Web of Science, Cochrane Library, CINAHL, EMBASE, and PEDro databases through July 26, 2023. Ten randomized controlled trials (RCTs) involving 461 participants with chronic or subacute LBP were analyzed. The interventions included video-based exercises and web applications, compared to clinic-based exercises, standard care, home exercises, waiting list, or placebo.
Results: Pain improved significantly in 6 out of 8 studies, disability in 6 out of 10 studies, and QoL in all 6 studies that assessed it. No adverse events or worsening outcomes were reported.
Conclusion: Telerehabilitation exercises are an effective, safe, and accessible alternative to conventional rehabilitation. While they offer cost-effectiveness and better patient adherence, methodological differences and short follow-up periods highlight the need for long-term, high-quality RCTs to strengthen the evidence.

Keywords: Disability, Exercise, Low Back Pain, Quality of Life, Telerehabilitation

S151.INVESTIGATION OF COGNITIVE FUNCTIONS AT DIFFERENT LEVELS OF FUNCTIONALITY IN CHRONIC NECK PAIN

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Purpose: The aim of the study is to examine cognitive functions at different functionality levels in chronic neck pain.
Methods: 106 patients between the ages of 40-60 who had neck pain for at least 6 months were included in the study. According to the Neck Disability Questionnaire, the patients were divided into two groups: 53 patients with severe-totally restricted (Group 1) and 53 patients with mild-moderate limitations (Group 2). The 1st Group consisted of 33 female and 20 male participants with an average age of 49.74±5.96, and the 2nd Group consisted of 34 female and 19 male participants with an average age of 48.49±5.3. Stroop TBAG test, which has five different sections, was used to evaluate cognitive functions.
Results: According to the results of the five sections of the Stroop TBAG test; The mean-standard deviation values for Group 1 are 17.98±5.69, 19.02±6.29, 19.08±4.39, 26.37±6.7, 34.12±9.1, for Group 2, it was found to be 12.06±3.55, 15.11±8.26, 16.28±4.48, 22.83±8.6, 30.69±10.43. According to the results, a significant difference was found between the two groups ($p<0.05$).
Conclusions: According to the results of the study, it was observed that there was a decrease in cognitive functions such as attention, perception, focus and reading speed with the increase in functional involvement in individuals with chronic neck pain. Accordingly, it should be emphasized that classifying the functional levels of individuals with chronic neck pain when starting the rehabilitation process will be guiding in planning the physiotherapy and rehabilitation approaches to be applied.
Keywords: Chronic Neck Pain, Cognitive Functions, Functional Influence, Physiotherapy and Rehabilitation

S152.THE EFFECT OF MULLIGAN MOBILIZATION TECHNIQUE APPLICATION ON PAIN IN PEOPLE WITH NECK PAIN

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Purpose: To evaluate the effect of the Mulligan mobilization technique on pain intensity and range of motion in individuals with neck pain.
Methods: Forty individuals with mechanical neck pain were enrolled in the study. The patients were randomly divided into 2 groups and a total of 10 sessions of treatment were administered to all 2 groups for 2 weeks, 5 days a week. Mulligan mobilization technique, electrophysical agents, active range of motion, and stretching exercises were carried out in the Mulligan group. In contrast, only electrophysical agents and exercises were applied to the conventional physiotherapy group. Range of motion (ROM) of the neck, Visual Analogue Scale (VAS), Neck Pain, and Disability Scale (NPDS) were used for evaluation.
Results: Statistical analyses were done to compare the amounts at the baseline and immediately after treatment. Statistically significant improvements were found in the post-treatment ROM, VAS, NPDS values in both groups ($p<0.05$). When the differences were compared, the results of the Mulligan group were significantly better than the conventional physiotherapy group ($p<0.05$).

Conclusions: This study showed that the Mulligan mobilization technique plus conventional physiotherapy is more effective than conventional physiotherapy in increasing joint range of motion, reducing pain, and reducing neck disability.
Keywords: Mulligan Mobilization, Neck Pain, ROM, VAS

S153.COMPARISON OF TWO DIFFERENT SENSORY SYSTEM-FOCUSED EXERCISES IN INDIVIDUALS WITH CHRONIC NECK PAIN

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Purpose: Joint position sense error is commonly observed in individuals with neck pain and it is known to negatively impact postural control, movement quality, and daily activities. This study aims to compare the effects of sensory system-focused sensorimotor exercises (SME) and yoga exercises (YE) on joint position sense and functionality in individuals with chronic neck pain.
Methods: Fifty individuals with chronic neck pain who met the inclusion criteria participated in the study and were randomly assigned to two groups. Participants followed their respective exercise programs for eight weeks. Joint position sense and functionality were assessed before and after the intervention.
Results: After treatment, both groups showed improvements in joint position sense ($p<0.05$), with a more pronounced improvement in the SME group. In terms of functionality, both groups demonstrated significant improvements ($p<0.05$); however, the improvement was greater in the SME group compared to the YE group ($p<0.001$).
Conclusions: This study demonstrated that both sensorimotor and yoga exercises have positive effects on joint position sense and functionality in chronic neck pain. However, sensorimotor exercises, which have gained popularity in recent years and include proprioceptive training, appear to be more effective than yoga exercises.
Keywords: Neck Pain, Position Sense, Proprioception, Yoga

S154.INVESTIGATION OF THE EFFECTS OF A SCOLIOSIS-SPECIFIC EXERCISE APPROACH ON THORACOLUMBAR FASCIA THICKNESS AND LOW BACK PAIN IN INDIVIDUALS WITH IDIOPATHIC LUMBAR SCOLIOSIS AND CHRONIC LOW BACK PAIN: A CASE SERIES

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Purpose: Literature suggests that individuals with chronic low back pain and idiopathic lumbar scoliosis have a thicker thoracolumbar fascia (TLF) compared to healthy individuals, and this thickness is more pronounced in relation to pain. However, the effects of scoliosis-specific exercises on TLF thickness remain unclear. This study aims to investigate the effects of the Scientific Exercise Approach to Scoliosis (SEAS) on TLF thickness and low back pain.
Methods: Three individuals with chronic low back pain and idiopathic lumbar scoliosis (mean age: 17±0.8 years) participated in the study. Pain was assessed using the Short Form McGill Pain Questionnaire and the Visual Analog Scale (VAS), while TLF thickness and organization were evaluated via ultrasound imaging (USG). SEAS exercises were performed in the clinic for 1 hour per week over 8 weeks, with home exercises conducted on other days. Baseline assessments were repeated after 8 weeks.
Results: Following SEAS exercises, the total score of the Short Form McGill Pain Questionnaire decreased from 15.3±6.7 to 8.7±0.5, indicating a 43.5% reduction. The VAS score decreased from

6.3±2.1 to 2.6±0.3, showing a 58.2% reduction. TLF thickness decreased by 16.6% on the right side (from 3.6±1.2 mm to 3.0±0.6 mm) and by 11% on the left side (from 3.1±1.1 mm to 2.8±0.8 mm). Additionally, while TLF organization was initially observed as "somewhat regular" or "irregular" on both sides, it appeared more structured after treatment.
Conclusions: SEAS exercises reduced pain levels and TLF thickness in individuals with idiopathic lumbar scoliosis and chronic low back pain. Furthermore, fascia organization improved following treatment. These findings suggest that SEAS exercises may contribute to pain management and fascial structure improvement in scoliosis patients; however, further research is needed.
Keywords: Fascia, Idiopathic Scoliosis, Low Back Pain

S155.THE EFFECT OF MANUAL THERAPY COMBINED WITH BREATHING EXERCISES ON PAIN AND PULMONARY FUNCTION IN ROTATOR CUFF IMPINGEMENT SYNDROME

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Purpose: The aim of this study is to investigate the effectiveness of manual therapy combined with breathing exercises in individuals with rotator cuff impingement syndrome.
Methods: The study was conducted with 52 individuals aged between 18 and 65 who were diagnosed with impingement syndrome. Participants were randomly divided equally into two groups. The control group received cold pack therapy, conventional-mode TENS, and a conventional exercise program. The intervention group received the same treatment program with the addition of manual therapy combined with breathing exercises. Both groups underwent treatment for a total of 6 weeks, with three sessions per week. Additionally, all participants were instructed to perform the prescribed exercises at home twice a day throughout the treatment period. Pain and disability were assessed using the Visual Analog Scale (VAS) and the Shoulder Pain and Disability Index (SPADI), while pulmonary function was evaluated using a spirometer.
Results: There was no significant difference between the two groups in terms of baseline VAS, SPADI, and pulmonary function values before treatment ($p>0.05$). However, after the treatment, both groups showed significant improvements in VAS, SPADI, and pulmonary function values ($p<0.05$). Except for VAS scores, the intervention group demonstrated greater improvements compared to the control group ($p<0.05$).
Conclusions: The addition of manual therapy and breathing exercises to a conventional physiotherapy program was found to be more beneficial for patients with impingement syndrome. This study highlights the importance of pulmonary function assessment and the inclusion of breathing exercises in the treatment of patients with impingement syndrome.
Keywords: Breathing Exercises, Impingement, Manual Therapy, ROM, SF-36, SPADI, Spirometer, VAS

S156.ACUTE EFFECT OF MANUAL THERAPY OF TEMPOROMANDIBULAR JOINT DYSFUNCTION: CASE REPORT

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Purpose: Temporomandibular joint dysfunction (TMD) affects the temporomandibular joint (TMJ) and surrounding muscles, causing pain and restricted mouth opening, which impairs quality of life. Manual therapy (MT) aims to relax muscles, enhance flexibility, improve joint range of motion, and provide correct proprioceptive input. This case report presents the outcomes of a single MT session in a TMD patient.

Methods: A 30-year-old male patient with a history of left TMJ arthrocentesis and Botox injections to bilateral masseter and temporalis muscles presented with facial pain, restricted mouth opening, and speech difficulty. Muscle pain and speech difficulty were assessed using a 10-point Visual Analog Scale (VAS), and maximum mouth opening was measured with a Varnier caliper. During a 40-minute MT session, techniques were applied to the TMJ and painful muscles, including the temporalis, masseter, sternocleidomastoid (SCM), and upper trapezius muscles. Mobilization techniques were used on the TMJ to facilitate rotation and translation movements.
Results: Post-intervention assessments showed pain reductions: temporalis muscle (9 to 8), masseter muscle (9 to 6), SCM muscle (9 to 6), upper trapezius muscle (8 to 5), and speech difficulty (6 to 3). Maximum painless mouth opening increased from 34 mm to 41 mm.
Conclusions: While limited studies support MT's efficacy in TMD treatment, this case report indicates that focused and effective MT can reduce symptoms and improve mouth opening in a single session. However, more randomized controlled trials with long-term follow-up are needed.
Keywords: Manual Therapy, Physiotherapy, Temporomandibular Joint Dysfunction

S157.A STUDY OF THE EFFECT OF EXERCISE COMPLEMENTED BY BIOFEEDBACK ON MID-THORACIC DYSFUCTION TREATMENT

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Purpose: This study has been designed to investigate the postural changes in cases with mid-thoracic dysfunction and to research the impact of exercise complemented by biofeedback on muscle strength, proprioception, balance, and spine mobility.
Methods: The patients were divided into two groups as active exercise program (N=25) and active exercise program with biofeedback (N=25). Both groups continued the physiotherapy and rehabilitation program for a total of 24 sessions for 8 weeks.
Results: The value of erect posture of the thoracic, a spinal mobility value, was found to be significantly lower in the exercise complemented by biofeedback group ($p<0.05$). Isometric and isokinetic muscle strength values for extension were higher for exercise complemented by biofeedback group ($p<0.05$). Regarding proprioception, when the deviations from the targeted angle are compared pre-treatment and post-treatment within both groups, it was found that all values for sensations during active and passive positions were significantly reduced ($p<0.05$). In the assessment of balance with eyes open and closed, the index values of stability for three directions displayed superior improvement in the exercise group. Visual Pain Scale, Neck Disability Index (NDI), and Oswestry Disability Index (ODI) values decreased considerably in both groups ($p<0.05$). According to Cornell Musculoskeletal Discomfort Questionnaire, the back values of the exercise complemented by biofeedback group were found to be better.
Conclusions: Training of exercise by biofeedback is effective for extensor muscle strength and proprioception. This is because it enhances sensory input, helping patients perform conventional exercises more efficiently and purposefully.
Keywords: Balance, Biofeedback, Isometric and Isokinetic Muscle Strength, Mid-Thoracic Dysfuction, Proprioception

S158.COMPARISON OF FOOT ARCH POSTURE, ACHILLES TENDON AND PLANTAR FASCIA THICKNESSES ACCORDING TO SEX IN HEALTHY INDIVIDUALS: A PILOT STUDY

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Purpose: Comparison of foot arch posture, Achilles tendon and plantar fascia thicknesses according to sex in healthy individuals.
Methods: Fourth eight healthy volunteers (24 female, 24 male) aged between 20-40 were recruited in the study. Foot arch postures of the participants were evaluated with Foot Posture Index (FPI) and Foot Arch Index (FAI). Achilles tendon (AT) and plantar fascia (PF) thicknesses were measured with the L7 flat head probe of Clarius Ultrasound (Clarius Mobile Health Corporation, Canada) in Brightness mode. The Mann Whitney-U test was used for inter-sex evaluations.
Results: The ages of the participants were recorded as 24.16±3.77 years for females and 27.04±6.09 years for males. There was a significant difference between the body mass index (BMI) ($p=0.009$) and API scores within the normal foot posture values of females and males bilaterally, with a higher trends to pronation in females ($W_{right}=4.042\pm2.274$, $M_{right}=1.58\pm2.376$, $p_{right}<0.001$; $F_{left}=4.083\pm2.165$, $M_{left}=2.042\pm2.312$, $p_{left}=0.003$), while no significant difference was found in terms of FAI ($p_{right}=0.959$; $p_{left}=0.736$), AT thickness ($p_{right}=0.781$; $p_{left}=0.483$) and PF thickness ($p_{right}=0.107$; $p_{left}=0.780$).
Conclusions: It has been reported that the height of the medial longitudinal arch decreases, AT becomes thinner and PF becomes thicker in pronation posture (1,2). This study concluded that although foot posture tends to be more pronated in females, it has no effect on AT and PF thicknesses, remaining within normal values.
Keywords: Achilles Tendon, Gait Analyses, Plantar Fascia, Ultrasonography

S159.INVESTIGATION OF RELATIONSHIPS BETWEEN ABDOMINAL MUSCLE THICKNESS AND DIFFERENT VERTICAL JUMP PERFORMANCES OF ADOLESCENT SOCCER PLAYERS

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Purpose: The aim of this study was to investigate the relationships between internal oblique, external oblique, transversus abdominis and rectus abdominis muscle thickness and squat jump, hands-fixed countermovement jump, hands-free countermovement jump and both side single leg vertical jump performances of adolescent soccer players.
Methods: Fifty-eight healthy male athletes (age:14.22±1.85 years; height:165.67±12.88 cm; body weight:56.62±11.61 kg) participated in the study. A linear ultrasound probe (Sonostar, 3.5–10 MHz) was used to image the muscles on both sides. Two images for all muscles were analyzed using MicroDicom software and the average was calculated. The athletes' jumps were recorded using a smartphone. Three videos of each jump were then analyzed using the My Jump Lab phone app and an average was calculated.
Results: There was no significant relationship between squat jump performance and non-dominant side external oblique and transversus abdominis muscle thickness ($r=0.18$ $p>0.05$; $r=0.25$ $p>0.05$, respectively). There was a significant relationship between the other parameters except these ($r=0.27$–0.62; $p<0.05$). The muscles with the strongest relationship with jumping performance were found to be the internal oblique ($r=0.43$–0.62; $p<0.05$) and rectus abdominis ($r=0.35$–0.59; $p<0.05$).
Conclusions: Due to the moderately positive correlations with vertical jump performance of adolescent soccer players, practices that will increase the thickness of the abdominal muscles, especially the internal oblique and rectus abdominis muscles, can be included in the training program.
Keywords: Abdominal Wall, Athletic Performance, Physical Fitness, Ultrasonography

S160.THE EFFECT OF BLOOD FLOW RESTRICTED CROSS-EDUCATION ON QUADRICEPS MUSCLE STRENGTH AND KNEE FUNCTION AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Purpose: This study aimed to investigate the effects of CE combined with BFR training compared to CE alone on quadriceps strength and knee function.
Methods: This study included 23 patients (mean age:25.8±6.5 years; BMI:23.8±2.2 kg/m²) who had undergone ACLR using a hamstring tendon autograft. Four-weeks post-surgery, the patients were randomly assigned to two groups: Group-1 received only CE, while Group-2 underwent CE combined with BFR training (8-weeks). Both groups followed a standardized rehabilitation protocol for the reconstructed limb until the 12th week post-surgery. Group-1 performed CE using an isokinetic system (60°/s speed, 3 sets×12 repetitions, twice weekly). Group-2 followed the same CE protocol but with the addition of BFR training. Quadriceps isometric muscle strength was assessed using an isokinetic system (Nm/kg). Knee function was evaluated using the International Knee Documentation Committee (IKDC) and the Knee Injury and Osteoarthritis Outcome Score (KOOS). All assessments were conducted before and after training. Two-way repeated measures ANOVA was used for statistical analyses.
Results: No significant time-by-group interaction was observed for quadriceps isometric strength in both limbs ($p>0.05$). However, significant time-related improvements were noted in quadriceps strength for both the involved ($p<0.001$) and uninvolved limbs ($p<0.001$). Similarly, no considerable time-by-group interaction was found for knee function ($p>0.05$). Nevertheless, a significant main effect of time was detected for knee function, with improvements in IKDC ($p=0.001$) and KOOS ($p<0.001$).
Conclusions: Compared to eccentric CETR alone, adding BFRT to eccentric quadriceps cross-education does not influence quadriceps strength or knee function in the reconstructed limb following ACLR. Future studies could explore different training protocols that integrate BFRT into CETR.
Keywords: Anterior Cruciate Ligament, Resistance Training, Rehabilitation, Quadriceps Muscle

S161.THE IMPACT OF CHRONIC NECK PAIN ON FUNCTIONAL CAPACITY: A COMPARATIVE STUDY WITH ASYMPTOMATIC INDIVIDUALS

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Purpose: Neck pain is a significant public health issue with a lifetime prevalence of up to 50%, negatively affecting daily activities, workforce participation, and quality of life. According to the International Classification of Functioning, Disability, and Health (ICF), neck pain limits an individual's activity and participation levels, leading to disability. Evaluating individuals not only in terms of pain but also functionally is crucial. This study aims to compare the functional capacity levels of individuals with chronic neck pain and healthy individuals.
Methods: The study included 27 individuals with chronic neck pain and 25 asymptomatic individuals, matched for age and sex. Pain intensity was measured using the Visual Analog Scale, and disability level was assessed with the Neck Disability Index. Functional capacity was evaluated using the WorkWell Systems test, and all participants completed five upper extremity tasks.
Results: The mean age of the participants was 41.3 years. When comparing functional capacity measurements, individuals with chronic neck pain demonstrated significantly lower performance than

asymptomatic individuals in repetitive reaching tasks, sustained overhead work, overhead object lifting, fine hand dexterity tasks, and hand and forearm skill tasks ($p<0.05$).
Conclusions: Individuals with chronic neck pain showed reduced functional capacity, linked to impairments in motor control, strength, endurance, and movement speed. Performance deficits in overhead tasks and fine motor activities suggest pain-related limitations in postural stability and dexterity. These findings emphasize the need for rehabilitation programs targeting motor control, strength, and endurance.
Keywords: Chronic Neck Pain, Functional Capacity Assessment, Physiotherapy, Rehabilitation

S162.LONG-TERM OUTCOMES OF MOTOR CONTROL EXERCISES DELIVERED VIA TELEREHABILITATION IN INDIVIDUALS WITH CHRONIC LOW BACK PAIN: A RANDOMIZED CONTROLLED TRIAL – 12-MONTH FOLLOW-UP

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Purpose: This study aims to investigate the long-term effects of motor control exercises delivered via telerehabilitation (TR) on pain and disability in individuals with chronic low back pain (CLBP).
Methods: A total of 16 individuals with CLBP were included. Pain severity levels were assessed using the Visual Analog Scale (VAS), and disability levels were measured with the Oswestry Disability Index (ODI). Participants were divided into two groups: one received in-person motor control exercises, while the other underwent the same exercise program via TR. The program lasted for 8 weeks, with sessions conducted three times per week. Assessments were performed before treatment, after treatment, and at the 12-month follow-up.
Results: In the TR group (4 males, 4 females), the mean age was 43.38±9.96 years, and the body mass index (BMI) was 26.28±1.95. In the clinical group (2 males, 6 females), the mean age was 39.13±0.27 years, with a BMI of 26.6±3.65. Pain and disability levels were similar between groups before and after treatment. Both groups showed significant improvements post-treatment ($p<0.05$), with no significant differences between groups in VAS and ODI scores ($p>0.05$). Over time, significant differences were observed between pre-treatment and both post-treatment and 12-month follow-up results, while post-treatment and 12-month outcomes remained similar.
Conclusions: Motor control exercises delivered via both methods were similarly effective in reducing pain and disability. Long-term results indicate that the improvements persisted at 12 months. TR-based exercises appear to be as effective as in-person exercises for CLBP, highlighting the need for further studies with larger populations.
Keywords: Exercise, Low Back Pain, Telerehabilitation

S163.ANKLE MUSCLE ARCHITECTURE AND FUNCTIONAL PERFORMANCE DO NOT VARY WITH LIMB DOMINANCE IN HEALTHY INDIVIDUALS

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Purpose: This study aims to compare ankle muscle architecture, muscle strength, and functional performance test results between the dominant and non-dominant extremities in healthy young individuals.
Methods: Twenty-four healthy young participants were assessed for architectural characteristics of gastrocnemius medialis (GM), gastrocnemius lateralis (GL) and tibialis anterior (TA) muscles and Achilles tendon thickness in both the dominant and non-dominant extremities. Plantar and dorsi flexor

isometric strength along with heel-rise test, weight-bearing lunge test (WBLT), single leg hop test performance, were also measured. A paired sample t-test were used for statistical analysis.
Results: No significant differences were found between the dominant and non-dominant extremities in muscle thickness, pennation angle, fiber length of GM, GL, and TA, or Achilles tendon thickness ($p>0.05$). Similarly, plantar ($p=0.352$) and dorsiflexor isometric strength ($p=0.334$), as well as the results of the heel rise ($p=0.758$), WBLT ($p=0.274$) and single leg hop test ($p=0.938$), showed no significant differences between extremities.
Conclusions: These findings indicate that lower extremity muscle architecture, ankle isometric strength, and functional performance test results are symmetrical between the dominant and non-dominant extremities in healthy young individuals. Maintaining this symmetrical development during rehabilitation and training may be crucial for injury prevention and the preservation or enhancement of motor function.
Keywords: Ankle, Dominance, Functional Performance, Muscle Architecture

S164.INVESTIGATION OF THE RELATIONSHIP BETWEEN SELF-CARE SKILLS AND SOCIAL-EMOTIONAL DEVELOPMENT IN CHILDREN WITH OBSTETRIC BRACHIAL PLEXUS PALSY

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Purpose: The aim of our study was to investigate the relationship between the self-care skills and social-emotional development of children with OBPP.
Methods: A total of 13 children aged 6-42 months, classified according to the Narakas Classification System, with various involvement types (Type 1 = 2, Type 2a = 5, Type 2b = 3, Type 3 = 1, Type 4 = 2), were included in the study. The children's self-care skills were assessed using the Pediatric Evaluation of Disability Inventory (PEDI), while their social-emotional development was evaluated with the Vineland Social-Emotional Early Childhood Scales (SEEC).
Results: It was observed that as the PEDI scores of children with OBPP increased, their SEEC scores also increased. PEDI Self-Care subscale and SEEC Interpersonal Relationships ($rho = 0.844$, $p = 0.0001$), SEEC Play and Leisure Time ($rho = 0.790$, $p = 0.001$), and SEEC Coping Skills ($rho = 0.771$, $p = 0.002$). PEDI Mobility subscale and SEEC Interpersonal Relationships ($rho = 0.864$, $p = 0.0001$), SEEC Play and Leisure Time ($rho = 0.850$, $p = 0.0001$), and SEEC Coping Skills ($rho = 0.818$, $p = 0.0001$). PEDI Social Function subscale and SEEC Interpersonal Relationships ($rho = 0.727$, $p = 0.005$), SEEC Play and Leisure Time ($rho = 0.780$, $p = 0.002$), and SEEC Coping Skills ($rho = 0.781$, $p = 0.002$). It was found that there is a strong positive relationship between all variables.
Conclusion: Children with OBPP who have better self-care skills also display better social-emotional development.
Keywords: Obstetric Brachial Plexus Paralysis, Self-Care, Social-Emotional Development

S166.THE RELATIONSHIP BETWEEN RESPIRATORY MUSCLE STRENGTH AND CORE PERFORMANCE IN HEALTHY WOMEN

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Purpose: This study was conducted to investigate the relationship between respiratory muscle strength and core performance in healthy women.

Methods: The study included 60 healthy woman aged 20-45 years. Respiratory muscle strength was measured with the Cosmed Pony FX spirometer. In 3 repetitive tests, the highest values were recorded as maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP) scores. Core endurance was evaluated by plank test. Physical activity levels of the individuals were questioned with the International Physical Activity Questionnaire (IPAQ). Spearman correlation analysis was used for statistical analysis.
Results: The mean age of the participants was 34.67±9.07 years. There was a weak positive significant correlation between MIP and core endurance scores ($r = 0.25$; $p = 0.05$), a weak positive significant correlation between MEP and core endurance scores ($r = 0.27$; $p = 0.03$), a moderate positive significant correlation between MIP and IPAQ scores ($r = 0.35$; $p = 0.006$), while no significant correlation was found between MEP and IPAQ scores ($p = 0.17$).
Conclusions: In the study, respiratory muscle strength and core performance were found to be related in healthy women. Physical activity level may play a supportive role on respiratory muscle function. Considering the biological characteristics of women, it is important to include these evaluations in the counselling programme for the protection of women's health.
Keywords: Core Endurance, Physical Activity, Respiratory Muscle Strength, Women's Health
Funding: This study was supported by TÜBİTAK 2209-A- University Students Domestic Research Projects Support Program

P001.POSTURAL DISORDERS IN OVERWEIGHT CHILDREN AND CHILDHOOD OBESITY: A BIBLIOMETRIC ANALYSIS BASED ON THE WEB OF SCIENCE

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Purpose: Although numerous studies have examined the relationship between obesity and posture, no bibliometric analysis has specifically focused on postural problems caused by childhood obesity and overweight. This study aims to provide a comprehensive bibliometric analysis of the existing literature on this topic.
Methods: A search was conducted in Web of Science (WoS) database for the years 2002-2024 using the keywords "childhood obesity" OR "obese children" OR "overweight children" OR "pediatric obesity" AND "posture" OR "postural disorder" OR "postural imbalance" OR "musculoskeletal alignment" in the title, abstract, and keyword sections. The retrieved data were analyzed using VOSviewer software.
Results: A total of 60 studies meeting these research criteria were found in the WoS database. Among them, 18 studies were within the field of pediatrics. Additionally, the United States emerged as the most productive country in this field, contributing 15 studies. It was observed that 51 studies were indexed in the Science Citation Index Expanded. Furthermore, 13 studies were indexed in the Social Sciences Citation Index, and 3 studies were included in the Emerging Sources Citation Index. The majority of the studies (53) were published as research articles, while the remaining 7 consisted of 3 conference papers, 3 review articles, and 1 book chapter.
Conclusions: In this bibliometric analysis, a limited number of studies were identified in the WoS database. It was observed that research examining the relationship between childhood obesity and postural disorders is predominantly published within the field of pediatrics. Future studies utilizing alternative databases such as Scopus and PubMed may provide more comprehensive results and a broader perspective on this topic.
Keywords: Bibliometrics, Databases, Pediatric Obesity, Postural Disorders, Posture

P002.THE RELATIONSHIP BETWEEN POSTURE AND PHYSICAL ACTIVITY: THE EFFECT OF PHYSICAL ACTIVITY ON POSTURE OF HEALTHY INDIVIDUALS

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Purpose: This study aims to examine the relationship between New York Posture Assessment (NYPA) scores and the International Physical Activity Questionnaire (IPAQ) to evaluate the impact of physical activity levels on posture.
Methods: In this cross-sectional study, NYPA and IPAQ scores of 50 participants were analyzed. Based on their IPAQ scores, participants were categorized into two groups: Minimally Active and Highly Active. The differences in NYPA scores between these groups were analyzed using the Mann-Whitney U test. Additionally, the correlation between IPAQ scores and NYPA was examined using Spearman correlation analysis.
Results: A mild positive correlation ($r = 0.128$) was found between NYPA scores and IPAQ. This suggests that as physical activity levels increase, posture scores may also improve. However, this correlation was not statistically significant ($p > 0.05$).
Conclusions: This study suggests that physical activity levels may have a potential effect on posture. However, further studies with larger sample sizes are needed to clarify this effect.
Keywords: Musculoskeletal Pain, Musculoskeletal System, Physical Fitness, Posture

P003.THE EFFECT OF INCOME-EXPENDITURE BALANCE ON THE SEVERITY OF TEMPOROMANDIBULAR JOINT DYSFUNCTION, DEPRESSION AND SMARTPHONE ADDICTION IN UNIVERSITY STUDENTS

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Purpose: The literature has shown that individuals with TMJD have higher rates of addiction and depression than healthy individuals, but the relationship between sociodemographic characteristics and these factors has not yet been demonstrated. In this study, we aimed to examine the effect of income-expenditure balance, one of the important factors affecting quality of life, on TMJD severity, depression and smartphone addiction.
Methods: A total of 396 university students, 267 females and 129 males, with a mean age of 22.04±3.71 years, studying at Toros University were included in our study. TMJD severity was assessed using the Fonseka Anamnestic Index (FAI), smartphone addiction was assessed using the Smartphone Addiction Index-Short Form (SPAI-SF), and depression severity was assessed using the Patient Health Questionnaire-4 (PHQ-4). Participants were divided into 2 groups according to income-expense balance; those whose income was more than their expenses and those whose income was less than their expenses.
Results: It was found that the FAI (p: 0.001), SPAI-SF (p: 0.018) and PHQ-4 (p: 0.000) scores of the participants whose income was less than their expenses were significantly higher than those whose income was more than their expenses.
Conclusions: According to the results obtained, income-expenditure balance has a significant effect on TMJD severity, depression and smartphone addiction. It reveals that there will be an increase in TMJD severity, depression and smartphone addiction level with the deterioration of income-expenditure balance. In order to explain the underlying causes of this interaction, future studies examining the parameters in detail are important.
Keywords: Depression, Smartphone Addiction, Temporomandibular Joint Dysfunction

P004.CLASSIFICATION OF RISK BY GESTATIONAL AGE AND BAYLEY-III OUTCOMES: SHOULD ALL INFANTS BE EVALUATED?

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Purpose: Infants at risk for neurodevelopmental delay are classified as high, moderate, or low risk based on gestational age. The Turkish Neonatology Society guidelines recommend early referral of high-risk infants for Bayley-III Developmental Assessment, while moderate- and low-risk infants may be overlooked. The aim of this study is to compare the Bayley-III results of low, moderate, and high-risk infants according to their gestational age.
Methods: A total of 54 infants referred to the Pediatric Rehabilitation Unit at Acıbadem Altunizade Hospital between 2020 and 2025 were assessed using the Bayley-III DAS. Cognitive, language, and motor skills were evaluated, and scale scores were classified as below the cutoff, borderline, or normal. Data were analyzed using SPSS 26.
Results: No significant differences were found between groups in cognitive (p=0.39), language (receptive p=0.38, expressive p=0.10), and motor skills (fine motor p=0.24, gross motor p=0.97). Developmental delays were particularly observed in the gross motor and language domains in the moderate- and low-risk groups, whereas fewer delays were identified in the high-risk group. In the high-risk group, 7.7% showed delays in cognitive and expressive language, and 46.2% in gross motor skills.
Conclusions: No significant differences were found among the risk groups in Bayley-III DAS scores.The early referral of high-risk infants for rehabilitation may explain the lack of a significant difference between groups. This study highlights the necessity of routine Bayley-III assessment for all at-risk infants, regardless of gestational age.
Keywords: Infant Development, Premature Infants

P005.INVESTIGATION OF THE RELATIONSHIP BETWEEN MENTAL ROTATION SKILLS AND UPPER EXTREMITY FUNCTIONS OF UNIVERSITY STUDENTS: A PILOT STUDY

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Purpose: This study aims to investigate the relationship between university students' mental rotation (MR) skills and upper extremity functions, including fine dexterity, grip strength, and reaction time.
Methods: “Right-Left Hand Confusion Test” was applied in a computerized environment to evaluate MR skills. Fine dexterity was evaluated with the “Nine Hole Peg Test,” grip strength was measured using the ‘Baseline® Hand Dynamometer,’ and reaction time was tested with the “Reaction Time Test” mobile app.
Results: 28 physiotherapy students participated, with a mean age of 19.82±3.16 years. There was a statistically significant positive correlation in moderate strength between reaction time and the time taken in the 3rd stage in which MR was evaluated (r:0.41; p:0.030). There was no significant relationship between grip strength and fine dexterity with MR (p>0.005).
Conclusions: MR skill is a cognitive process that enables the mental rotation and visualization of an object. Since the ability to process information quickly and accurately in this task provides accurate results in a shorter time, the relationship with reaction time is significant. However, other factors (gender, attention etc.) should also be considered. In disciplines that require three-dimensional thinking, MR skills are crucial for success. Therefore, conducting the study in different disciplines, adding related assessment parameters, and with a larger sample may provide more comprehensive results.
Keywords: Grip Strength, Motor Skills, Perception, Reaction Time, Rotation, Students

P006.LONG-TERM PSYCHOLOGICAL EFFECTS OF THE EARTHQUAKE: ANXIETY AND STRESS LEVELS AMONG UNIVERSITY STUDENTS TWO YEARS AFTER THE DISASTER

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Purpose: This study aimed to assess the long-term psychological effects of the earthquake on university students, two years later, and to examine the relationship between earthquake related anxiety and general anxiety levels.
Methods: The study included a total of 39 university students who were enrolled at Hatay Mustafa Kemal University and were present in the provinces affected by the earthquake at the time of the disaster. Data were collected using the Beck Anxiety Inventory (BAI), Earthquake Anxiety Scale (EAS), and Depression Anxiety Stress Scale (DASS-21). Descriptive statistics and Pearson correlation analysis were performed to determine the relationships between anxiety and stress levels.
Results: The mean scores were 16.31±12.99 for BAI, 26.74±9.51 for EAS, and 20.72±13.56 for DASS-21. Participants exhibited moderate anxiety levels on the BAI and the EAS, while the DASS-21 indicated severe levels of depression, anxiety, and stress. There were significant, moderate positive correlations between BAI and EAS ($r=0.528$, $p=0.001$), BAI and DASS-21 ($r=0.690$, $p<0.001$), and EAS and DASS-21 ($r=0.563$, $p<0.001$). Additionally, 5.1% of participants had received psychological support, while 20.5% had to relocate due to the earthquake.
Conclusions: The findings suggest that students who experienced the earthquake still have high levels of anxiety and stress two years after the disaster. The strong correlations between earthquake-related anxiety and general anxiety levels highlight the long-term psychological impact. It becomes evident that mental health interventions should be implemented for students studying at earthquake-affected universities, such as Hatay Mustafa Kemal University.
Keywords: Anxiety, Earthquake, Mental Health, Stress

P007.INVESTIGATION OF TRUNK STABILITY IN WOMEN WITH AND WITHOUT PELVIC ORGAN PROLAPSE

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Purpose: The primary aim of this study is to investigate trunk stability in women with and without pelvic organ prolapse.
Methods: This study was designed as a cross-sectional study, and 39 women voluntarily participated. The presence of POP was assessed using the POP-Q classification method. Trunk extension core endurance was evaluated using the Biering Sorenson test. The lateral core muscles were assessed using the lateral bridge test, which was conducted bilaterally on both the right and left sides. To evaluate the anterior core muscles, the trunk flexor test was used, and the results were recorded in seconds.
Results: The study included 24 women with stage 3 pelvic organ prolapse (POP) [age: 53.2±7.9 (26-60) years, height: 159.4±4.9 cm, body weight: 70.3±7.7 kg, body mass index: 27.5±2.2 kg/m²] and 15 women with stage 0 pelvic organ prolapse [age: 40.1±12 (24-60) years, height: 160±7.7 cm, body weight: 62.8±8.2 kg, body mass index: 24.4±3.1 kg/m²]. A moderate and highly significant negative correlation was found between POP stage and left lateral bridge ($rho = -0.556$, $p < 0.001$), a weak-to-moderate significant negative correlation was observed between POP stage and trunk flexion ($rho = -0.485$, $p = 0.002$).
Conclusions: These findings indicate that as the prolapse stage increases, the stability of the trunk flexor muscle group and the lateral trunk muscle group tends to decrease, and this relationship is statistically significant. In addition to this study evaluating the relationship between prolapse and trunk stability, further longitudinal studies with larger sample sizes are needed.
Keywords: Prolapse, Trunk Stability, Women's Health

P008.CORRELATION BETWEEN DYSFUNCTIONAL BREATHING AND QUALITY OF LIFE IN INDIVIDUALS WITH THORACIC OUTLET SYNDROME

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Purpose: In individuals with Thoracic Outlet Syndrome (TOS), respiratory characteristics and biomechanics may be affected due to hyperactivity of the accessory respiratory muscles. Therefore, it may be useful to evaluate dysfunctional breathing characteristics in individuals with TOS. The aim of this study was to investigate the correlation between dysfunctional breathing and quality of life in individuals with TOS.
Methods: Nineteen TOS patients (16 female, 3 male; mean age 33.95 ± 13.16 years) participated. Dysfunctional breathing was assessed with the Nijmegen Questionnaire, and quality of life was assessed with the EuroQol 5-Dimensional 5-Level Quality of Life Questionnaire (EQ-5D-5L).
Results: The mean score obtained by the individuals from the Nijmegen Questionnaire was found to be 23.37 ± 8.64. It was observed that 14 individuals (73.7%) had dysfunctional breathing (Nijmegen Questionnaire score >20). The mean score of the EQ-5D-5L Questionnaire was 9.31 ± 3.26. There was a significant positive correlation between the EQ-5D-5L total score and the Nijmegen Questionnaire score ($r=0.558$, $p<0.05$). There was a significant positive correlation between the Anxiety/Depression sub-parameter of the EQ-5D-5L Questionnaire and the Nijmegen Questionnaire score. ($r=0.483$, $p<0.05$). There was no relationship between the other parameters of the EQ-5D-5L and the Nijmegen Questionnaire ($p>0.05$).
Conclusions: Dysfunctional breathing was detected in the majority of individuals with TOS. There is a moderate relationship between dysfunctional breathing and quality of life in individuals with TOS. Evaluation of dysfunctional breathing in individuals with TOS is important. Treatment methods for dysfunctional breathing in individuals with TOS may contribute to the improvement of quality of life.
Keywords: Breathing Mechanics, Health Related Quality of Life, Thoracic Outlet Syndrome

P009.EXAMINATION OF THE RELATIONSHIP BETWEEN PELVIC FLOOR DYSFUNCTION SEVERITY AND PSYCHOLOGICAL SKILLS IN FEMALE ATHLETES ENGAGED IN HIGH-IMPACT SPORTS: A PRELIMINARY STUDY

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Purpose: This study aimed to examine the relationship between pelvic floor dysfunction (PFD) severity and psychological skills in female athletes engaged in high-impact sports.
Methods: A total of 97 female athletes engaged in high-impact sports (age = 20.0 [(18.0); (32.0)] years; body mass index = 20.4 [(17.5); (28.9)] kg/m²) were included in the study. PFD severity was assessed using the Pelvic Floor Distress Inventory-20 (PFDI-20), which consists of three subscales: Pelvic Organ Prolapse Distress Inventory-6 (POPDI-6), Colorectal-Anal Distress Inventory-8 (CRADI-8), and Urinary Distress Inventory-6 (UDI-6). The psychological skills of the athletes were evaluated using the Athletic Coping Skills Inventory (ACSI), which includes seven subscales: coping with adversity, coachability, concentration, confidence and achievement motivation, goal setting and mental preparation, peaking under pressure, and freedom from worry. Spearman's correlation test was used for statistical analysis.
Results: A negative weak correlation was found between coachability and POPDI-6 ($rho=-0.214$; $p=0.035$), UDI-6 ($rho=-0.271$; $p=0.008$), and total PFDI-20 ($rho=-0.211$; $p=0.039$) scores. Additionally,

a negative weak correlation was observed between the total ACSI score and UDI-6 (rho=-0.208; p=0.042) and total PFDI-20 (rho=-0.210; p=0.040) scores. No significant relationships were found among other parameters (p>0.05).
Conclusions: A negative correlation was found between PFD severity with coachability and psychological skills in female athletes. These findings suggest that athletes with better psychological skills may experience fewer PFD symptoms and cope with them more effectively. The results emphasize the importance of considering both physical and psychological aspects of pelvic floor health and highlight the necessity of comprehensive physical and psychological assessments for female athletes engaged in high-impact sports.
Keywords: Athletes, Pelvic Floor Disorders, Psychology

P010.THE IMMEDIATE EFFECTS OF ANKLE MOVEMENT WITH MOBILIZATION AND MULLIGAN TALOCRURAL TAPING ON GAIT AND BALANCE IN STROKE PATIENTS

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Purpose: This study aimed to examine the effects of the combination of Mulligan's ankle movement with mobilization (MWM) technique and talus stabilization taping on the spatiotemporal parameters of gait and balance in stroke patients.
Methods: A total of 56 chronic stroke patients were randomly assigned to the Study Group and the Sham Group, in a 1:1 randomization ratio. Participants in the Study Group underwent Mulligan's talocrural joint MWM technique and talar stabilization taping. In contrast, the Sham Group received the Mulligan talocrural joint MWM technique without applying the required shear force and talar stabilization taping without the necessary tension for stabilization. Gait and balance were assessed using the Zebris pedobarographic device. All measurements were performed before and immediately after the intervention.
Results: No significant differences were found between the groups in stride length, double stride length, step width, swing, or stance phase percentages before and after the intervention. Similarly, there were no significant differences between the groups in the pathway and velocity of center-of-pressure before and after the intervention.
Conclusions: Mulligan MWM and taping interventions had no immediate effects on gait and balance in patients with stroke. This lack of an effect is thought to be due to the failure to incorporate the gains obtained in this neurologically affected population into gait and balance training processes.
Key words: Balance, Gait, Mobilization with Movement, Spatiotemporal Parameter, Stroke

P011.RELIABILITY OF THE Y BALANCE TEST PERFORMED IN DIFFERENT LOWER EXTREMITY POSITIONS IN BALLET DANCERS

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Purpose: The goal of this study is to examine the test-retest reliability of the modified Turn-out120 Y Balance Test and Turn-out140 Y Balance Test, taking into account the specific needs and commonly used positions of ballet dancers.
Methods: The study involved 15 healthy individuals (5 men and 10 women, age: 19.13 ± 1.24) who had been practicing ballet actively for at least 3 years, had no major injuries in the lower extremities in the past 6 months he Y Balance Test setup was done using a measuring tape, and the Y Balance, Turn-out120 Y Balance, and Turn-out140 Y Balance tests were applied. Turn-out refers to the full external rotation of the lower limbs, corresponding to the first position in ballet. In the Turn-out120 test, the legs were

externally rotated at 120 degrees, and in the Turn-out140 test, they were rotated at 140 degrees. After a week, the same tests were repeated. The data were analyzed using IBM SPSS Statistics 23, calculating Intraclass Correlation Coefficients (ICC).
Results: The combined ICC value for the Y Balance Test was 0.73, for Turn-out120 was 0.82, and for Turn-out140 was 0.88.
Conclusions: The Turn-out140 test showed the highest reliability for balance assessments in ballet dancers. The Y Balance Test, performed in the standard position, showed moderate reliability. Therefore, the Turn-out120 and Turn-out140 tests, which are more reliable for ballet dancers, should be preferred. Further studies are needed to explore the relationship between these tests and dance or clinical performance and validity.
Keywords: Balance, Ballet, Reliability, Test-Retest

P012.COMPARISON OF POSTURAL HABITS AND AWARENESS LEVELS IN INDIVIDUALS WITH AND WITHOUT TEMPOROMANDIBULAR JOINT DISORDER

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Purpose: Although the link between postural disorders and musculoskeletal issues is well-documented, the impact of postural habits on temporomandibular joint function remains unclear. Likewise, the effects of temporomandibular disorders (TMD) on postural habits and awareness are not fully explored. This study aimed to compare postural habits and awareness in individuals with and without TMD.
Methods: A total of 100 individuals aged 18–60 participated, including 50 with diagnosis of TMD who had experienced jaw, face, or temporal pain for at least three months (pain score ≥3 on the Numerical Rating Scale) and 50 without TMD. The demographic information was recorded of subjects, and they were asked to complete the Postural Habits and Awareness Scale (internal consistency coefficient >0.85, $p<0.05$).
Results: Groups were similar in age and gender. Subjects with TMD had lower scores of postural awareness ($p=0.009$), postural habits ($p<0.001$) and total scores ($p<0.001$) than the control group. When the sub-dimensions of the scale are examined, they had lower scores in stance habit and awareness ($p<0.001$), positional awareness ($p=0.025$), and ergonomic awareness ($p<0.001$).
Conclusions: The observed lower level of postural habit and awareness in individuals diagnosed with TMD may indicate a relationship between TMD and postural perception. From a health protection and improvement perspective, we suggest that incorporating a detailed evaluation of postural habits and awareness levels alongside other musculoskeletal parameters in TMD rehabilitation and integrating educational interventions on this issue into therapy programs could contribute to the development of new approaches.
Keywords: Awareness, Habits, Posture, Temporomandibular Joint Disorders

P0013. DOES SHOULDER PROPRIOCEPTION AND MUSCLE STRENGTH AFFECT BALANCE IN AIKIDO ATHLETES?

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Purpose: This study was examinate to investigate how shoulder proprioception and muscle strength affect balance parameter in Aikido athletes.

Methods: 25 aikido athletes, 12 females and 13 males, with a mean age of 21.59 years, were included in the study. Shoulder muscle strength was measured at 90, 120, 180 degrees flexion angles and proprioception was measured at 30 and 60 degrees flexion angles for both extremities (Biodex Isokinetic System). Balance was assessed with eyes open and closed, on hard and soft surfaces (Biodex Balance System SD). Data were analyzed Spearman Correlation Analyses, with significance set at $p<0,05$.
Results: No correlation was found between both shoulder muscle strength measurements at 90, 120, 180 degrees flexion angles and balance results ($p>0.05$). Moderate correlations were found between the proprioception value measured at 30 degrees flexion angle of the right shoulder and balance values measured on the soft surface with eyes open ($r=0.511$, $p<0.05$); no correlation was found between the other values ($p>0.05$).
Conclusions: These findings suggest a relationship between dominant side shoulder proprioception and balance parameters in right dominant side athletes. Improved proprioception for the dominant side may positively affect balance. Results highlight that balance assessment should be approached from a broad perspective and in general. Consider that proprioception is a personal variable, and lower extremity muscular strength may influence balance values. A larger sample size is needed to obtain statistically significant results.
Key Words: Martial Arts, Muscle Strength, Postural Balance, Proprioception

P014.A CROSS-GENDER COMPARISON OF PAIN, CORE ENDURANCE, QUALITY OF LIFE AND POSTURAL AWARENESS IN OFFICE WORKERS WITH CHRONIC NECK PAIN, A PILOT STUDY

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Purpose: The aim of this study is to compare pain, core endurance, quality of life and postural awareness in office workers with chronic neck pain according to gender.
Methods: Fourteen office workers (8 females, 6 males) with chronic neck pain who were working at a university in Türkiye were included in the study. Pain intensity was assessed by Visuel Analog Scale (VAS); core endurance by Prone bridge test and Sits up test; quality of life by Short-Form 36 (SF-36); and postural awareness by Postural Habit and Awareness Scale (PHAS). Gender differences were analysed using the Mann-Whitney U test.
Results: The median age of the participants was 38.5 (f:38, m:38.5) years. The median VAS value of females was 5.5 (5.0-6.95), and the median VAS value of males was 4.5 (3.7-5.2). Comparing genders; significant differences were found between VAS (p=0.047), core endurance (sits up, p=0.032) and emotional role difficulty (p=0.026) sub-dimension of the SF-36. While the VAS score was higher in females, the emotional role difficulty score and the number of sits ups were lower. There was no significant difference between genders in terms of other subscales of the the SF-36 scale and the PHAS ($p>$ 0.05).
Conclusions: Although women had greater pain intensity and worse emotional states than men, no difference was found in terms of postural habits and awareness levels.
Keywords: Core Endurance, Neck Pain, Postural Awareness, Quality of Life

P015.PHYSIOTHERAPY AND REHABILITATION IN NEUROBRUCELLOSIS: CASE REPORT

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Purpose: This study holistically assesses a brainstem neurobrucellosis case via the International Classification of Functioning (ICF) and proposes an exemplar physiotherapy programme.
Methods: A 63-year-old man was admitted to a physical therapy clinic with complaints of posture, balance and gait disturbance. Assessments were performed at baseline and after 9 weeks. As part of the assesment of body structure and function; manual muscle testing was used to assess muscle strength and the Postural Assessment Scale (PASS) was used to assess postural control and balance. The Functional Independence Measure (FIM) was used to assess activities of daily living as part of the activity assessment. The Short Form (SF-36) was used to assess quality of life as part of the participation assessment. The patient underwent a physiotherapy programme for 9 weeks, 5 days a week, for a total of 45 sessions. The programme consisted of neuromuscular electrical stimulation, balance and coordination exercises, and gait training.
Results: As a result of the physiotherapy programme, improvements were noted in the areas of unassisted sitting and assisted standing on the PASS, in the cognitive aspects of social interaction and memory scores on the FIM, and in the general health and emotional well-being subscales of the SF-36.
Conclusions: This study shows that physiotherapy and rehabilitation approaches are effective in improving postural control, balance, general mental health, social interaction and memory parameters in a patient diagnosed with neurobrucellosis. Clinicians are advised to adopt a holistic approach when implementing physiotherapy and rehabilitation programmes in patients with neurobrucellosis.
Keywords: Bacterial Infection, Brucella, Electrotherapy, Exercise, Physiotherapy Techniques

P016.EFFECT OF CERVICAL VAGAL STIMULATION ON AUTONOMIC PARAMETERS AND PAIN AFTER GYNECOLOGICAL ABDOMINAL SURGERY: A CASE SERIES

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Purpose: This study examined the acute effects of a single-session cervical vagal nerve stimulation (VNS) on autonomic parameters and postoperative pain in patients undergoing gynecological abdominal surgery.
Methods: A single-session, 20-min, 10 Hz cervical VNS was applied after gynecological surgery. Four female patients (mean age: 47.75 ± 5.61) participated. Mean height: 161 ± 5.59 cm, weight: 70 ± 5.94 kg. Autonomic parameters were assessed with ECG, and pain with the Visual Analog Scale (VAS).
Results: The mean VAS measurement value of the participants before treatment was 5.25 ± 2.75 cm, decreasing to 3.25 ± 1.25 cm after the session. The mean blood pressure values before the session were as follows: systolic pressure was 109 ± 4.96 mmHg, decreasing to 108.25 ± 5.31 mmHg, while diastolic pressure was 61 ± 5.47 mmHg, decreasing to 59.5 ± 3.41 mmHg. The mean heart rate was 86.25 ± 16.25 beats/min before the intervention and decreased to 82.5 ± 11.15 beats/min after the session. The mean root mean square of successive differences (RMSSD) in consecutive R-R intervals, derived from ECG data as an indicator of parasympathetic system activity, increased from 21.21 ± 14.14 ms to 42.88 ± 14.65 ms.
Conclusions: Cervical vagal stimulation was observed to have an acute positive effect on the autonomic system and pain after application. These findings suggest that cervical VNS may be considered a potential alternative in treatments. Further studies with long-term follow-up and larger sample sizes are needed.
Keywords: Gynecological Surgery, Physiotherapy and Rehabilitation, Vagal Stimulation

P017.FROM THE PERSPECTIVE OF PROFESSIONAL FEMALE FOOTBALL PLAYERS: A QUALITATIVE STUDY EXPLORING RECOVERY AND COMMUNICATION EXPERIENCES IN THE POST-INJURY REHABILITATION PROCESS

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Purpose: The incidence of sports injuries in professional female football players has been reported as 5.7-11.1 per 1000 hours. Injuries lead to take off from sports, career setbacks, and psychological challenges. Effective communication during rehabilitation is a key factor in recovery. Understanding young athletes' communication preferences in rehabilitation is crucial. This study aims to explore the recovery process and communication experiences of professional female football players after sports injuries.
Methods: Nine professional female football players aged 18-24, who had experienced a sports injury causing at least one month of take off from official matches were included using a purposive sampling method. Semi-structured interviews were conducted to explore factors influencing recovery, the qualities required in healthcare professionals and coaches, and challenges faced during rehabilitation. The data were analyzed using content analysis, identifying three main themes.
Results: Three main themes emerged regarding recovery experiences: 1) Professional and social support: The expertise of the healthcare team, emotional support from family and friends, the coach's training methods contribute significantly to recovery. 2) Psychological barriers during recovery: Loss of motivation, fear of not returning to previous performance, feelings of isolation, and not being understood. 3) Communication expectations: Female football players expect a careful and sensitive method of communication and experience difficulties in interacting with their coaches.
Conclusions: Professional female football players prioritize quality of healthcare, social support, and considerate communication during rehabilitation. Physiotherapists working with young female athletes should adopt modern communication techniques to enhance rehabilitation success.

Keywords: Communication, Female, Football, Rehabilitation, Qualitative Research

P018.THE EFFECT OF PROBLEMATIC SMARTPHONE USE ON REACTION TIME: A PILOT STUDY

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Purpose: Excessive smartphone use is recognized as a potential behavioral addiction, known as "Problematic Smartphone Use (PSU)." PSU negatively affects upper extremity performance by increasing cognitive load and reducing attention. However, there are limited studies that investigate the effect of PSU on reaction time, which serves as an indicator of cognitive and motor functions. This study aims to compare the upper extremity reaction times of individuals with and without PSU.
Methods: A total of 106 individuals aged 18-24 participated in the study. PSU was assessed using the Smartphone Addiction Scale-Short Form. Based on their scores on this scale, participants were divided into two groups: those with problematic smartphone use (PSU group) and those without (control group). The upper extremity reaction times were evaluated using the BlazePod® device.
Results: In the PSU group (n=46), the average reaction time for the dominant and nondominant upper extremities were 530.80±59.11 ms and 547.76±67.80 ms, respectively. In the control group (n=60), the average reaction time for the dominant and nondominant upper extremities were 501.11±59.05 ms and 518.98±58.32 ms, respectively. A significant difference in reaction times between the groups was found for both the dominant ($p=0.012$) and nondominant ($p=0.021$) upper extremities.
Conclusions: The findings indicate that PSU negatively affects the reaction time of both upper extremities. Considering the negative impact of PSU on motor response times, it is suggested that PSU should be considered in assessment processes and integrated into intervention programs, which may contribute to rehabilitation outcomes.

Keywords: Reaction Times, Smartphone, Technology Addiction, Upper Extremity

P019.EXPLORING THE INTERPLAY BETWEEN BRUXISM, PSYCHOLOGICAL FACTORS, AND QUALITY OF LIFE IN ADOLESCENTS WITH IDIOPATHIC SCOLIOSIS

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Purpose: The aim of this study was to investigate the interaction between bruxism, psychological factors and quality of life in adolescents with AIS.
Methods: A total of 54 adolescents diagnosed with AIS participated in this study. Bruxism was assessed using a self-report questionnaire designed to detect bruxers. Psychological status was evaluated through the Depression Anxiety Stress Scale (DASS), which measures depression, anxiety, and stress levels. The quality of life of the participants was assessed using the Scoliosis Research Society-22 (SRS-22) questionnaire. Statistical analyses, including correlation tests, were conducted to explore the relationships between bruxism, psychological factors, and quality of life.
Results: As bruxism increased, anxiety ($r = 0,447$, $p < 0,001$), stress ($r = 0,405$, $p = 0,002$) and depression ($r = 0,384$, $p = 0,004$) scores increased and quality of life ($r = -0,338$, $p = 0,012$) score decreased.
Conclusions: These findings suggest that higher levels of bruxism are associated with increased psychological distress and lower quality of life in adolescents with AIS. These findings highlight the importance of a multidisciplinary approach in managing AIS, addressing not only the physical but also the psychological aspects of the condition. Future research should focus on longitudinal studies to further elucidate these relationships and develop targeted interventions to improve the overall well-being of adolescents with AIS.
Keywords: Bruxism, Psychology, Scoliosis, Quality of Life

P020.INVESTIGATION OF THE EFFECT OF PERIPHERAL NEUROPATHY DEVELOPING IN CANCER PATIENTS DURING THE TREATMENT PERIOD ON SOCIAL PARTICIPATION

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Purpose: The aim of our study was to investigate the relationship between peripheral neuropathy and social participation in patients undergoing different cancer treatments.
Methods: The study included individuals aged 18-65 years who scored above 24 on the Mini Mental State Examination Test and who received chemotherapy, immunotherapy, or both treatment modalities. The European Organisation for Research and Treatment of Cancer Quality of Life Chemotherapy-Related Peripheral Neuropathy Scale (EORTC QLQ-CIPN20) was used to assess peripheral neuropathy effects and the Community Participation Questionnaire Revised Form was used to assess community participation. Neuropathy effects of individuals according to the treatments they received were analysed by Kruskal-Wallis test, and the relationship between neuropathy effects and social participation was analysed by Spearman correlation analysis.
Results: The age of 188 individuals was 56.31 ± 9.68 years with equal gender distribution. Chemotherapy was received by 54.3%, immunotherapy by 34.6% and both treatment types by 11.2%. The top two cancer types were breast cancer 21.3%, colon cancer 17%. When CIPN20 test results were compared, sensory scores ($p<0.001$), motor scores ($p=0.004$) and autonomic scores were higher in chemotherapy recipients compared to other treatment recipients ($p=0.009$). A negative, weak, statistically significant correlation was found between CIPN20 motor scores and TKA-R scores ($p=0.014$, $r= -0.1784$).

Conclusions: As a result of our study it was found that chemotherapy administered to cancer patients increases the impact of peripheral Neuropathy and the impact on the motor components of peripheral neuropathy may negatively affect the social participation of individuals.
Keywords: Cancer, Peripheral Neuropathy, Social Participation

P021.INVESTIGATION OF THE RELATIONSHIPS BETWEEN TIME SINCE STROKE, ACTIVITY PERFORMANCE, AND ACTIVITY SATISFACTION IN STROKE SURVIVORS

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Purpose: The aim of this study is to investigate the relationships between time since stroke, activity performance, and activity satisfaction in stroke survivors.
Methods: A total of 49 individuals with a mean age of 57.53±10.58 years were included in the study. In addition to demographic data, the time since stroke (in months) was recorded. The Canadian Occupational Performance Measure was used to assess participants' activity performance and activity satisfaction.
Results: The study included 31 male and 8 female stroke survivors with a mean age of 57.53±10.58 years. The mean time since stroke was found to be 62.17±54.08 months. No significant correlation was found between time since stroke and activity performance or satisfaction (r=-0.031, p= 0.427; r= 0.079, p= 0.317). However, a excellently and statistically significant correlation was observed between activity performance and activity satisfaction (r=0.906, p= 0.001).
Conclusions: According to the results of this study, while a significant relationship was found between activity performance and satisfaction, no association was observed between time since stroke and either activity performance or satisfaction. These findings suggest that, rather than relying on time-based traditional approaches, rehabilitation strategies tailored to individual needs and innovative methods may be more effective in the rehabilitation process of stroke survivors.
Keywords: Activity, Performance, Stroke

P022.THE EFFECT OF ACU-TENS ON EMESIS GRAVIDARUM: A PILOT STUDY

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Purpose: The aim of the study was to investigate the effects of acu-TENS applied to the P6 (Neiguan) point on Emesis Gravidarum (EG) symptoms, quality of life and patient satisfaction.
Methods: First trimester primigravid five pregnant women aged 22-31 years who were diagnosed with EG were treated with acu-TENS for 20 min with a wristband called ReliefBand® at the P6 (Neigan) point on the wrist when they felt symptoms (Woodside Biomedical Inc., Carlsbad, CA). Symptom frequency, duration and severity were assessed using the Pregnancy Assessment Form, Rhodes Index of Nausea, Vomiting and Retching (RINVR) Scale and the Pregnancy- Unique Quantification of Emesis (PUQE-24) Scale; quality of life and patient satisfaction were assessed using visual analog scales (VAS).
Results: The women, who were 26.4±4.03 years old and 8.2±1.48 weeks pregnant on average, used the wristband an average of 4.06±1.90 times in three days and 79.6±36.62 minutes in total. At the end of three days, there was a mean decrease of 53.61% in the RINVR score and 49.3% in the PUQE-24 score. The satisfaction of the pregnant women, whose quality of life improved by 37.53%, was quite high (mean VAS=7.96±1.41 cm).

Conclusions: The results of this pilot study suggest that acoustimulation of P6 with Aku-TENS has positive effects on EG symptoms and quality of life in pregnant women. In conclusion that the efficacy of Aku-TENS is therefore worthy of investigation in randomized controlled trials with a larger sample.
Keywords: Morning Sickness, Pregnant People, Transcutaneous Electric Nerve Stimulation, Quality of Life

P023.THE EFFECT OF DIFFERENT ATTENTIONAL FOCUS STRATEGIES ON UPPER EXTREMITY PERFORMANCE: A PILOT STUDY

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Purpose: This pilot study tested how internal versus external attentional focus influences upper-extremity functional performance.
Methods: A total of 12 healthy, physically active individuals (6 males, 6 females; Age X±SD: 23.35±2.24 years; BMI X±SD: 22.25±2.88 kg/m²) participated in the study. Participants performed three different performance tests—Seated Medicine Ball Throw Test (SMBT), Upper Extremity Y Balance Test (UEYBT), and Closed Kinetic Chain Upper Extremity Stability Test (CKCUEST)—on three separate days under three different conditions: without any attentional focus instructions (control), with internal focus instructions, and with external focus instructions. The order of conditions was randomized. The Wilcoxon Signed-Rank Test was used for statistical analysis, and significance was set at p=0.017 after applying the Bonferroni correction.
Results: According to the SMBT results, performance was higher in the external focus condition compared to other conditions (p=0.012). No significant differences were found between focus conditions in CKCUEST (p>0.017). In UEYBT, performance in the medial direction was higher in the external focus condition than in other conditions (p=0.017), but no significant difference was observed between internal and external focus conditions (p=0.050). In the superolateral direction of the UEYBT, no difference was found between attentional focus conditions (p>0.017), whereas in the inferolateral direction, performance was higher in the external focus condition (p<0.017).
Conclusions: External focus improved medial and inferolateral UEYBT performance and SMBT scores. While attentional focus can shape outcomes, its impact varies by test and movement, warranting further study for sport and rehabilitation guidance.
Keywords: Attentional Focus, Physical Functional Performance, Upper Extremity

P024.INVESTIGATION OF OCCUPATIONAL BALANCE IN COLLEGE STUDENTS WITH AND WITHOUT ANXIETY DISORDER

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Purpose: Study aims to examine the differences in occupational balance between university students diagnosed with and without anxiety disorder.
Methods: In this cross-sectional study, socio-demographic information of students was recorded. Beck Anxiety Inventory (BAI) was used to assess general anxiety levels of individuals diagnosed with anxiety disorder by a psychiatrist, while Activity-Role Balance Questionnaire 11 Turkish Version (ARBA11-T) was used to measure their occupational balance. All scales were administered online via Google Forms. Statistical analyses were conducted using the SPSS program, and significance level of p<0.05 was accepted for all analyses.

Results: Total of 73 individuals (61 females, 17 males) aged between 18-25 years (mean: 21.74±1.16 years) participated. Mean BAI score of students diagnosed with anxiety disorder was 40.18±11.13, while that of students without an anxiety diagnosis was 19.11±12.16. When ARBA11-T results were examined, the mean score for students with anxiety disorder was 14.70±4.88, whereas it was 21.20±3.14 for those without anxiety disorder. A statistically significant difference was found between the two groups in terms of BAI scores ($p<0.01$) and ARBA11-T scores ($p<0.05$).
Conclusions: University-aged individuals may experience various physical, social, and psychological challenges. While anxiety disorder is commonly diagnosed in this age group, it is also known that individuals without a formal diagnosis may still experience anxiety. The findings of this study indicate that university students without an anxiety disorder diagnosis have better occupational balance compared to those diagnosed with anxiety. There is a need to enhance interdisciplinary strategies aimed at promoting occupational balance.
Keywords: Activity-Role Balance Questionnaire, Anxiety Disorder, Beck Anxiety Inventory, College Students, Occupational Balance

P025.ASSOCIATION OF RESTING HEART RATE AND AEROBIC CAPACITY IN ADULTS WITH CYSTIC FIBROSIS

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Purpose: Resting heart rate is a significant indicator of physical fitness and mortality. As it is known that increased resting heart rate is an important problem in chronic respiratory disease such as cystic fibrosis (CF). The aim of this study was to investigate of association with percentage of resting heart rate and exercise capacity in adult CF patients.
Methods: Twenty-five patients (13F, 12M, 26.4±6.6 years) were included. Exercise capacity (3-minute step test and 1-minute sit-to-stand test) were evaluated. Heart rate, peripheral oxygen saturation, dyspnea, leg fatigue and general body fatigue were assessed before and after the test. The total number of steps climbed was noted. Sit-to-stand test was performed continuous sit and stand-up for a minute quickly and count of stand-up was recorded. The percentage of resting heart rate was calculated with (resting heart rate/220-age) *100 formulation.
Results: Number of 3-minute step test was 83.28±17.00 steps and number of 1-minute sit-to-stand test was 30.68±6.36 stand-up. The percentage of resting heart rate was 48.16±5.89% and 24% of participants were tachycardic at rest. The percentage of resting heart rate was negatively correlated with 3-minute step test score ($r=-0.418$, $p=0.038$) however not correlated with 1-minute sit-to-stand test score ($r=-0.304$, $p=0.140$).
Conclusions: Resting heart rate is associated with exercise testing that assesses aerobic capacity, such as the 3-minute step test in adults with CF. Resting heart rate is an easily accessible predictor of aerobic capacity and should be considered when planning aerobic exercise training.
Keywords: Cystic Fibrosis, Exercise Test, Heart Rate

P026.COMPARISON OF TISSUE STIFFNESS AND PRESSURE PAIN THRESHOLD CHANGES BASED ON THE AFFECTED SIDE AND GENDER IN PATIENTS WITH ROTATOR CUFF PROBLEM: A PILOT STUDY

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Purpose: This pilot study aimed to assess whether tissue stiffness and pressure pain threshold values differ between the affected and unaffected sides and between genders in patients with rotator cuff problems.
Methods: 10 individuals with rotator cuff problem (4 males, 6 females) participated in this study (Age X±SD: 46±6 years; BMI X±SD: 24.14±2.13 kg/m²). Pressure pain threshold measurements were measured with digital algometer (JTECH Medical Industries) at supraspinatus, long head of biceps, pectoralis major and trapezius (upper/middle/lower) muscles. Tissue stiffness was assessed with digital indentometer (IntendoPRO, Technical University of Munich) at trapezius (upper/middle/lower), latissimus dorsi, thoracolumbar fascia (L1/L2/12th rib), and gluteus maximus. In this study, the Mann Whitney U test was used to compare the affected and unaffected sides with male and female participants.
Results: Thoracolumbar fascia stiffness at L1 and L2 was higher on the unaffected side ($p<0.01$). No significant differences were found in other tissue stiffness and pressure pain threshold measurements between the affected and unaffected sides ($p>0.05$). Between genders, males had higher middle trapezius stiffness on the affected side ($p<0.05$), while females showed higher pressure pain threshold in the pectoralis major on the affected side ($p<0.05$). Other muscle stiffness and pressure pain threshold measurements showed no significant differences between genders ($p>0.05$).
Conclusions: A change in the load distribution on the affected side may lead to an increase in compensatory tension in the fascial chains, leading to an increase in thoracolumbal fascia stiffness on the opposite side. It is necessary to confirm the findings by increasing the number of samples.
Keywords: Fascia, Rotato Cuff, Stiffness

P027.AN INVESTIGATION OF RELATIONSHIP BETWEEN PULMONARY FUNCTION AND EXERCISE CAPACITY AND COMORBIDITY LEVEL IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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Purpose: Comorbidities may negatively affect pulmonary function and exercise capacity in chronic obstructive pulmonary disease (COPD). We aimed to investigate the relationship between pulmonary function, exercise capacity, and comorbidity level in COPD.
Methods: Thirty-two males with COPD [age=65.84±8.33 years, $\%FEV_1$=% 58.75±17.22) were included in the study. A pulmonary function test was performed. Exercise capacity was assessed using a six-minute walking test (6MWT). Comorbidities were recorded. Comorbidity level was determined using the Charlson Comorbidity Index (CCI).
Results: The mean 6MWT distance was 464.48±97.87 m. The mean CCI score was 4.75±2.38. Of the participants, 43.8% (n=14) had a history of coronary artery disease, 28.1% (n=9) had hypertension, 21.9% (n=7) had diabetes mellitus, 15.6% (n=5) had a history of cancer, 9.4% (n=3) had hyperlipidemia, 6.3% (n=2) had chronic heart failure, 9.4% (n=3) had cerebrovascular accident, 6.3% (n=2) had liver disease, 3.1% (n=1) had peripheral vascular disease, and 3.1% (n=1) had chronic kidney disease. A moderate negative correlation was found between CCI score and FEV_1 ($r=-0.406$, $p=0.021$) and forced vital capacity (FVC) ($r=-0.523$, $p=0.002$). No significant correlation was found between CCI score and peak flow rate and forced expiratory flow between 25-75% of FVC ($p>0.05$). A moderate negative correlation was found between CCI score and 6MWT distance ($r=-0.376$, $p=0.034$).
Conclusions: The prevalence of comorbidities, including coronary artery disease, hypertension, and diabetes, is high in individuals with COPD. Comorbidities in COPD negatively affect pulmonary function and exercise capacity. We thought that comorbidity evaluation should be performed in the context of pulmonary rehabilitation.
Keywords: COPD, Comorbidity, Exercise Capacity

P028.INVESTIGATION OF THE EFFECTS OF SMARTPHONE ADDICTION ON SHOULDER RANGE OF MOTION AND UPPER EXTREMITY BALANCE PARAMETERS IN ADOLESCENT VOLLEYBALL PLAYERS

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Purpose: Use of smartphones has increased worldwide in the exchange of information, communication, daily life and sports life. Smartphone addiction can lead to many problems such as musculoskeletal problems, changes in ROM, decreased function, pain and discomfort. Therefore, aim of our study was to investigate the relationship between the level of smartphone addiction and shoulder ROM and upper extremity balance parameters in adolescent volleyball players.
Methods: Study included 67 adolescent athletes (Age: 13.69 ± 2.21 years, BMI: 19.99 ± 2.99 kg/m2). Athletes were evaluated with the Smartphone Addiction Scale - Short Form, digital goniometer and Upper Quarter Y Balance Test.
Results: No statistically significant relationship was found between smartphone addiction and shoulder ROM ($p>0.05$). A statistically significant relationship was found between smartphone addiction and dominant side medial, superiolateral, inferiolateral and nondominant side medial, superiolateral, superiolateral directions and composite scores of the Y Balance Test in the positive direction and at moderate strength ($r= 0.30 - 0.40$; $p<0.05$). ($r= 0.30 - 0.40$; $p<0.05$).
Conclusions: According to data of the athletes who participated in our study, there is no relationship between smartphone addiction and shoulder ROM. When relationship between smartphone addiction and Y Balance Test was analysed, it was observed that balance scores increased as smartphone addiction increased. We think that these two data are related to the fact that volleyball improves upper extremity balance parameters and the increase in smartphone addiction of adolescent athletes. It is expected that future studies will be conducted by including larger population of sedentary and athletes.
Keywords: Addiction, Adolescent, Balance, ROM, Smartphone, Volleyball

P029.INVESTIGATION OF THE EFFECTS OF ASSOCIATED IMPAIRMENTS ON THE ACTIVITY LEVEL OF THE CHILD IN SCHOOL-AGE CHILDREN WITH CEREBRAL PALSY

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Purpose: The aim of the study was to examine the effects of associated impairments on the activity level of children with cerebral palsy (CP) between the ages of 6-12.
Methods: 50 children were included in the study. The functional level of the children according to the Gross Motor Function Classification System (GMFCS), their associated impairments (cognitive, visual, auditory, epilepsy) and their levels according to the impairment index (low/moderate/severe) were recorded. The activity level was assessed with the Pediatric Evaluation of Disability Inventory Computer Assistive Test (PEDI-CAT).
Results: The mean age was 8.37±1.65 years. According to the GMFCS, 14% of the children were LevelI, 30% LevelII, 18% LevelIII, 12% LevelIV and 13% LevelV. According to the impairment index, 22% of the children were low, 34% were moderate, and 44% were severe. A negative and strong correlation was found between levels of impairment and all subparameters of PEDI-CAT ($p<0.001$). Relationships between daily activities ($r=-0.743$), mobility ($r =-0.832$), social-cognitive skills ($r=-0.750$), and responsibility ($r=-0.725$) and impairment index were statistically significant.
Conclusions: The increase in associated impairments negatively affects the daily life activities, mobility, social-cognitive skills, and responsibility levels of children with CP. Strong negative correlations show that the activity levels are related to the severity of associated impairments. These results emphasize the

importance of considering the effects of associated impairments in children with CP and holistic treatment approaches.
Keywords: Activity levels, Associated Impairment, Cerebral Palsy, Child

P030.EXAMINATION OF FOOT POSTURE, LOWER EXTREMITY MECHANICAL PROPERTIES, AND BALANCE IN YOUNG ADULTS

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Purpose: This study aimed to evaluate the association between foot posture, lower extremity mechanical properties, and static balance among university students.
Methods: The participants were university students aged 18–25 years (BMI <30) from a public university in Bandırma. Those exercising ≤2 days per week were considered non-regular exercisers. Dominant foot was identified by the preferred kicking foot. Foot posture was assessed with the Foot Posture Index (FPI), lower extremity mechanics with the MyotonPRO, and static balance with the Flamingo Balance Test.
Results: The study included 56 participants (14 males [25%] and 42 females [75%]) with a mean age of 21.55 ± 1.74 years and a mean BMI of 23.51 ± 4,14 kg/m². The right leg was the dominant extremity for 49 participants (88%), while the left leg was dominant in 7 participants (13%). Only 7 participants (13%) engaged in regular physical exercise. No statistically significant relationship was found between FPI scores and muscle measurements ($p>0.05$). However, a significant association observed between FPI scores and static balance performance ($p<0.05$). Additionally, a significant negative correlation was identified between the mechanical properties of the left lower extremity and Flamingo Balance Test scores ($p<0.05$).
Conclusions: Foot posture is significantly associated with static balance in young adults, with higher FPI scores indicating poorer balance performance. Moreover, lower extremity mechanical properties, including muscle tone, stiffness, and elasticity, impact static balance. Evaluating foot posture can aid in developing preventive strategies for lower extremity injuries and improving balance performance.
Keywords: Balance, Foot, Lower Extremity

P031.THE EFFECT OF ADDED AEROBIC EXERCISE TO ISOMETRIC EXERCISE ON PAIN, FUNCTIONALITY, AND NECK AWARENESS IN WOMEN WITH CHRONIC NECK PAIN

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Purpose: This randomized controlled experimental study aimed to investigate the effects of adding aerobic exercise to isometric exercise on pain, neck awareness, and functionality in women with chronic neck pain.
Methods: Study included 26 volunteer women aged 40-60 living in Istanbul who had been experiencing neck pain for at least 3 months. The participants were randomly divided into experimental (n=13) and control (n=13) groups. Both groups were instructed to perform neck isometric exercises three times a day for 10 repetitions. Additionally, the experimental group received aerobic exercise in the form of a 30-minute walk, three days a week, at a modified BORG scale level of 3-4. Before and after the treatment, the severity of participants' neck pain (VAS) and neck joint range of motion (goniometer) were measured and recorded. Functionality and neck awareness were evaluated using the Neck Disability Index, Bournemouth Neck Scale, and Fremantle Neck Awareness Questionnaire (FBFA).

Results: A noteworthy improvement in right and left lateral flexion active range of motion was observed in the experimental group compared to the control group ($p < 0.02$).
Conclusion: Aerobic exercise combining with isometric exercise has a positive impact on neck lateral flexion values.
Keywords: Aerobic Exercise, Chronic Neck Pain, Isometric Exercise

P032.EFFECT OF AEROBIC EXERCISE TRAINING ON DISTAL NEUROPATHY SYMPTOMS AND PLANTAR PRESSURE IN TYPE 2 DIABETICS WITH PERIPHERAL NEUROPATHY

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Purpose: Our aim was to investigate the effects of aerobic exercise training on distal neuropathy symptoms and plantar pressure in type-2 diabetic subjects with peripheral neuropathy.
Methods: The study included 48 subjects. Biothesiometer was used to determine the presence of neuropathy and symptoms of neuropathy. Pedobarograph platform was used to record peak pressure and forefoot/rearfoot pressure ratio in 10-regions of the foot during walking for plantar pressure distribution. Subjects were divided into 2-groups. Group-1 were asked to use CAD/CAM insoles with appropriate shoes for 12 weeks. Group-2 were included in an aerobic exercise program 3-days a week for 12 weeks in addition to those in group-1. All evaluations were repeated before and after treatment. The research was conducted with ethics committee approval.
Results: The mean age of the subjects included in the study was 61.2±2.7 years, and the mean body mass index was 28.3±1.5kg/m^2. When the groups were compared after treatment, all neuropathy scores were similar. When the plantar pressures were compared, significant difference was found in the 5^{th}-metatarsal head, midfoot and heel pressures in the dominant extremity. In the non-dominant extremity, significant difference was found in favor of the aerobic exercise group in the pressures of the thumb, 3^{rd}- metatarsal head, 5^{th}-metatarsal head and midfoot.
Conclusions: In diabetics with peripheral neuropathy, aerobic exercises in addition to the use of custom insoles may support foot biomechanics by reducing forefoot pressure and normalize plantar pressure. We believe that the combined use of interventions added to preventive rehabilitation programs may reduce the risk of ulcers.
Keywords: Insole, Peripheral Neuropathy, Type 2 Diabetes

P033.A COMPARISON OF PAIN, JOINT RANGE OF MOTION, MUSCLE STRENGTH, CORE STABILITY, AND FUNCTIONAL STATUS IN PATIENTS WITH SUBACROMIAL IMPINGEMENT SYNDROME AFFECTING THE DOMINANT AND NON-DOMINANT SIDES

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Purpose: This study aims to compare pain, joint range of motion, muscle strength, core stability, and functional status in individuals diagnosed with Subacromial Impingement Syndrome (SIS) affecting the dominant and non-dominant side.
Methods: The study included 38 patients (19 with dominant-side involvement and 19 with non-dominant-side involvement). Pain severity was assessed using the Visual Analog Scale. Shoulder joint range of motion was measured with a digital goniometer, while muscle strength was evaluated using a digital dynamometer (Lafayette Manual Muscle Tester). Functional status was determined via the Disabilities of the Arm, Shoulder, and Hand Short Form. Core stability endurance was assessed using

the lateral bridge test, Modified Biering-Sorensen trunk extension test, trunk flexion endurance test, and Prone Bridge test, whereas muscle strength was evaluated using the Sit-ups and Modified Push-ups tests.
Results: A significant difference was found only in the shoulder joint range of motion parameters between the two groups. Individuals with dominant-side involvement showed better results shoulder flexion ($p=0.018$), extension ($p=0.003$), abduction ($p<0.001$), internal rotation ($p=0.024$), and external rotation ($p=0.005$). No significant differences were observed between the groups in pain, muscle strength, core stability (both strength and endurance), or functional status ($p>0.05$).
Conclusions: The findings suggest that joint range of motion is better preserved in patients with dominant-side involvement than in those with non-dominant-side involvement. This may be attributed to the greater use of the dominant side. Rehabilitation strategies aimed at improving joint range of motion are considered important for individuals with non-dominant-side involvement.
Keywords: Core Stability, Functional Status, Joint Range of Motion, Subacromial Impingement Syndrome

P034.INVESTIGATION OF THE RELATIONSHIP BETWEEN EARLY EXERCISE ADHERENCE, PAIN, FEAR OF MOVEMENT, AND KNEE-RELATED FUNCTION IN PATIENTS UNDERGOING TOTAL KNEE ARTHROPLASTY: PILOT STUDY

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Purpose: The aim of this study was to investigate the relationship between exercise adherence and pain, fear of movement, and knee-related function in patients undergoing total knee arthroplasty due to primary osteoarthritis in the early postoperative period.
Methods: The study included 19 patients aged between 50-70 years who underwent unilateral total knee arthroplasty. Routine home exercises were prescribed by hospital physiotherapists. Upon discharge, patients were provided with exercise diaries and instructed to record their adherence until their fourth-week follow-up. At the fourth-week visit, pain intensity was assessed using the Visual Analog Scale (VAS), exercise adherence with the Exercise Adherence Rating Scale (EARS), fear of movement with the Brief Fear of Movement Scale (BFOM), and knee-related function with the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). Pearson correlation coefficient was used for statistical analysis of the collected data, and the significance level was set at $p = 0.05$.
Results: The mean age of the participants was 62.79±6.98 years. A moderate negative correlation was found between exercise adherence at the fourth postoperative week and both pain ($r=-0.525$, $p=0.021$) and knee function ($r=-0.529$, $p=0.020$). However, no significant correlation was observed between exercise adherence and fear of movement ($p>0.05$).
Conclusions: Our study demonstrated that as exercise adherence increases in the early postoperative period following total knee arthroplasty, pain intensity decreases and knee function improves, while no relationship was found between exercise adherence and fear of movement. We believe that the results of our pilot study may change with an increased number of cases.
Keywords: Exercise, Knee artroplasty, Pain, Patients Compliance

P035.INVESTIGATION OF THE EFFECT OF KINESIO- TAPING APPLIED TO DIFFERENT MUSCLE GROUPS IN INDIVIDUALS WITH CHRONIC NECK PAIN

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Purpose: This study aimed to investigate the effects of kinesio taping applied to different regions in addition to stabilization exercises on pain, functionality, and fear of movement in individuals with chronic neck pain.
Methods: The study included 14 individuals (11F, 3M) aged 18-65 years with moderate (3-7) chronic neck pain, assessed using the Visual Analog Scale (VAS). Participants were randomly assigned into two groups using stratified randomization. Both groups performed cervical and scapulothoracic stabilization exercises. Following each exercise session, kinesio taping was applied to the cervical region in Group 1 and to spinal region in Group 2. The treatment program lasted for 8 weeks, with sessions conducted twice a week for 30 minutes. Pain severity were assessed using VAS, neck disability with Neck Disability Index (NDI), functional status with Profile Fitness Mapping Neck Questionnaire (ProFitMap-neck), and fear of movement with Tampa Scale for Kinesiophobia (TSK) before and after the treatment.
Results: The results showed that the majority of participants (65%) were housewives, with mean ages of 45.29±11.45 years and 40.71±16.65 years in each group, respectively. Significant improvements were observed in all groups in VAS, NDI, ProFit-Neck, and TSK scores at the end of treatment ($p<0.05$). Additionally, Group 1 showed superior improvement in VAS-Activity scores, while Group 2 showed greater improvement in TSK scores compared to Group 1.
Conclusions: It is suggested that incorporating kinesio taping for comprehensive muscle groups into rehabilitation programs alongside stabilization exercises may improve pain, functionality, and fear of movement parameters in these individuals.
Keywords: Chronic Pain, Exercise, Functional Status, Kinesio Taping, Neck

P036.THE RELATIONSHIP OF CERVICAL PROPRIOCEPTION SENSATION WITH SPORTIVE PERFORMANCE IN ADOLESCENT SOCCER PLAYERS

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Purpose: The aim of this study was to investigate the relationship between cervical proprioception and sportive performance in adolescent soccer players.
Method: The study included 45 volunteers aged between 12 and 17 years. Demographic information of the participants was collected with a form. Joint position error test was used to evaluate cervical proprioception sense. Sit-to-stand test, vertical jump test, 20-meter sprint test, 10-meter walk test, 30-second push-up test, 30-second sit-up test, Biering-Sorenson test, flamingo test and burpee test were used for the evaluation of sportive performance. Statistical analysis of the data was performed with SPSS 26 package program.
Results: The mean age of the participants was 13.87±1.27 years. In the cervical proprioception evaluation of the participants, a negative correlation was found between the right rotation deviation angle and flexibility ($r=-0.329$, $p=0.027$), endurance ($r=-0.316$, $p=0.034$) and agility ($r=-0.393$, $p=0.008$), while no significant relationship was found between the other parameters ($p>0.05$). In the left rotation deviation angle, there was a negative correlation with flexibility ($r=-0,372$, $p=0,012$), but no significant correlation was found between the other parameters ($p>0,05$).
Conclusion: The results of the study are consistent with the relevant literature. It is thought that cervical proprioception exercises added to the training programs of adolescent soccer players may positively affect sportive performance.
Keywords: Neck, Football, Proprioception, Sportive Performance

P037.TRIPLE TENDON TRANSFER IN RADIAL NERVE PALSY AFTER HUMERUS FRACTURE: A CASE REPORT

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Purpose: Radial nerve palsy is a common complication following humeral shaft fractures, leading to significant functional impairment. In chronic cases, tendon transfer surgery provides an effective reconstructive approach. This study evaluates the functional outcomes of triple tendon transfer in a patient with radial nerve palsy after a humeral fracture.
Method: A 61-year-old female sustained a right humeral shaft fracture in November 2022 due to a fall. She underwent surgical fixation with an intramedullary nail (IMN) at an external center. The patient presented to our clinic in February 2024 with wrist and finger extension loss. Electromyography confirmed radial nerve denervation. Since no clinical recovery was observed, IMN removal and revision surgery with double plating were performed. On September 20, 2024, a triple tendon transfer was conducted. The flexor carpi radialis was transferred to the extensor digitorum communis, the palmaris longus to the extensor pollicis longus, and the pronator teres to the extensor carpi radialis brevis. The patient was immediately referred for hand rehabilitation. A volar-block static wrist and finger splint was used, and structured rehabilitation, including biweekly physical therapy, was initiated.
Results: At the 5th postoperative week, the patient achieved 45° of active wrist extension, full thumb extension, and a Kapandji opposition score of 5. Full interphalangeal extension and satisfactory finger flexion were also observed.
Conclusion: Triple tendon transfer successfully restored wrist and finger extension in this chronic radial nerve palsy case. Early rehabilitation played a crucial role in optimizing functional recovery and promoting the patient's independence.
Keywords: Humerus Fracture, Orthopedic Surgery, Physical Therapy, Radial Nerve Palsy, Tendon Transfer

P038.INVESTIGATION OF THE RELATIONSHIP BETWEEN OUTCOME EXPECTATIONS FOR EXERCISE, PHYSICAL ACTIVITY LEVEL AND KINESIOPHOBIA İN INDIVIDUALS WITH CARDIAC ARRHYTHMIA: PRELIMINARY RESULTS

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Purpose: Determining whether the outcome expectations for exercise in individuals with a cardiac arrhythmia are associated with physical activity level, kinesiophobia, age, body mass index (BMI), and smoking status.
Methods: The study included 15 individuals diagnosed with cardiac arrhythmia (mean age = 50 ± 14.41 years, nine males, six females). The demographic information of the individuals, including age, BMI, and smoking status, was surveyed. Outcome expectations for exercise were assessed by the Multidimensional Outcome Expectations for Exercise Scale (MOEES), physical activity level was evaluated by the International Physical Activity Questionnaire (IPAQ), and kinesiophobia assessed by Tampa Scale of Kinesiophobia for Heart (TKS-H).
Results: 93.3% of the individuals were ex-smokers, and 6.7% were smokers. The IPAQ total median score was 1074 (412.5 – 3306) MET-min/week, TKS-H median score was 36 (30-46), and the MOEES total median score was 59 (49-65). Of the individuals, 26.6% had a high level of physical activity, 53.3% had a moderate level, and 20.1% had a low level of physical activity. A strong negative correlation was found between the MOEES total score and TKS-H total score ($r=-0.741$, $p<0.05$), and a low positive correlation was found between the MOEES total score and the IPAQ total score ($r=0.254$, $p<0.05$).
Conclusions: According to our preliminary results, individuals with cardiac arrhythmia and low exercise outcome expectations exhibited higher levels of kinesiophobia.Current study results suggest that addressing these expectations could enhance the benefits derived from exercise and lead to the development of effective exercise programs tailored to patients' needs. Future studies should assess

exercise outcome expectations and investigate the effectiveness of exercise programs designed to meet these expectations.
Keywords: Cardiac Arrhythmia, Exercise Outcome Expectations, Kinesiophobia, Physical Activity

P039.PRIORITIZING FINANCIAL CONSIDERATIONS: THE REHABILITATION JOURNEY OF ELITE HANDBALL PLAYERS AFTER ANTERIOR CRUCIATE LIGAMENT INJURY

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Purpose: Understanding contextual factors is crucial to a successful anterior cruciate ligament (ACL) injury recovery. The present study aimed to investigate the experiences of elite female handball players in relation to injury, surgical ACL repair, rehabilitation, and the process of returning to sports.
Methods: It was conducted with phenomenological methodology, among qualitative research methods. Thirteen Turkish National Teams handball players who had recovered from anterior cruciate ligament injuries were interviewed online in a semi-structured format. All study participants were playing on a professional level.
Results: The main themes and findings were: 1) Perceptions about the health system: Financial, physical, and emotional experiences of handball players throughout the process of diagnosis, surgery, and rehabilitation. 2) Return to sport decision: Players rushed their comeback due to club board and coach pressure. Certain players were not ready yet but they forced to play. 3) Achieving optimum performance: Players understand the benefits of an effective treatment at this period. Social support and psychological factors affected performance significantly. 4) Change the system: Recommendations for handball governing bodies and health professionals. The players engaged in self-criticism regarding their entire experience.
Conclusions: Most athletes worried about treatment expenditures throughout recovery. Handball players claimed that coaches lacked a rehabilitation process knowledge and had communication challenges. Thus, they expected the Turkish Handball Federation to educate coaches and ensure clubs covered treatment costs. To enhance rehabilitation after ACL reconstruction, interdisciplinary communication skills and sports administrators' protection of athlete rights through regulations are needed.
Keywords: Anterior Cruciate Ligament, Qualitative Research, Rehabilitation

P040.INVESTIGATION OF REACTION TIME IN AN INDIVIDUAL WITH MULTIPLE SCLEROSIS AND THE ACUTE EFFECT OF EXERCISE ON REACTION TIME: A CASE REPORT

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Purpose: The aim of the study was to evaluate the change in reaction time before and after routine applied exercise in an individual diagnosed with Multiple Sclerosis (MS), in terms of visual reaction time and muscle activation.
Methods: A 38-year-old female with Relapsing Remitting MS (EDSS score: 3) was included in the study. Reaction time was measured using BlazePod, while muscle activation was assessed via EMG. Before exercise, the individual's maximum voluntary isometric contraction was recorded. During the task, the individual was asked to press the BlazePod when a red light appeared within a 30-second period, and simultaneous EMG recordings were taken. After completing a 30-minute exercise routine (including stretching, resistance training, and walking), reaction time and muscle activation were reassessed.

Results: Pre-exercise reaction times averaged 811.6 ms for the right side and 728 ms for the left side. Post-exercise, these values improved to 650 ms (right) and 675.3 ms (left). After exercise, muscle activation in the deltoid muscle showed a slight decrease: right middle (4.7% to 4%), right anterior (14.9% to 11.8%), left middle (6.2% to 5%), and left anterior (8.45% to 8.3%).
Conclusions: The results indicate that exercise improved reaction time but led to a reduction in muscle activation, likely due to fatigue. This case report highlights the acute effects of exercise on the central and peripheral nervous systems in individuals with MS. These findings can serve as a valuable reference for designing rehabilitation programs and guiding clinical practices, emphasizing the importance of exercise in managing MS symptoms.
Keywords: Electromyography, Multiple Sclerosis, Reaction Time

P041.BIOPSYCHOSOCIAL FACTORS AFFECTING KINESIOPHOBIA IN PATIENTS WITH NON-SPECIFIC CHRONIC LOW BACK PAIN

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Purpose: This study aimed to examine the biopsychosocial factors affecting kinesiophobia (fear of movement) in individuals with low back pain.
Methods: Eighteen individuals with chronic low back pain (8 males, 10 females; mean age: 50.39±9.34 years) were included in the study. Kinesiophobia levels were assessed using the Tampa Scale for Kinesiophobia (TSK). Functional disability was measured using the Oswestry Disability Index (ODI), and quality of life was assessed with the SF-12. Pain intensity (at rest, during activity, and at night), depression, and anxiety levels were evaluated using psychometric scales. Physical performance tests included the 2-Minute Walk Test (2MWT), shoulder abduction and knee extension muscle strength, and respiratory muscle strength. Relationships between variables were analyzed using Pearson correlation analysis.
Results: A significant positive correlation was found between TSK scores and ODI ($r=0.611$, $p=0.007$), depression ($r=0.611$, $p=0.007$), and anxiety ($r=0.633$, $p=0.005$). However, no significant correlation was found between kinesiophobia and pain intensity, symptom duration, body mass index (BMI), SF-12, 2MWT, respiratory muscle strength, or muscle strength measurements ($p>0.05$).
Conclusion: Kinesiophobia in patients with low back pain is strongly associated with functional disability and psychological factors. However, pain severity, physical performance, muscle strength, and quality of life do not appear to be determining factors for kinesiophobia. These findings highlight the importance of a biopsychosocial approach that integrates both physical and psychological factors in the management of kinesiophobia.
Keywords: Functional Disability, Depression, Low Back Pain, Kinesiophobia, Psychosocial Factors

P042.THE RELATIONSHIP BETWEEN RESPIRATORY MUSCLE STRENGTH AND CORE PERFORMANCE IN HEALTHY WOMEN

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Purpose: This study was conducted to investigate the relationship between respiratory muscle strength and core performance in healthy women.
Methods: The study included 60 healthy woman aged 20-45 years. Respiratory muscle strength was measured with the Cosmed Pony FX spirometer. In 3 repetitive tests, the highest values were recorded as maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP) scores. Core endurance was evaluated by plank test. Physical activity levels of the individuals were questioned with the International Physical Activity Questionnaire (IPAQ). Spearman correlation analysis was used for statistical analysis.
Results: The mean age of the participants was 34.67±9.07 years. There was a weak positive significant correlation between MIP and core endurance scores ($r = 0.25$; $p = 0.05$), a weak positive significant correlation between MEP and core endurance scores ($r = 0.27$; $p = 0.03$), a moderate positive significant correlation between MIP and IPAQ scores ($r = 0.35$; $p = 0.006$), while no significant correlation was found between MEP and IPAQ scores ($p = 0.17$).
Conclusions: In the study, respiratory muscle strength and core performance were found to be related in healthy women. Physical activity level may play a supportive role on respiratory muscle function. Considering the biological characteristics of women, it is important to include these evaluations in the counselling programme for the protection of women's health.
Keywords: Core Endurance, Physical Activity, Respiratory Muscle Strength, Women's Health
Funding: This study was supported by TÜBİTAK 2209-A- University Students Domestic Research Projects Support Program

P043.HOW STATIC POSTURE IMPACTS FUNCTIONAL PERFORMANCE IN OVERHEAD ATHLETES: A CORRELATION ANALYSIS

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Purpose: This study delves into the interplay between static posture and functional performance metrics in overhead athletes.
Methods: A total of 136 athletes participated in the study, including 58 healthy male and 78 female athletes. Photographic posture analysis and functional performance tests were utilised to assess static posture parameters and the athletic performance respectively. Correlation analyses were conducted to explore potential relationships between various static posture variables, including C7-Tragus, Thoracic kyphosis, Lumbar lordosis, and Pelvic tilt angles, and performance metrics such as Upper Quarter Y Balance Test, Closed Kinetic Chain Upper Extremity Stability Test, Upper Limb Rotation Test, Seated Medicine Ball Throw, and Unilateral Seated Shot-Put Test scores.
Results: The findings revealed weak correlations among all pairs of postural variables and performance variables for both male and female athletes, with coefficients ($|r| < 0.40$) indicating a lack of substantial linear relationships within our sample population. Despite the overall weak correlations, statistically significant associations were observed, particularly among female athletes. The Upper Quarter Y Balance Medial Dominant variable exhibited significant correlations with both C7-Tragus Dominant ($r = 0.33$, $p < 0.05$) and C7-Tragus Nondominant ($r = 0.24$, $p < 0.10$).
Conclusions: These results provide valuable insights about relationship between static posture and athletic performance, underscoring the importance of considering both static and dynamic factors in assessing athletic performance. The static postural parameters may not strongly predict athletic performance in overhead athletes, exploring these associations sheds light on potential avenues for injury prevention and training optimization in sports.
Keywords: Performance Tests, Photogrammetric Posture Analysis, Static Posture

P044.THE IMMEDIATE EFFECTS OF A SINGLE-DOSE EXTRACORPOREAL SHOCK WAVE THERAPY ON CLINICAL PARAMETERS IN DELAYED REHABILITATION FOLLOWING DUPUYTREN'S SURGERY: A CASE REPORT

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Purpose: The aim of this study was to evaluate the immediate effect of a single-dose Extracorporeal Shock Wave Therapy (ESWT) on clinical parameters in a case with delayed initiation of physiotherapy following surgery for Dupuytren's contracture.
Methods: A 61-year-old male patient, who underwent surgery for Dupuytren's contracture 7 weeks prior and received no postoperative treatment, was referred to our clinic due to reduced grip strength, impaired hand dexterity, rigid scar tissue, and flexion deformity of the MCP joint. Clinical examination revealed deep, rigid, hypertrophic, and adherent scar tissue in the palm. A single session of ESWT was administered to the scar tissue using a protocol of 2500 impulses, 3.0 bar pressure, and 10 Hz frequency. Pre- and post-treatment assessments included grip strength measured with a Jamar hydraulic hand dynamometer, MCP joint flexion deformity assessed via finger goniometry, and fingertip-to-palm distance in the fist position measured with a ruler.
Results: Post-treatment improvements were observed across all parameters. Grip strength increased from 9.1 kg to 10.8 kg. MCP joint flexion deformities in the 2nd, 3rd, 4th, and 5th digits decreased from 25°, 35°, 25°, and 15° to 18°, 21°, 10°, and 7°. Fingertip-to-palm distances for the 2nd, 3rd, 4th, and 5th digits improved from 3.8 cm, 3.3 cm, 2.5 cm, and 1.4 cm to 1.0 cm, 3.3 cm, 2.0 cm, and 1.3 cm.
Conclusions: A single-dose ESWT application demonstrated immediate improvement in clinical parameters. We suggest that ESWT may be beneficial for acute functional enhancement in patients referred late for postoperative rehabilitation.
Keywords: Dupuytren's Contracture, Extracorporeal Shock Wave Therapy, Hand Rehabilitation, Scar Tissue

P045.INVESTIGATION OF THE EFFECT OF TEMPOROMANDIBULAR JOINT MANUAL THERAPY ON PELVIC FLOOR DYSFUNCTION IN A FEMALE PATIENT WITH TEMPOROMANDIBULAR JOINT DYSFUNCTION AND PELVIC FLOOR DYSFUNCTION: A CASE REPORT

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Purpose: Pelvic floor dysfunction (PFD) and temporomandibular joint dysfunction (TMD) are significant musculoskeletal disorders that can severely impair individuals' quality of life. This study aimed to investigate the effect of temporomandibular joint (TMJ) manual therapy on PFD in a female patient diagnosed with both TMD and PFD.
Methods: In a 42-year-old female patient the following assessment tools were used: Mandibular Function Impairment Questionnaire (MFIQ), Fonseca Anamnestic Index Craniofacial Pain and Disability Inventory, TMJ Tampa Kinesiophobia Scale ,TOMASS, Visual Analog Scale(VAS), Pelvic Floor Distress Inventory(PFDI-20), Female Sexual Function Index and Depression Anxiety and Stress Scale-21(DASS-21). Additionally, the craniovertebral angle TMJ range of motion jaw opening muscle strength pelvic floor muscle strength and endurance pressure algometer and pain threshold were assessed. The treatment was administered twice a week for eight weeks. All assessment parameters were measured at baseline 4th week and 8th week of treatment.
Results: Maximum mouth opening was measured at baseline, 4^{th} and 8^{th} week, respectively, as 32.3; 41.6; 43.7 mm. The patient reported TMJ pain as 7 on VAS before treatment, whereas pain was reported as 0 at both interim and final evaluations. Pelvic floor pain threshold values at baseline for the levator ani, obturator internus, and piriformis muscles were measured as 10,0,9, respectively, whereas these

values were recorded as 4,0,2 at the end. The MFIQ score decreased from 18 to 0 and the PFDI-20 score decreased from 37 to 0.
Conclusions: This case report suggests that TMJ treatment may positively impact PFD. Larger randomized controlled trials are needed.
Keywords: Manual Therapy, Pelvic Floor Dysfunction, Temporomandibular Joint Dysfunction

P046.COMPARISON OF BODY REACTION TIME IN CHILDREN WITH AND WITHOUT PES PLANUS

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Purpose: The foot plays an important role in supporting body weight and performing physical activities. Misalignment of the foot has the potential to affect the proximal part of the body. Pes planus is a common foot deformity in children. There are no studies that have investigated the effect of pes planus on the reaction time of the trunk. The purpose of this study was to compare the reaction time of children with and without pes planus.
Methods: Twenty children, 13 boys and 7 girls, were included. Demographic information was recorded. Children with bilateral pes planus (group 1) and children without pes planus (group 2) were divided into two groups. Trunk reaction time was recorded as the number of pods in the time determined with the Blazepod evaluation device.
Results: The mean age of the children studied was 8.88±1.98 years. The mean BMI was 17.8±2.95. The number of tapped pods was 23.1±4.10 in group 1 and 26.8±4.00 in group 2 for the right side and 20.9±3.75 in group 1 and 26.2±3.81 in group 2 for the left side (right p=0.033 and left p=0.003). There was a statistically significant difference between the groups in the number of right and left taps.
Conclusions: Our study showed that children without pes planus had better body reaction time. The study suggests that distal misalignment may cause an inability to support the body and a delay in trunk reaction.Body reaction time should be considered in foot misalignment disorders that affect body movement and in movement disorders (developmental delay, cerebral palsy).
Keywords: Child, Pes Planus, Reaction Time

P047.INVESTIGATION OF EARLY MUSCLE STRENGTH, BALANCE, GAIT AND FUNCTIONAL STATUS AFTER AWAKE CRANIOTOMY SURGERY IN PATIENTS WITH INTRACRANIAL TUMOR

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Purpose: The aim of this study is to examine the changes in muscle strength, balance, gait, and functional status before and after awake craniotomy surgery in individuals with intracranial tumor.
Methods: This prospective study included a total of 19 individuals, consisting of 15 men (78.95%) and 4 women (21.05%). The mean age of the participants was 32.0 ± 9.47. The muscle strength of the participants' upper extremity (shoulder flexors, elbow flexors/extensors, wrist extensors/flexors) and lower extremity (hip flexors, knee extensors, plantar flexors, dorsiflexors) was assessed using a hand dynamometer, balance was assessed with the Berg Balance Scale, gait was evaluated using the Tinetti Gait Scale, and functional performance levels were assessed with the Karnofsky Performance Scale at two different time points: pre- and post-surgery. The statistical analysis of the data was conducted using the Wilcoxon Test.
Results: Significant decreases were observed in the strength of the left elbow extensors ($p = 0.029$) and the right dorsiflexors ($p = 0.007$) after surgery. A significant decrease was noted in the Karnofsky

Performance Scale scores after surgery (p = 0.030). The reductions in the Berg Balance Scale (p = 0.087) and the Tinetti Gait Test (p = 0.132) results were not statistically significant.
Conclusions: The results indicate that patients with intracranial tumors may experience muscle weakness and functional capacity loss after awake craniotomy, affecting daily activities. Early and individualized rehabilitation is essential. Long-term studies with larger samples could help identify post-surgical functional changes and optimize rehabilitation strategies.
Keywords: Awake Craniotomy, Balance, Functional Performance, Gait, Muscle Strength, Rehabilitation

P048.COMPARISON OF BODY AWARENESS LEVELS OF WOMEN WHO DO PILATES AND WOMEN WHO DO NOT

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Purpose: Pilates is a mind-body exercise that is frequently used today. Various studies in the literature have shown the effects of exercises such as Pilates on body awareness. The purpose of our study was to look at how Pilates exercises affect body awareness.
Methods: In our study, a total of 80 women, 40 of whom were doing Pilates and 40 of whom were not, with an average age of 30.83±4.89, were compared. Those who had been doing Pilates for at least 1 month, 2 sessions per week, were included in the Pilates group. The Body Awareness Questionnaire was used to assess body awareness.
Results: According to the results of statistical tests, a significant difference was found between the Body Awareness Questionnaire scores of the two groups in favor of the pilates group (p=0.029).
Conclusions: Pilates exercises can be used as an effective method to increase body awareness.
Keywords: Body Awareness, Exercise, Pilates

P049.GAIT ASSESSMENT RESULTS AFTER C-MILL® VIRTUAL REALITY TREADMILL THERAPY IN A PERSON WITH INCOMPLETE SPINAL CORD INJURY

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Purpose: This study aimed to evaluate the effects of advanced balance and mobilization exercises using the C-Mill® (Hocoma AG, Switzerland) virtual reality platform on gait parameters in a person with incomplete spinal cord injury.
Methods: A 29-year-old male patient, 187 cm tall and weighing 87 kg, with a lumbar 3 level AIS D spinal cord injury, was included in a 10-session program over a 3-week period. The program, supported by strengthening and stretching exercises, included advanced balance and mobilization exercises on a virtual reality-based treadmill, each lasting 30 minutes. Each session consisted of static balance, dynamic balance, and walking exercises on obstacles created by virtual projections, performed in 3 x 10-minute duration. At the beginning and end of the treatment period, gait analysis was conducted at the participant's comfortable walking speed (kilometers per hour; km/h) using the C-Mill® virtual reality platform, measuring cadence (steps per minute; steps/min), double step length (meters; m), and step width (m) parameters.
Results: Initially, at a walking speed of 2.0 km/h, cadence was 65.0 steps/min, double step length was 1.04 m, and step width was 0.07 m. Post-treatment, cadence decreased to 54.3 steps/min, double step length increased to 1.23 m, and step width increased to 0.1 m. The results showed a decrease of 10.7 steps/min in cadence, with double step length and step width increasing by 0.19 m and 0.03 m, respectively.

Conclusions: The C-Mill® virtual reality platform improved gait parameters, suggesting its potential as an effective tool in neurological rehabilitation to enhance gait.
Keywords: Gait, Rehabilitation, Spinal Cord Injury

P050.EFFECT OF PHYSICAL ACTIVITY ON FALL PREVENTION AMONG GERIATRICS

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Purpose: While approximately 28-35% of individuals aged 65 and over fall each year, this rate increases as age increases. Loss of vision, balance, postural control, reaction time and muscle strength and cognitive problems in geriatrics are reasons of the risk of falling. 18% of geriatrics apply to the emergency department due to falls. There is an increase in social health costs due to physical dependency developing as a result of falls. Preventing falls, maintaining mobility and improving quality of life in the geriatric population is important in reducing physical dependency and social health costs. The exercises included in Physiotherapy and Rehabilitation services for fall prevention is a cost-effective, easy-to-implement and sustainable option. Aim of this study is to summarize exercise programs that developed to prevent risk of falling in geriatrics.
Methods: In our research, information obtained from full text of 4 articles on falls in geriatrics that searched through Pubmed and Google Scholar was summarized.
Results: In literature, optimal exercise program recommends a program that is containing balance, high exercise dose and no walking content. This exercise program was found to be 38%, OTAGO exercises were found to be 35%, and lifestyle integrated functional exercises (LiFE) were found to be 31% effective in reducing falls.
Conclusions: It was emphasized that balance and strengthening exercises for lower extremities, especially including foot and ankle muscles, are important in reducing falls. Inclusion of special exercise methods such as Tai Chi, Yoga and dual-task exercises in rehabilitation program will help to prevent falls in geriatrics.
Keywords: Balance, Geriatric Assessment, Postural

P051.EFFECT OF INCREASED THORACIC HYPERKYPHOSIS ANGLE ON ACROMIOHUMERAL DISTANCE, SCAPULAR MUSCLE ACTIVATION, PAIN AND SHOULDER FUNCTION IN PATIENTS WITH SUBACROMIAL PAIN SYNDROME

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Purpose: Increased thoracic kyphosis angle (thoracic hyperkyphosis) has been accepted as one of the extrinsic causes of subacromial pain syndrome (SAPS) in recent years. The aim of this study was to investigate the effects of thoracic hyperkyphosis on acromiohumeral distance (AHD), scapular muscle activation, pain intensity and shoulder function in patients with SAPS.
Methods: Thirty-two patients between 20-50 years, diagnosed with unilateral SAPS and a thoracic kyphosis angle (TKA) >40° were included in the study. TKA was measured with the Goniometer-pro

mobile application. Patients were divided into two groups according to TKA (TKA=40°-50°, 35.62±11.27 years and TKA>50°, 34.25±10.32 years). AHD was evaluated with ultrasound at 0°, 60°, and 90° shoulder abduction, activation of upper trapezius (UT), lower trapezius (LT), and serratus anterior (SA) muscles was evaluated with surface electromyography (EMG), pain intensity was evaluated with visual analog scale (VAS), and shoulder function was evaluated with 'American Shoulder and Elbow Surgeons' (ASES).
Results: The mean age and BMI of the groups were similar ($p>0.05$). In the TKA>50° group, AHD at 60° and 90° shoulder abduction and ASES score were lower, UT/LT and UT/SA ratios (between 60°-120° of shoulder abduction) and activity pain were higher ($p<0.05$). Rest pain, night pain, AHD at 0° abduction, UT/LT and UT/SA ratios at 0°-60° and 120°-180° of shoulder abduction were similar ($p>0.05$).
Conclusions: Increased thoracic hyperkyphosis increases activity pain and scapular force couple imbalance, while decreasing AHD and shoulder function in patients with SAPS.
Keywords: Acromiohumeral Distance, Electromyography, Scapular Force Couple, Subacromial Pain Syndrome, Thoracic Hyperkyphosis

P052.DETERMINANTS OF DYNAMIC BALANCE IN ADOLESCENT ATHLETES: BODY MASS INDEX

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Purpose: The aim of this study was to examine the effect of body mass index (BMI) on balance in adolescent athletes.
Methods: A total of 300 adolescent athletes (mean age = 15.29±4.75 years, mean BMI = 20.31±3.28 kg/m²) participated in the study. Body weight was assessed using the Tanita BC 418 MA (Tanita, Japan) device. BMI was classified as underweight (≤18.5 kg/m²), healthy weight (18.5-24.9 kg/m²), overweight (25-29.9 kg/m²), and obese (30-39.9 kg/m²). The Y-balance test was used to measure athletes' dynamic balance. Participants were instructed to stand at a designated point of a pre-drawn "Y" shape and extend their toes in anterior, posteromedial, and posterolateral directions. Pearson correlation test and linear regression analysis were used for statistical analysis.
Results: Among the participants, 50% were volleyball players, 20% were basketball players, and 30% were tennis players. BMI was weakly correlated with the anterior ($p=0.001$, $r=-0.348$), posteromedial ($p=0.023$, $r=-0.149$), and posterolateral ($p=0.001$, $r=-0.220$) directions of the Y-balance test. A one-unit change in BMI was found to affect anterior balance by 12%, posteromedial balance by 2%, and posterolateral balance by 4%.
Conclusions: This study has shown that adolescent athletes with a high BMI experience impaired balance. Balance deficiency can negatively affect not only athletic performance but also increase the risk of injuries. Particularly during adolescence, excessive body mass may hinder motor control and reduce movement efficiency. To maintain optimal performance and prevent injuries, athletes should carefully manage their body mass, especially during this developmental period. Additionally, incorporating aerobic exercises that support balance into their training programs is essential.
Keywords: Adolescent, Athletes, Body Mass Index, Postural Balance

P053.EXAMINATION OF THE RELATIONSHIP BETWEEN FORWARD HEAD POSTURE AND SLEEP, GASTROINTESTINAL SYSTEM, AND LOWER URINARY SYSTEM SYMPTOMS IN ADULT WOMEN: A PILOT STUDY

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Purpose: Due to the proprioceptive input in the cervical region, biomechanical connections, the presence of the vagus nerve, which is a significant component of the autonomic nervous system, and the stress frequently affecting this area, postural changes and autonomic dysfunctions in this region can influence sleep quality and symptoms of the gastrointestinal and lower urinary systems in individuals. This study aimed to investigate the relationship between forward head posture and sleep, gastrointestinal, and lower urinary system symptoms in adult women.
Methods: The study included 34 volunteer women (age=22(2) years, body mass index=22.66±2,95 kg/m^2) were included. The degree of forward head posture was assessed using a modified goniometer with the craniovertebral angle, sleep quality was evaluated with the Pittsburgh Sleep Quality Index (PSQI), gastrointestinal symptoms were assessed using the Gastrointestinal Symptom Rating Scale (GSRS), and lower urinary system symptoms were evaluated using the Female Lower Urinary Tract Symptoms (ICIQ-FLUTS) scale. Spearman correlation test was used for analysis.
Results: The craniovertebral angles, PSQI and GSDÖ scores were found as 45(6) degrees; 6.91±3.32; 40.56±11.13, respectively. ICIQ-FLUTS storage, voiding and incontinence symptom scores were found as 3(2); 1.5(2) and 0(1), respectively. A significant negative correlation was found between craniovertebral angle and sleep quality scores (rho=-491; p=0,03), as well as gastrointestinal symptom scores (rho=-739; p<0,001). However, there was no significant correlation between craniovertebral angle and ICIQ-FLUTS-storage, ICIQ- FLUTS-voiding and ICIQ-FLUTS-incontinence scores (p>0.05).
Conclusions: An increase in forward head posture was shown to affect sleep quality and gastrointestinal system symptoms. Improving cranio-cervical posture is important for the improvement of sleep quality and gastrointestinal system symptoms.
Keywords: Forward Head Posture, Gastrointestinal System, Lower Urinary System, Sleep Quality

P054.INVESTIGATION OF THE RELATIONSHIP BETWEEN MUSCLE VISCOELASTICITY AND BODY MASS INDEX IN PHYSICALLY ACTIVE INDIVIDUALS

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Purpose: The viscoelastic properties of muscles influence muscle performance and joint stability. Body mass index (BMI) is known to be associated with the viscoelastic properties of muscles. This study aims to investigate the relationship between BMI and the viscoelastic properties of the quadriceps muscle in individuals with high levels of physical activity (PA).
Methods: Thirty-two participants with a high level of PA (International Physical Activity Questionnaire-Short Form score >3000 MET-min/week) were included in the study (age:21.41±1.45years, 8Male/24Female). BMI values were calculated (24.20±3.01kg/m²). The viscoelastic properties of both vastus lateralis, vastus medialis, and rectus femoris muscles were assessed using MyotonPro® while participants were in a supine position.
Results: A statistically significant correlation was found between BMI and the stiffness(N/m) of the right and left vastus lateralis (p=0.007, r=0.464; p=0.008, r=0.461, respectively), the stiffness of the left vastus medialis (p=0.003, r=0.502), and the elasticity(logarithmic decrement) of the left vastus medialis

(p=0.014, r=0.429). However, no significant relationship was observed between BMI and muscle tone(Hz).
Conclusions: In individuals with high levels of PA, a significant correlation was found between BMI and the stiffness of the right and left vastus lateralis, the stiffness of the left vastus medialis, and the elasticity of the left vastus medialis. Adiposity may enhance it by increasing connective tissue and water content. Excessive or insufficient stiffness may lead to injuries. When designing exercise programs for overweight, obese individuals with high levels of PA, the impact of BMI on the stiffness and elasticity of the quadriceps muscle should be considered.
Keywords: Body Mass Index, Elasticity, Muscle Tone, Stiffness

P055.INVESTIGATION OF THE RELATIONSHIP BETWEEN DISABILITY LEVEL AND PULMONARY FUNCTION İN PATIENTS WITH MULTIPLE SCLEROSIS

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Purpose: The aim of our study was to investigate the relationship between disability level and pulmonary function in patients with MS.
Method: Eleven individuals (9 women and 2 men) diagnosed with MS by a specialist neurologist were included in the study. Disability level of patients with MS was evaluated with the Expanded Disability Status Scale (EDSS). Respiratory function was assessed by dynamic lung volumes using Cosmed Q-Box body plethysmography device. Forced vital capacity (FVC), forced expiratory volüme in 1 second (FEV1), peak flow rate (PEF) and maximum mid-expiratory flow rate (FEF 25-75%) were obtained. The best measurement score was used for statistical analysis.
Results: The median age of the patients was 33 years and the median EDSS score was 3 years. EDSS total score was negatively and well correlated with FVC, FEV1 and FEF25-75 parameters in patients with MS (r= -0.792, p= 0.004; r= -0.713, p= 0.014; r= -0.659, p= 0.027), but not with PEF (r=-0.463; p=0.151).
Conclusion: These results suggest that the level of disability may be associated with pulmonary function in patients with MS. Therefore, we suggest that treatment and rehabilitation approaches to protect and improve pulmonary function, which may cause morbidity and mortality in the future, should be implemented from the early period.
Keywords: Disability Level, Multiple Sclerosis, Pulmonary Function

P056.INVESTIGATION OF THE RELATIONSHIPS BETWEEN PAIN, PAIN THRESHOLD, COGNITIVE FUNCTIONS, AND SLEEP QUALITY IN WOMEN WITH HIGHER ERGONOMIC RISK AND CHRONIC NON-SPECIFIC MUSCULOSKELETAL PAIN: A PILOT STUDY

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Purpose: This study aims to investigate the relationship between chronic non-specific musculoskeletal pain on pain threshold, cognitive functions, and sleep quality.
Methods: Eleven female participants were included (22.09±1.14 years, 165.45±5.22 cm, 61.27±10.43 kg). Pain (Short McGill Questionnaire), fatigue (Short Fatigue Inventory), sleep quality (Pittsburgh Sleep Index-PSQI), cognitive functions (Cognitive State, Stroop, Trail Making Test A-B), pain

threshold (Algometry: C2, C5, m. trapezius, m. tibialis anterior right/left), and ergonomic risk (RULA) were evaluated. Pearson correlation was applied using SPSS 20.
Results: Fatigue showed positive correlation with McGill perceived pain (r=0.607, p=0.048). PSQI and Stroop Word Test had a correlation (r=0.609, p=0.047), suggesting poor sleep quality may negatively affect cognitive functions. TMT-B showed a positive correlation with cognitive status (r=0.610, p=0.046). Stroop Box Test demonstrated a negative correlation with C2 Left (r=-0.476, p=0.01), C2 Right (r=-0.775, p=0.026), and C5 Right (r=-0.690, p=0.024). McGill sensory pain perception negatively correlated with Stroop Color (r=-0.724), Capa (r=-0.673), and Original (r=-0.752)($p<0.005$), indicating that the sensory pain component adversely affects cognitive processes. RULA showed a negative correlation with the right m. tibialis anterior pain threshold (r=-0.642, p=0.033).
Conclusion: This study demonstrates that chronic non-specific musculoskeletal pain is associated with cognitive functions, sleep quality, and pain threshold. Poor sleep quality negatively affects cognitive processes, while the emotional component of pain impairs executive functions.
Keywords: Cognitive Function, Musculoskeletal Pain, Pain Threshold

P057.INVESTIGATION OF POSTURE, BALANCE, AND GAIT PARAMETERS IN UNILATERAL TRANSFEMORAL AMPUTEES AND THE EFFECT OF PROSTHESIS USAGE DURATION ON THESE PARAMETERS

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Purpose: The aim of this study was to investigate the effects of prosthetic use by comparing posture, balance, and gait in individuals with unilateral transfemoral amputation who have different prosthetic usage periods.
Methods: The study included individuals with unilateral transfemoral amputation (n=30) and healthy individuals (n=15). Amputees were divided into two groups based on their prosthetic usage duration: new prosthetic users (<3 years, n=15) and long-term prosthetic users (≥3 years, n=15). Trunk posture (parameters measured with the Diers Formetric 4D system), temporal gait parameters (measured with the Ultium Insole SmartLead system), fear of falling (International Falls Efficacy Scale-FES-I scores), body image (Amputee Body Image Scale-ABIS scores), and prosthetic satisfaction (Prosthetic Satisfaction Questionnaire scores) were assessed. **Results:** Significant differences were found between new and long-term prosthetic users in terms of posture, balance, and gait parameters ($p<0.05$). Long-term prosthetic users exhibited a 45% lower double support time, a 20% higher walking speed, and a 35% better balance performance, while excessive loading on the intact limb increased by 25%. Additionally, amputees demonstrated asymmetries in temporal-spatial gait parameters compared to healthy individuals.
Conclusions: Long-term prosthetic users performed better in posture, balance, and gait parameters compared to new users; however, both groups still exhibited significant differences compared to the control group. Increased prosthetic usage duration reduced fear of falling and partially improved gait asymmetries, but significant differences in pelvic alignment and static balance parameters persisted compared to the control group.
Key Words: Balance, Gait, Posture, Prosthetic Use, Transfemoral Amputation

P058.INVESTIGATING THE EFFECTS OF REFORMER PILATES ON FUNCTIONAL CAPACITY AND PSYCHOSOCIAL HEALTH IN HEALTHY WOMEN: A PILOT STUDY

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Purpose: This study aimed to examine the effects of an 8-week reformer Pilates program on functional capacity, perceived stress, sleep quality, and fatigue in women.
Methods: Thirteen healthy women aged 20-45 participated. The 30-Second Sit-to-Stand Test (30SST) assessed functional capacity, the Perceived Stress Scale measured stress, the Sleep Hygiene Index evaluated sleep quality, and the Fatigue Severity Scale measured fatigue. Participants performed reformer Pilates exercises, supervised by a physiotherapist, twice a week for 50 minutes over 8 weeks. Assessments were conducted before and after the program.
Results: Participants' average age, height, and weight were 29.08±6.81 years, 163.31±8.75 cm, and 59.69±9.88 kg. Significant improvements were observed in functional capacity, perceived stress, sleep quality, and fatigue levels after the program ($p<0.05$).
Conclusions: The 8-week reformer Pilates program improved functional capacity, perceived stress, sleep quality, and fatigue in healthy women. The improvement in sleep quality, which impacts overall well-being, highlights the positive effects of Pilates on both physical and psychosocial health. Despite the small sample size, the study demonstrates that reformer Pilates can be beneficial for improving both physical function and psychological health in various populations.
Keywords: Fatigue, Functional Capacity, Pilates Training, Sleep Quality, Woman’s Health