

# Supplement Conference Summary

# XVII International Days of Rehabilitation Needs and Standards of Rehabilitation Rzeszów, February 27-28, 2025

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### Motor Control Training and Soft Tissue Therapy in the Treatment of Pain Associated with Upper Cross Syndrome

**Introduction:** Upper Cross Syndrome entails significant functional and quality-of-life implications for affected individuals. The study aimed to assess the effectiveness of motor control training and soft tissue therapy in reducing pain levels, improving quality of life, and increasing hand grip strength.

Materials and Methods: The study involved 30 women aged 33–58 years diagnosed with Upper Cross Syndrome, randomly assigned to two groups. Group 1 (n=15) participated in an 8-week motor control training program, while Group 2 (n=15) underwent weekly soft tissue therapy sessions over the same period. Pain pressure thresholds were assessed using an algometer, and hand grip strength was measured with a dynamometer, both before and after 8 weeks. Pain levels were evaluated using the VAS scale and Laitinen scale, while quality of life was assessed with the NDI questionnaire. Statistical analysis, including descriptive statistics and correla-

tion assessments, was performed using Statistica 13.3 software (Student's t-test, Wilcoxon test, Mann-Whitney U test, and Spearman correlation coefficient).

Results: Both groups showed statistically significant improvements (p<0.05) in all assessed parameters. Increases in pain pressure threshold and hand grip strength were observed, alongside reductions in pain levels (VAS and Laitinen scales). Both therapeutic approaches contributed to improved quality of life (NDI). Most results did not show statistically significant differences between groups (p>0.05). Conclusions: The proposed therapeutic approaches effectively improved quality of life, reduced pain levels, and enhanced hand grip strength in women with Upper Cross Syndrome, demonstrating the efficacy of these treatment protocols.

**Keywords:** pain, Upper Cross Syndrome, dynamometer, algometer

#### Andrukhiv Tetyana, Dmoch-Gajzlerska Ewa

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# Postnatal spasticity diagnosed in the fourth month of life and the type of rehabilitation used: case report, effect of time of diagnosis on treatment options

Introduction: Postnatal spasticity is a neurological condition that is characterized by excessive muscle tone, leading to restricted limb mobility. It can result from brain damage that occurs as a perinatal complication in the neonatal period. Importance of early diagnosis for rehabilitation: Early diagnosis of spasticity is crucial to the effectiveness of rehabilitation. The sooner therapeutic measures are taken, the better the chances of improving the child's motor function and quality of life. Early intervention reduces the risk of later complications as well.

Example of a child diagnosed with postnatal spasticity at the age of four months. A.P. boy born at 38 weeks of the 3rd pregnancy (1st pregnancy - stillborn), weight - 3,150 kg, height 50 cm. on the Apgar scale 8 points. Symptoms included stiffness of the muscles of the hands, lower limbs, difficulty in lifting the head and lack of interaction with the environment. The following rehabilitation methods were used:

- Daily physiotherapy sessions (therapeutic massage, foot reflexotherapy, point massage).
- Paraffin therapy.
- Therapeutic baths with resinost and pine bud decoction.
- Occupational therapy was introduced to support motor development (manual exercises, sensory play).

The goal of the rehabilitation was to improve range of motion, increase muscle strength and support the development of skills which resulted in the progress of treatment, better response to external stimuli and greater interaction with the environment.

**Summary:** Early diagnosis and intervention are key to improving the quality of life of children with spasticity. The earlier therapeutic measures are taken, the greater the chances of positive results. Parental participation in therapy can significantly support the rehabilitation process.

Conclusions: Appropriate therapy can lead to significant im-

provements in motor function and overall development of the child. Cooperation between parents and rehabilitation therapists is essential to achieve the best therapeutic results. Both children and their families need psychological support to better cope with the challenges of the disease. **Keywords:** postnatal spasticity, early diagnosis, rehabilita-

**Keywords:** postnatal spasticity, early diagnosis, rehabilition, psychological support.

#### Aštaryová Ivana<sup>1,2</sup>, Kobela Jozef<sup>1,2</sup>, Hudáková Zuzana<sup>1,2</sup>, Ondrejková Katarína<sup>1,2</sup>

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#### The importance of orofacial stimulation in stroke patients

**Introduction:** After a stroke, patients often have difficulty swallowing food, whether solid or liquid. A possible conservative treatment is orofacial stimulation, which is a set of movements and actions that help develop the motor skills of the face, cheeks, lips, tongue, palate and pharynx. Elements of developmental kinesiology from the Autoreflex prenatal and postnatal position method are used to reflexively influence tongue movements.

Material and Methods: The research method we chose was a case study of a 66-year-old patient after two ischemic strokes in the basin of the middle cerebral artery l. sin. and in the area of the cerebella l. sin. The patient was fed through a nasogastric tube, later he had a PEG (percutaneous endoscopic gastrostomy) inserted. In the treatment of swallowing, oro-

facial stimulation was used through point and path stimulation, training of tongue movements through the Autoreflex prenatal and postnatal position method and the use of a spoon and cold water.

**Results:** After treatment with orofacial stimulation and APPP tongue movement elements, the patient is able to swallow not only solid food but also liquids. PEG is used only for drug treatment.

**Conclusions:** With early therapy with orofacial stimulation and elements of the APPP method, swallowing function can be restored at every stage of swallowing.

**Keywords:** APPP. Orofacial stimulation. Swallowing. Tongue movements.

#### Babecka Paulina, Wyka-Wojeńska Anna

Zakład Usprawniania Leczniczego, Instytut Matki i Dziecka

### Physiotherapy after knee arthroplasty in children and adolescents treated for malignant bone cancer

Introduction: In recent years, the effectiveness of oncological treatment of children and adolescents systematically increases. It is increasingly possible to use sparing treatment with the use of endoprostheses. The aim of the study was to present the rehabilitation process after knee joint endoprosthesis implantation in patients treated for malignant bone cancer. Material and methods: The study presents the process of physiotherapy in patients of the Department of Oncology and Oncological Surgery of the Institute of Mother and Child who underwent knee replacement surgery during the treatment of bone cancer.

**Results:** Physiotherapy is an integral element of the treatment of patients after surgery to remove tumors around the knee joint.

Conclusions: Early initiation of the physiotherapy process, adapted to the patient's current condition and capabilities, is important for restoring the function of the knee joint, and because of that it improves the quality of life after the end of the oncological treatment process.

**Keywords:** physiotherapy, oncology, endoprosthesis, children and adolescents

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#### Babskyi Nestor, Tyravska Oksana

Lviv State University of Physical Culture named after Ivan Boberskyi

### Physical therapy of patients after transfemoral amputation using hydrokinesiotherapy

**Introduction:** Transfemoral amputation is a serious challenge for patients, accompanied by significant functional limitations, balance disorders and a decrease in quality of life. The integration of modern physical therapy methods, such as hydrokinesitherapy, can significantly improve physical condition, promoting active rehabilitation and adaptation.

Hydrokinesitherapy is based on the use of the properties of the water environment, such as reducing gravitational load, increasing flexibility of movement and improving blood circulation. These features are critical for amputees, allowing them to perform physical exercises with minimal risk of overload.

The aim of the study was to evaluate the effect of hydrokinesitherapy on muscle strength, hip range of motion, balance and overall functionality in patients with transfemoral amputation.

Materials and methods: The study involved 10 patients aged 25 to 45 years, who were divided into two groups: experimental (hydrokinesitherapy) and control (standard physical therapy). The program lasted 8 weeks and included 2-3 sessions per week lasting 30-45 minutes. To evaluate the results, manual muscle testing (MMT) was used to determine the

strength of the hip and trunk muscles, as well as goniometry to measure the amplitude of movements in the hip joint. **Results:** Muscle strength (by MMT): In the experimental group, the average score increased from 3.2±0.5 to 4.0±0.3 (p<0.01). In the control group, the improvement was less pronounced: from 3.1±0.4 to 3.5±0.5 (p<0.05). Amplitude of movements in the hip joint (by goniometry): In the experimental group, the average range of motion increased by 20% for flexion (from 70° to 84°) and by 18% for extension (from 10° to 12°). In the control group, the increase was 8% for flexion (from 72° to 78°) and 6% for extension (from 11° to 12°). General functionality: 85% of participants in the experimental group reported a decrease in pain on the visual analog scale (VAS) from 6.4±1.2 to 3.1±0.9. Patients in the control group showed a less significant reduction in pain: from 6.2±1.1 to 4.5±1.0.

**Conclusions:** In this way, hydrokinesitherapy is an effective and safe method of rehabilitation for people with transfemoral amputation, which should be included in physical therapy programs.

**Keywords**: hydrokinesitherapy, amputation, physical therapy, quality of life.

#### Bać Katarzyna, Jaworska Agnieszka

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## Physiotherapeutic Prevention of Occupational Diseases Based on the Analysis of Medical Decisions Issued at the Voivodeship Occupational Medicine Center in Rzeszów from 2019 to 2023

**Introduction:** The aim of this article is to present the most commonly diagnosed occupational diseases at the Voivodeship Occupational Medicine Center in Rzeszów from 2019 to 2023 and the prevention of these conditions through physiotherapy.

Materials and Methods: The rulings issued by the WOMP in Rzeszów were analyzed in accordance with the occupational disease certification system currently in force in Poland. The analysis considered factors such as disease entities, their causes (type of profession), as well as the gender and age of the patients. To obtain precise data for the analysis, categorization,

standardization of names, and transformation of qualitative data into quantitative data were performed. Ultimately, the data were grouped and classified.

Results: Between 2019 and 2023, 273 cases of occupational diseases were diagnosed. During the analyzed period, women accounted for 51.56% of all cases, while men made up 48.35%. The primary cause of morbidity was infectious or parasitic diseases and their consequences, affecting 193 individuals. The second most frequently diagnosed condition was carpal tunnel syndrome, with 19 cases. The age groups with the highest number of diagnoses were 60–69 years

(38.10%) and 50–59 years (36.26%). The highest incidence was recorded in group A (according to the Polish Classification of Activities - PKD), which includes agriculture, forestry, hunting, and fishing, with 140 cases, and in group Q (according to PKD), encompassing healthcare and social assistance, with 50 cases. It was observed that carpal tunnel syndrome predominantly affects women, with 16 out of 19 cases, over 30% of whom were seamstresses. Chronic epicondylitis of the humerus was more common among men than women (2 women and 4 men), although there was no dominant occupational group associated with this condition.

Healthcare workers are primarily exposed to infectious or parasitic diseases and their consequences, which account for 90% of all occupational diseases in this sector. Nursing is the most affected occupational group. An important aspect of occupational diseases is their prevention through physiotherapeutic measures. This is a crucial element of comprehensive employee health management, reducing morbidity and improving overall quality of life.

Keywords: occupational diseases, physiotherapy prevention, causative factors

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#### Psychophysical health of students before and during the examination session

**Introduction:** The aim of the study was to assess the impact of the student examination session on physical activity, diet, sleep quality and stress level in physiotherapy students.

Material and methods: The study involved 113 students of the University of Rzeszów studying physiotherapy. 68 people who completed the survey twice were qualified for analysis, including 75% women and 25% men. The FFQ6 food frequency questionnaire, the IPAQ international physical activity questionnaire, the Pittsburgh PSQI sleep quality questionnaire and the PPS-10 questionnaire were used.

**Results:** During the session, the respondents cooked for themselves significantly less often (p<0.001) and consumed fast food products more often (p=0.025). The number of meals consumed during the day (p=0.018), dairy products and eggs (p=0.0134), cereal products (p=0.012) and fats (p=0.028) also decreased. During the examination session, more students reported normal sleep (60.29%) compared to the period before the session (51.47%). Reduced sleep quality was demonstrated by 48.53% of students before the session,

while during it was 39.71%. Low stress level before the session was demonstrated by 16.18% of students, while during the session it increased to 23.53%. Average stress level was declared by 32.35% of students before the session, and during the session by 36.76%. High stress level before the session was present in 51.47% of students, while during it decreased to 39.71%. During the session, there was a slight decrease in the declarations of people who assigned themselves to the subcategory of "sufficient" physical activity by 11.8%. There was also an increase in the subcategories of "high" and "insufficient" levels of physical activity by 4.4% and 7.4%, respectively.

Conclusions: The students' sleep quality was normal both during and before the session. No significant differences were found in the stress level of students. The students' physical activity did not differ before and during the examination session. During exams, students tended to eat ready-made food, fast food and ready-made meals more often.

 $\textbf{Keywords:} \ student, physical \ activity, nutrition, sleep, stress.$ 

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### The impact of physical activity during pregnancy on the health of the mother and child

**Introduction:** The aim of the study was to assess how physical activity during pregnancy affects perinatal parameters of the mother and child.

Material and methods: The study group consisted of 103 women after childbirth and their newborn children. For more than half of the women, it was their first pregnancy (61.2%). The age of the study participants ranged from 21 to 43 years. The women gave birth between the 31st and 42nd week of pregnancy. All women were consistently physically active during pregnancy. The study used an own questionnaire as well as the Actigraph wGT3X-BT accelerometer – an objective tool for measuring physical activity.

Results: A group of 14 women was selected who simultane-

ously had two risk factors associated with too little activity: average activity time below 150 min. and a daily number of steps below 6 thousand. In this group, there is a significantly higher risk of developing gestational diabetes (GDM) (29 vs. 4%; RR = 6.29 (95% c.i.: 1.77-22.29); p = 0.002). In the group of women with "doubly" low activity, there is also a significantly lower birth length of children (53.0 vs. 55.1 cm; p = 0.007). **Conclusions:** Low physical activity in a healthy, uncomplicated pregnancy may increase the risk of adverse health consequences for the mother and child

**Keywords:** physical activity, gestational diabetes, edema, premature birth

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### Early mobilization of patients after lung transplantation (LTx) – an interdisciplinary model of care

Introduction: The purpose of this presentation is to present a model of early mobilization of patients after lung transplantation (LTx) in the intensive care unit (ICU) developed at the Krakow transplant center. Early physiotherapy in the ICU, with particular emphasis on respiratory therapy, significantly improves prognosis and patient outcomes, and helps minimize the risk of pulmonary complications, functional and cognitive disorders that result from treatment in ICU. Although both the number of transplant centers in Poland and the number of lung transplants are increasing, however, the literature lacks reports on standardized physiotherapy protocols for this group of patients in the early postoperative period. Material and Methods: Lung transplant patients, like other patients after thoracic surgery (cardiac surgery, thoracic surgery), are in the ICU in the first few days after surgery. Early mobilization protocols are implemented to counteract the effects of immobilization and ICU stay. This process should be implemented as early as within 72 hours of ICU admission. It is effective and safe as long as there is interdisciplinary cooperation and an appropriate patient evaluation process. This presentation outlines the process of physiotherapy for lung transplant (LTx) patients based on current literature and the authors' program which is conducted at the Krakow center. **Results:** The basis for the implementation of early and safe physiotherapy of patients after lung transplantation (LTx) is the use of known physiotherapy evaluation tools such as: S5Q, MRC sum score, ICU mobility scale. Competent evaluation of the patient's cooperation with the ventilator during mechanical ventilation and assessment of readiness for extubation (cooperation of pulmonologist-transplantologist, anesthesiologist, physiotherapist, nurse) is also essential. Conclusions: The presented model of assessment and physiotherapy program allows safe and effective mobilization of patients after LTx as early as possible. In addition, the 24hour care/ 7-day-a-week model has the effect of reducing pulmonary complications in this group of patients, shortening the length of stay in the ICU, and perhaps fewer medical

**Keywords:** lung transplantation (LTx), early rehabilitation, intensive care units (ICUs)

interventions (e.g., bronchoscopies).

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#### The role of multidisciplinary collaboration in the care of patients with vulvodynia

Introduction: Vulvodynia is chronic vulvar pain of unknown aetiology, lasting at least three months. It can lead to a drastic reduction in the patient's overall quality of life. The aim of this study was to present physiotherapeutic options and interdisciplinary collaboration in vulvodynia Material and methods: A 32-year-old female patient with a diagnosis of vulvodynia. She complains of recurrent intimate infections, migraines, painful menstruation, urgency urges and symptoms of irritable bowel syndrome. No history of pregnancy or childbirth. She is under the constant care of a psychologist and psychiatrist. External palpation examination revealed high tension in the iliac rim area and significant sacroiliac and nodular soreness. A therapy plan was established using an exposure ladder. Manual therapy focused on relaxation of the lower lumbar region, buttocks, abdomen,

diaphragm and pelvic floor. Home recommendations included the involvement of the partner in the therapeutic process. Results: After 6 months of regular therapy, the patient experienced a significant reduction in tension and pain. This enabled a full vaginal ultrasound examination and cytology to be performed. The patient is continuing the treatment. Conclusions: Individually tailoring the therapy to the patient's needs, taking into account her medical history, preferences and tolerance for different forms of physical activity, was crucial to the success of the treatment. Collaboration between different specialists, including physiotherapists, gynaecologists, psychologists and a psychiatrist, is essential, as an interdisciplinary approach enables a holistic view of the patient's problems and a more effective management of her complaints. Keywords: interdisciplinarity, physiotherapy, vulvodynia

#### Bejer Agnieszka<sup>1,2</sup>, Szczepanik Magdalena<sup>1</sup>, Płocki Jędrzej<sup>2,3</sup>, Kulczyk Marek<sup>2</sup>, Kotela Andrzej<sup>4</sup>

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### Adaptation and validation study of the Polish version of the Oxford Shoulder Instability Score

**Introduction:** The purpose of this study was to perform a translation and cultural adaptation of the Polish version of the OSIS (OSIS-PL) and to assess its reliability, validity and responsiveness

**Material and methods:** This was a prospective cohort study with a repeated-measures design. Patients after arthroscopic treatment for SI (age  $\bar{x}$ =30.05±9.01) were tested three times (test 1 n=75; test 2 n=71; test 3 n=51). Construct validity was assessed by comparing the OSIS-PL with the 36-item Short Form Health Survey (SF-36 2.0), the Disabilities of Arm, Shoulder and Hand Questionnaire - abbreviated version (QuickDASH). To confirm the one-dimensional structure of the OSIS-PL, confirmatory factor analysis (CFA) was performed. Minimal clinically important difference (MCID) was computed using the anchor-based method.

**Results:** The OSIS-PL demonstrated excellent internal consistency with Cronbach's alpha value of 0.93, and test–retest

reliability (Intraclass Correlation Coefficient; ICC<sub>2,1</sub>=0.99). Five out of six hypotheses formulated a priori (83.33%) were confirmed, which suggests high construct validity of OSIS-PL. The CFA identified a one-dimensional structure of the OSIS-PL (the chi-squared:  $\chi^2$ =11.592, p>0.999; all the defined fit indices showed adequate values). The OSIS-PL showed from moderate (Effect Size; ES=0.412) to high (Standardized Response Mean; SRM=1.307) degrees of responsiveness, and the MCID amounted to 1.76.

**Conclusion:** The OSIS-PL is a user-friendly questionnaire with strong psychometric properties, designed for implementation in clinical practice among the Polish population following arthroscopic treatment of shoulder instability, as well as in research projects, including those of international scope.

**Keywords:** questionnaire; joint instability; shoulder; validation study

#### Błajda Joanna<sup>1</sup>, Wąsacz Małgorzata<sup>1</sup>, Kopańska Marta<sup>1</sup>

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### Pain in pregnancy - an underestimated problem? An analysis of Polish Google search trends

**Introduction:** The most popular internet browser is Google, which is used daily by tens of millions of people in Poland. Pregnancy is a beautiful period in a woman's life, however, it is often associated with various ailments that can impede daily functioning. The aim of this study is to analyse the trend in the interest of Internet users in Poland in selected keywords in the field of pain in pregnancy.

**Material and methods:** The tool used in the study was the Google Trends service. The period from 01.12.2014 to 01.12.2024 was analysed. The study was conducted on days 28-29 December 2024.

Results: The study showed a high interest of internet users in Poland in pain complaints in pregnant women. Regional differences in interest in particular keywords were also demonstrated. Analysis of the data showed a high interest of internet users in the keyword 'back pain in pregnancy'. The peak of interest in this keyword was recorded in June 2017, with the highest interest in the Lubuskie Voivodeship (100 on the GT scale) and the lowest in the Mazowieckie Voivodeship (65 on the GT scale). A clear increase in internet user interest in the keyword 'physiotherapy in

pregnancy' was shown. It was shown that interest in this keyword has increased significantly since January 2019. The peak of interest in this keyword was recorded in September 2024. The highest interest (100 on the GT scale) was recorded in the Podlaskie, Pomorskie and Dolnośląskie provinces, while the lowest interest was recorded in the Lubuskie province (0 on the GT scale).

Conclusions: The high interest in pain complaints in pregnancy indicates the need for more education of pregnant women about these problems, their causes and ways to cope with them. The growing interest in physiotherapy indicates that women are increasingly seeking professional help for pain relief. Regional differences in interest in particular keywords suggest that education and prevention activities should be tailored to the specific characteristics of each region. These data can be used to plan effective information campaigns targeting pregnant women to help them better understand their bodies and take care of their health.

Keywords: pain, pregnancy, google trends

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### LEGO® Block Play as a Form of Therapy for Fine Motor Skills Development in Children with Autism Spectrum Disorder

Introduction: Autism spectrum disorder is a neurodevelopmental disorder that affects the development and functioning of a child in various aspects of life. Children with autism spectrum disorder (ASD) often experience difficulties in fine motor skills, which are related to reduced muscle tone, sensory processing issues, delayed development of praxis skills, and problems with visual-motor coordination. Noticeable difficulties include inadequately adjusting the force of pressure on objects, a lack of precision in hand and finger movements, as well as challenges related to object manipulation. The aim of this study is to present the impact of playing with LEGO® bricks on the development of fine motor skills in children with autism spectrum disorder.

Material and Methods: To analyze the above topic, articles from the PubMed and Google Scholar databases were searched using the keywords: fine motor skills, LEGO therapy, autism spectrum disorder. Four publications were found and analyzed. Results: The review revealed a significant improvement in

Results: The review revealed a significant improvement in motor skills in children participating in LEGO® block-based activities. Notable improvements were observed in visual-motor coordination, grip precision, hand strength, and increased manipulative skills, such as assembling and disassembling blocks. There was also an increase in children's engagement in tasks requiring object manipulation and the development of problem-solving skills.

**Conclusion:** The use of basic LEGO® blocks is an effective and engaging method to support the development of fine motor

skills in children with ASD. LEGO\* block play engages children emotionally and cognitively, which enhances the effectiveness of therapy compared to traditional methods. Further research is necessary to understand the long-term impact of

LEGO\* therapy on the development of children with ASD. **Keywords:** fine motor skills, LEGO therapy, autism spectrum disorder

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#### Preoperative and Perioperative Rehabilitation for Lung Cancer Resection

Introduction: Respiratory rehabilitation is a crucial component in preparing patients for surgical procedures, particularly in cases involving cancer-related surgeries. It supports the improvement of lung function, reduces the risk of postoperative complications, and accelerates the recovery process. Another essential goal of this process is the reduction of psychological stress associated with a cancer diagnosis, which can positively influence the patient's engagement in the therapeutic process.

Materials and Methods: This presentation is a review-based study that involved an analysis of scientific literature on respiratory rehabilitation for preoperative preparation and perioperative care. Studies were selected focusing on patients of various ages, with particular attention to elderly individuals. The review encompassed a variety of rehabili-

tation methods, including passive exercises, active-assisted exercises, and resistance training.

**Results:** The analysis revealed that respiratory rehabilitation: Improved chest mobility – Regular exercises enhanced breathing mechanics and reduced the risk of atelectasis.

Reduced postoperative complications – Techniques for clearing airway secretions and teaching effective coughing significantly decreased the incidence of infections.

Enhanced patient quality of life – Psychological support combined with exercises significantly reduced anxiety levels and increased engagement in therapy.

Shortened hospital stays – Patients regained independence more quickly and were discharged home sooner.

**Keywords:** Respiratory rehabilitation, Postoperative complications, Quality of life

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#### Medical massage as a necessary part of standard of modern rehabilitation

The motto of this year's 17th International Rehabilitation Days is advances and standards in modern rehabilitation. Medical massage is one of the basic elements of a physiotherapist's professional activities used in the rehabilitation process and one of the professional subjects included in the current standard of education for the profession of physiotherapist. Nowadays we define massage as a mechanical reversible or elastic deformation of body tissues aimed at maintaining or improving their functional state (own definition based on the publication of Dr. Krzysztof Kassolik - Chairman of the Massage Section of the PTF). We can perform this deformation of tissues manually or instrumentally, but always within the range of flexibility of the deformed structures. Acting already at the level of the cellular structures of the tissues being deformed, we achieve an improvement in the functional state of cells in terms of elasticity and flexibility of the structures of the cytoplasm and cell nucleus, which leads to the activation of biochemical and biophysical processes occurring in cells (based on a presentation by Dr. Miroslaw Sopel, Prof. of the UM in Wroclaw, given at the 14th National Methodological and Scientific Conference on Massage in Lodz, Poland). The summation of these actions at the level of tissues, organs and the whole organism allows direct and indirect neural reflexes to achieve an improvement in the functional state of the whole organism, providing a holistic effect on the overall psycho-physical state of the individual. Based on these mechanisms, we can accept the thesis that massage is able to ideally prove itself as one of the main means of physiotherapy and physiopoilics used in modern rehabilitation. We must consider what types of medical massage we can use in rehabilitation. In my opinion, it will be primarily classical massage of the superficial

tissues of the skin as the largest multi-tissue and multifunctional organ of the body, and deep tissue massage of the fascial and muscular structures of the musculoskeletal system. We can also use all available types of massage in an aquatic environment, both from the field of underwater massage and spray massage, including soaking massage. From the range of specialized types of massage, we can use isometric massage to build up muscle strength and mass, muscle tension relaxation massage, combined with muscle stretching, to get the muscles to stretch properly and thus achieve full range of motion, limited by the flexion position adopted at work and often at rest. It is also possible to use manual lymphatic drainage (MDL) or instrumental pneumatic massage to improve the outflow of venous blood and lymph, as well as arterial blood flow to the distal parts of the limbs. There

is also the use of neuro-reflex segmental massage, used to normalize the function of internal organs (visceral action), as well as reflex massage, especially in the foot area, which also allows an effect on all internal organs of the body. It is also possible, in my opinion, to use instrumental vibration massage, such as with the Aquavibron Ecopompa apparatus, using the positive effects of vibration on the functional activation of sructures of the musculoskeletal apparatus, as well as the circulatory and respiratory systems, digestive and urogenital systems. Thus, summarizing the comprehensive possibilities of the functional impact of massage on the individual elements of the body and on the body as a whole, we can unequivocally state that massage is an indispensable means of action in the standards of application of physiotherapy and physioprophylaxis in modern medical rehabilitation.

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### Assessment of adaptability and cohesion of families of children treated for idiopathic scoliosis

**Introduction:** When defining the problems of children with idiopathic scoliosis (IS), it is reasonable to take into account the quality of life of their families (FQOL) and its adaptability and coherence in the treatment process. An important psychological aspect is the support an adolescent patient receives from the family. Family cohesion and the ability to adapt to the existing situation seem to be an important factors that may influence the treatment process and the FQOL level of their families.

Material and methods: The analysis covered a total of 200 families of children aged 7-18 from the Podkarpackie Voivodeship. The research used the original interview and physical examination card created for the purpose of the study, Family Adaptability and Cohesion Scale (FACES III) and FQOL. Statistical analysis showed significant differences between both compared groups.

Results: Family cohesion and adaptability assessed by indi-

vidual family members, including children and adolescents, were statistically significantly stronger in families of children and adolescents without IS compared to families of children and adolescents with IS. It was established that family adaptability in the assessment of children and adolescents is a factor differentiating the FQOL level in both groups.

Conclusion: The presented research is part of the discussion on the functioning of families of children with adolescent idiopathic scoliosis. The obtained results enrich the current knowledge concerning the functioning of families of children treated for adolescent idiopathic scoliosis with regard to selected aspects of the family system. These findings may be helpful in developing supportive and therapeutic measures when working with IS patients.

**Keywords**: Family Quality of Life, juvenile idiopathic scoliosis, family adaptability, family cohesion

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### Analysis of body balance in patients after after single- and multi-level cervical discectomy and fusion

**Introduction:** The purpose of the study is to analyze the body balance parameters and pain level of patients with cervical pain syndrome who underwent single- and multi-level cervical discectomy and fusion.

Material and methods: Patients (performed cervical discectomy and fusion) and a control group took part in the study. The study included 92 people (52F and 40M), the mean age of the participants was 51.47 years  $\pm$  5.89 years. All participants underwent body balance testing using the AMTI dynamometric platform and completed a personal questionnaire and a VAS pain scale. Patients were examined twice - before and after surgery.

**Results:** Statistically significant changes in body balance parameters were found in patients who underwent multilev-

el ACDF. Better results of body balance parameters were achieved by patients undergoing single-level ACDF. The VAS scale results showed a statistically significant reduction in pain in the neck and upper limbs in both patients with single- and multi-level ACDF. Research has proven that body balance parameters are related to pain.

#### **Conclusions:**

- 1. ACDF treatment affects body balance parameters.
- 2. Patients undergoing multi-level ACDF have worse body balance parameters before the procedure.
- 3. Reduction of pain in the cervical spine resulting from ACDF may improve body balance parameters.

Keywords: discectomy, cervical spine, body balance, pain

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#### Physiotherapy in psychiatry - myth or hit?

**Introduction:** The purpose of this research is to analyze the feasibility of providing physiotherapy funded by the National Health Fund in the field of psychiatry against the background of recent scientific reports.

Material and methods: The first stage of the study includes a review of all available forms of services in the field of psychiatry including outpatient, day care and inpatient modes, as well as other support centers for people with mental disorders funded by the National Health Fund in terms of physiotherapy. In the second stage, a literature review was conducted, which included original works evaluating the impact of physiotherapy interventions on patients with schizophrenia and depression.

**Results:** There is a shortage of comprehensive physiotherapy within the available free psychiatric services. There is scientific evidence of the positive effects of aerobic training in the treatment of schizophrenia and depression, and resistance training in the treatment of anxiety disorders.

Conclusions: In the area of psychiatry funded by the National Health Fund, there is an insufficient number of physiotherapy services, despite substantial evidence in the literature of the effectiveness of selected interventions. It is necessary to design research in the field of psychiatry using various forms of physiotherapy.

**Keywords:** mental health, physiotherapy, physical activity, schizophrenia, depression, anxiety

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#### The effects of regular aerobic exercise in women after breast cancer surgery

Introduction: Surgical treatment of breast cancer is often associated with a significant reduction in physical activity (PA). Physical rehabilitation plays a crucial role in recovery, promoting physical and mental well-being, and preventing cancer recurrence. Women who maintain regular physical activity after breast cancer surgery can reduce the risk of premature death by up to 42%. Aim of the study: The aim of this study was to determine the health benefits of regular moderate-intensity aerobic exercise in women after breast cancer surgery.

Material and methods: The study included 50 women who had undergone mastectomy and participated in organized group physical training (median age = 67 years; median weight = 74.66 kg; median time since mastectomy = 8 years; radical mastectomy = 53.3%). The participants engaged in moderate-intensity aerobic training for at least 60 minutes per week over a 6-month period, with a minimum 80% attendance rate. Physical activity (IPAQ), general well-being (WHO-5), and mental state (GAD-7) were assessed using standardized questionnaires. The control group consisted

of 35 healthy women who did not participate in organized exercise.

Results: Women in the study group (Group A) demonstrated significantly higher scores in general well-being on the WHO-5 scale (56.4% vs. 40.4%) and moderate physical activity (950.00 MET/week vs. 590.67 MET/week) compared to the control group (Group B). However, the control group engaged in more intense physical activity, walked more frequently, and achieved better overall physical activity scores. Women in the study group (Group A) exhibited significantly higher scores on the GAD-7 scale (7.7 points vs. 4.5 points), indicating persistently high levels of generalized anxiety.

Conclusions: Women after breast cancer treatment, regardless of the time since surgery, should remain consistently physically active. Moderate-intensity aerobic and resistance exercises improve functional fitness, help sustain physical activity at an adequate level, and enhance both physical and mental well-being.

**Keywords:** exercise, moderate-intensity aerobic training, breast cancer, rehabilitation

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### Acupuncture in the Fight Against Migraine: Immunomodulatory and Neurophysiological Mechanisms of Acupuncture in Migraine Treatment

Introduction: Migraine is a complex, chronic neurological disorder characterized by recurrent headaches that significantly impact patients' quality of life. There is evidence of genetic predisposition to this condition, which motivates research into its biochemical mechanisms and the effectiveness of various rehabilitation methods. Acupuncture, as a complementary medicine technique, is gaining popularity as an alternative treatment for migraine. The aim of this study is to review the literature on the mechanisms of action of acupuncture and its effectiveness in treating migraine.

Materials and Methods: A literature review was conducted by analyzing research and review articles from PubMed and Embase databases for the period 2020-2024. Inclusion

criteria were based on the relevance of the articles to the topic of the study.

Results: Acupuncture modulates the activity of NK cells, macrophages, and T lymphocytes, improving immune response and reducing inflammation. The review found that various acupuncture methods effectively reduce the frequency and intensity of migraine attacks. Acupuncture also affects the nervous system by modulating the release of neurotransmitters such as serotonin and dopamine, and by activating somatosensory and autonomic pathways, which explains its analgesic effects. Studies using magnetic resonance imaging and omics techniques have shown that acupuncture influences brain function and metabolism in migraine patients, which may be related to its therapeutic efficacy.

Conclusions: Acupuncture shows significant potential as an effective method for treating migraine. Its action is based on complex immunomodulatory and neurophysiological mechanisms that contribute to reducing inflammation and modulating pain response. However, further research is necessary

to fully understand all aspects of its action and to optimize therapeutic protocols.

**Keywords:** Acupuncture, Migraine, Psychoneuroimmunology, Rehabilitation\

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### Immersotherapy - therapy for a woman with intellectual disability and mental illness - Case study.

**Introduction:** Understanding Depth - OZN rehabilitation through diving - a program based on motor, sensory, psychological and social impact. Based on a case study based on observation and aquatic therapy, an analysis of changes and behaviours of a young woman after 7 weeks of classes was carried out.

Material and methods: The study used a training program with an instructor guide authored by: Ewa M. Drucis, Piotr Czaczkowski and Agnieszka Dejna. Methodology developed on a pilot group that was influenced by their behaviour, commitment and physical and mental capabilities. Performing the same task multiple times for reinforcement purposes is the key to success.

**Results:** We observed Iza, 30 years old, severe OZN, neurological and psychological coupling. Progress has been made in the following areas: Self-confidence-mastering

diving skills increased self-confidence and self-esteem. Improving concentration-diving requires focus and attention to surroundings. Strengthening social ties - being in a group, with a partner, helps strengthen acquaintances, friendships and build important bonds. A sense of belonging-being part of a community provides support, which is important for mental health. A sense of self-fulfilment - completing diving tasks gives satisfaction and self-acceptance, which also leads to overcoming fears.

#### **Conclusions:**

- Helps to function more efficiently in the social aspect
- Affects posture, lung efficiency and fitness.
- Helps to understand oneself in the social context
- Increases self-esteem and faith in one's own abilities and skills. **Keywords:** Immersion therapy, intellectual disability, mental illness, diving.

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#### Rehabilitation of stroke patients – The mirror neuron system theory

Introduction: Stroke is a leading cause of disability world-wide, often resulting in motor impairments that significantly affect quality of life. Rehabilitation plays a pivotal role in enhancing recovery and promoting neuroplasticity in post-stroke patients. Interventions targeting the mirror neuron system (MNS) have gained attention due to their potential to facilitate motor relearning and cortical reorganization. Mirror neuron system (MNS) is a group of specialized neurons that "mirrors" the actions and behaviour of others. Mirror neuron system-based training is one of the hot treatment technologies in recent years, which provides a motion-observation-execution matching mechanism and brings a new strategy for functional rehabilitation after stroke.

Material and methods: The literature review was performed by analyzing research and review articles from the Pubmed and ScienceDirect databases published over the last 5 years. Results: Multiple clinical studies have demonstrated that stimulating the mirror neuron system (MNS) significantly enhances motor and cognitive recovery in post-stroke patients. Repeated engagement in action observation training (AOT) has been shown to activate the MNS in brain regions associated with motor control and cognition. This activation facilitates the direct recruitment of motor neurons responsible for executing the observed actions, leveraging the MNS's capacity to link perception and motor execution.

#### **Conclusions:**

- 1. Modulating the activity of the mirror neuron system (MNS) offers a novel approach to fostering brain recovery after stroke.
- 2. Techniques designed to stimulate the motor mirror neu-

ron network can enhance neuroplasticity, supporting improved motor function recovery in the extremities of poststroke patients.

Keywords: Mirror neuron system; Rehabilitation; Stroke

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#### Vagus Nerve Stimulation in Neurological Rehabilitation: Supporting Neuroplasticity and Nervous System Regeneration

Introduction: Vagus Nerve Stimulation (VNS) is a promising technology in the rehabilitation of patients after spinal cord injuries and strokes. The mechanism of action of VNS is based on the modulation of neuroplasticity and the influence on inflammatory processes in the central and peripheral nervous system. The use of VNS in functional therapy opens up new possibilities for improving the quality of life of neurological patients. The aim of the analysis is to discuss the potential applications of VNS in neurological rehabilitation and to present the results of the latest clinical studies that demonstrate the effectiveness of this method.

Materials and methods: Data from clinical and experimental studies from the last five years were analyzed, which assessed the effect of VNS on motor functions, cognitive abilities and recovery time in patients with neurological damage. Results: Improved motor function: In a randomized study (n=108, 2022) in patients with upper limb paralysis after stroke, VNS combined with exercise therapy improved muscle strength by 30% compared to rehabilitation alone. Impact

on neurological recovery: Studies on animal models have shown that VNS increases the level of brain-derived neurotrophic factor (BDNF) by up to 50%, supporting the regeneration of neuronal connections. Reduction of spasticity: In patients with spinal cord injury, undergoing 12 weeks of VNS therapy, a 35% reduction in muscle tone (Ashworth scale) was observed. VNS also affects the activity of the prefrontal cortex, which may support the rehabilitation of cognitive functions such as memory or concentration.

Conclusions: Vagus nerve stimulation is an innovative tool supporting neurorehabilitation, especially in cases refractory to traditional therapies. VNS not only accelerates the recovery of the nervous system, but also allows patients to return to daily activities more quickly. Challenges include optimizing stimulation parameters and integrating with existing therapeutic protocols. Further research is needed to fully understand the potential of this technology.

Keywords: neurological rehabilitation, neuroplasticity, VNS.

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### The effect of prehabilitation on the effectiveness of anti-oedema prophylaxis in women after breast cancer treatment – preliminary report

**Introduction:** The aim of the study was to compare the effectiveness of standard elements of compex antioedema therapy with therapy in which prehabilitation was additionally used.

Material and methods: The study included patients treated for breast cancer at the Breast Cancer Unit at the Specialist Hospital in Brzozów Podkarpacki Oncology Center. The study group included 40 patients with additional prehabilitation, and the control group included 40 patients with only comprehensive anti-oedema therapy. The follow-up time was 10 months. The study used a self-made authorship questionnaire. Every 3 months, a ten-day program of comprehensive anti-oedema therapy was performed in each group of patients. Lymphoedema parameters were assessed.

Results and conclusions: Greater effectiveness was observed from the therapy in the study group. Lymphoedema was not observed in any of the patients in the study group. Further continuation of the study on a larger group of subjects and a longer follow-up period is recommended.

Keywords: prehabilitation, breast cancer

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# Assessment of the impact of a classic neck and shoulder girdle massage treatment on bioelectric activity of the brain and health assessment parameters for adults

Introduction: Massage is a common known procedure used both in the treatment of pain and has a relaxing effect on the human body. The main aim of this study was to assess the impact of the duration of classic neck and shoulder girdle massage treatment on the bioelectrical activity of the brain as well as health assessment parameters in adults aged 18-60. Material and methods: The study was conducted at the Medical College of Rzeszow University between May and December 2023 among 60 adults aged 18-60. It consisted of two interventions with 2-week time interval. The participants each time received the classic massage of the neck and shoulder girdle, lasting 15 minutes at the first meeting and 30 minutes at the second. Both during the first and second intervention, before and after massage, the bioelectrical activity of the brain was recorded by EEG method using the EEG-DigiTrack Biofeedback device, blood pressure and heart rate were measured and the participants were asked to complete the STAI-S and original questionnaires.

**Results:** After 15-minute massage, highly statistically significant increase in the alpha brain wave amplitude was found during measurement by EEG with closed eyes. In the case

of 30-minute massage, a highly statistically significant difference was shown in the case of alpha and beta brain waves also during the recording with closed eyes. Comparison of the results before and after massage showed that after intervention the level of perceived muscle tension decreases, well-being improves, anxiety decreases, blood pressure and heart rate decreases. There was no evidence the impact of the duration the neck and shoulder girdle classic massage on the parameters assessed in this study.

Conclusions: The duration of classic massage does not affect the changes in brain wave values, the subjective level of muscle tension, the subjective assessment of actual wellbeing, the level of anxiety or the change in blood pressure and heart rate in adults aged 18-60. There is an increase in the amplitude of the alpha brain wave after classic massage of the neck and shoulder girdle. It is necessary to conduct further research on the impact of massage on the bioelectric activity of the brain.

**Keywords:** electroencephalography, classic massage, health assessment parameters

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#### Examination of the Hip Joint from a Physiotherapist's Perspective.

The examination of the hip joint from a physiotherapist's perspective is a key element in the diagnosis and treatment of musculoskeletal disorders. It requires knowledge of anatomy, biomechanics, and functional assessment techniques, enabling the identification of sources of pain and dysfunction. A crucial aspect of this process is the concept of Movement

System Impairments (MSI), developed by Shirley Sahrmann. MSI focuses on analyzing movement patterns and identifying compensations and abnormalities that may lead to overuse and injuries. According to this concept, dysfunctions within the movement system result from suboptimal functioning of tissues and structures. By employing this ap-

proach, the physiotherapist evaluates body movements and positions to determine which structures are overloaded and which require improved stability or mobility.

By combining traditional assessment methods with the MSI approach, physiotherapists can create more precise and effec-

tive treatment plans. This holistic approach not only eliminates symptoms but also helps prevent recurrence of problems, significantly enhancing the patient's function and quality of life.

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#### Measurement of pelvic floor muscle load in motion

Introduction: The femfit\* (version 3.0) is a pressure sensor array designed to measure intravaginal (IVP) and intraabdominal (IAP) pressure simultaneously (ref). It consists of eight pressure sensors which measure pelvic floor activation pressure (sensors 1-6) and abdominal pressure, (sensor 7 – 8). The primary aim of this study was to measure IVP and IAP using femfit\* during selected sports activities in female elite athletes with and without stress urinary incontinence (SUI) and determine if there was a difference between the two groups.

Materials and methods: This was an observational pilot case-controlled study. Ten female elite athletes five with and five without SUI were included from local sports clubs. SUI was determined using the International Consultation on Incontinence Questionnaire. Institutional ethical approval was obtained for the study. Each participant had their own femfit® as it is a single user device, which was self-inserted according to the instructions - to insert it like a tampon. Measurements of IVP and IAP were carried out during the following sport activities: jumps on the ground up to 10 cm during 30 seconds, relaxation for 30 seconds, jumps on a trampoline up to 20 cm during 30 seconds, relaxation for 30 seconds, weightlifting with 25% of body weight (60 kg weight of the athlete corresponds to a load of 15 kg) during 30 seconds, relaxation for 30 seconds, slow running during 30 seconds, relaxation for 30 seconds, fast run during 30 seconds, relaxation for 30 seconds.

**Results:** The highest mean intravaginal pressures among the 10 participants were recorded when jumping on the ground

and the trampoline (53.7  $\pm$  21.6 mmHg), followed by fast and slow running (24.7  $\pm$  8.0 mmHg), with the lowest mean intravaginal pressures measured during weightlifting (11.6 ± 4.0 mmHg). The intraabdominal pressures measured followed the same pattern, all sports activities tested, intravaginal and intraabdominal pressures were higher in the group without SUI than in the group with SUI, but the differences were not statistically significant. In this pilot study, the athletes without SUI were able to generate higher intravaginal pressures overall, when compared to the group with SUI. The ability of the pelvic floor to respond sufficiently to increases in abdominal pressure, during high intensity activity appears to be less in those athletes with SUI. The higher intravaginal and abdominal pressures measured during trampolining corresponded with the most amount of urine leakage in those athletes with SUI, suggesting a negative impact on the pelvic floor during this activity. Nonetheless, the ability of femfit® to measure a vaginal pressure profile during activity is encouraging for a larger trial in these two groups.

Conclusions: The femfit\* pressure measurement during sports activities revealed lower intravaginal pressures in the female elite athletes with stress urinary incontinence, when compared to those without. These results imply that it is important to recognize the impact of different sporting activities, on pressure profiles and their potential impact on pelvic floor function.

Keywords: pelvic floor muscle load, motion

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### The effect of spinal cord stimulation on gait in patients with Parkinson's disease: a review

Introduction: Parkinson's disease (PD) is a neurodegenerative disease manifesting symptoms such as muscle stiffness, tremors, postural disorders, and abnormal gait, which increases the risk of falls. In recent years, there has been an increasing number of studies investigating the effect of spinal cord stimulation (SCS) in PD to improve motor functions, including gait. The study aimed to analyze the literature to assess the effectiveness of SCS in gait in patients with PD. Material and methods: A literature review was conducted using the PubMed database, using the following keywords: "Parkinson's disease," "spinal cord stimulation," and "gait." The obtained articles (n=84) were assessed using the inclusion and exclusion criteria. Finally, 6 studies were qualified for the review.

**Results:** A total of 63 patients with PD were included in the studies; the average age of the patients was about 59 years, and the average duration of the disease was 11.7 years. The

studies used classical implanted spinal cord stimulators and transcutaneous magnetic spinal cord stimulators. The analyzed articles assessed the effect of SCS on: the risk of falls (TUG), freezing of gait (NFoG-Q), walking speed (10MWT), and the level of movement disorders (UPDRS - III).

#### Conclusions

- 1. Spinal cord stimulation may be a promising intervention to improve gait in patients with Parkinson's disease. However, due to the small number of reports of ambiguous results, different methodologies, and too small a number of participants, caution should be exercised when formulating final conclusions.
- 2. Further studies with a unified methodology including randomization, the presence of control groups, standardized assessment tools, and a larger number of patients are indicated. **Keywords:** gait, Parkinson's disease, spinal cord stimulation, physiotherapy, rehabilitation

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# Comparison of body posture assessment methods according to Kasperczyk and according to SzOP (the Detailed Posture Assessment) on the example of children of younger school age

Introduction: The aim of the study is to compare the sensitivity of two diagnostic methods, the Kasperczyk method and SzOP (the Detailed Posture Assessment) method, in detecting posture defects in children of younger school age. The study aims to determine which of these methods is more effective in identifying posture defects in different body planes. Material and Methods: The analysis included 32 participants aged 10 to 12 years, who were assessed for body posture using two methods, the point method according to Kasperczyk and SzOP method. The Kasperczyk method is based on a point analysis of body elements in three planes, while the SzOP combines a body assessment with a visual comparison of correct and incorrect postures. A confusion matrix was used to assess the effectiveness of both methods, analyzing their sensitivity and specificity in identifying posture defects. Results: The analysis included 32 participants, with whom

416 diagnoses were performed using the Kasperczyk method and 480 diagnoses using SzOP method. The Kasperczyk method showed varied diagnostic efficacy, with the highest accuracy in the assessment of the sagittal and posterior frontal planes, but low efficacy in the anterior frontal plane. The SZOP method achieved 100% accuracy in all analyzed areas, which suggests its high precision in diagnosing body posture. Conclusions: Although the hypothesis was accepted that the Kasperczyk method allows for a more accurate description of postural defects, it turned out that its low specificity leads to frequent false positive diagnoses. Although this method is effective in excluding irregularities, its precision in detecting actual postural defects is lower compared to the SzOP. SzOP method proved to be particularly useful as a tool for initial diagnosis.

#### Havronska Adriiana, Korytko Zoryana

#### Evaluation of the effectiveness of physical therapy in children with leggcalve-perthes disease

Introduction: Legg-Calve-Perthes disease (LCP) is a serious orthopaedic disease that is often detected in children aged 4 to 12 years. It is associated with the death of bone tissue in the head of the femur. Patients with this disease are at high risk of serious complications, such as hip deformity, which can limit their movement and impair their quality of life (QL). The increasing number of cases of LCP among primary school boys requires a patient-centred approach to their rehabilitation. Therefore, the aim of this study was to evaluate the effectiveness of a differentiated approach to the physical therapy programme for children with LCP to improve their functional status and QL.

Materials and methods: Two groups of boys aged 5-11 years with LCP were examined. The control group (CG, n=10) received standard physical rehabilitation, and the comparison group (CG, n=10) received an individual programme developed taking into account the specific needs of each child at the request of parents. In all patients, the baseline level of morphological and physiological parameters, QL according to the PedsQL questionnaire, the level of pain according to the VAS scale, and the condition of the hip joint according to goniometry and manual muscle testing

(MMT) were studied. Both programmes included a set of exercises aimed at restoring joint mobility, strengthening muscles and developing coordination in combination with a game method. The duration of the rehabilitation intervention was two weeks (10 sessions of 45 minutes each). Dosing of physical activity was based on adequacy criteria for various systemic indicators.

Results: A significant improvement in physical activity was observed at the second examination, which was confirmed by the results of an objective examination. In children, the amplitude of movements in the affected joint increased (by 40-50%, p<0.01); muscle strength indicators improved according to the MMT (by 25-35%, p<0.05); pain sensation decreased according to the VAS scale (by 50-65%, p<0.01). Patients increased the reserve capacity of the cardiovascular system, improved QL and general health.

**Conclusions:** Thus, further research will help to improve the optimal parameters of the rehabilitation programme in order to reduce the manifestations of the disease and improve the quality of life of young patients.

**Keywords:** Legg-Calve-Perthes disease, children, rehabilitation.

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### Rehabilitation – an alternative non-drug intervention for the treatment of peripheral neuropathy induced by chemotherapy

Introduction: Malignant neoplasms are a complex problem in the healthcare system. Various treatment methods are used: surgical, chemotherapy, radiotherapy, immunotherapy, targeted, and hormonal therapy. One of the most effective methods is chemotherapy, which affects not only tumor cells but also healthy cells, and provokes complications that worsen the functional activity and quality of life of patients. The most common side effects of chemotherapy include chemotherapy-induced peripheral neuropathy (CIPN). This is damage to peripheral, sensory, motor, or autonomic nerve fibers, and spinal or cranial nerves.

Material and methods: Analysis and generalization of scientific and methodological literature on scientifically based

databases PubMed and Cochrane Library.

Results: Depending on the nature of the damaged nerve fibers, three groups of symptoms of CIPN are distinguished: sensory (numbness, tingling, allodynia, hyperalgesia, paresthesia, dysesthesia, complete loss of sensitivity), motor (peripheral weakness of the limbs up to bilateral drooping of the wrists or feet, impaired balance and gait, seizures, decreased tendon reflexes) and, less often, vegetative. The onset of CIPN symptoms usually occur during the treatment itself, within a week after chemotherapy and persists for several months or years after the end of chemotherapy.

The manifestations of CIPN depend not only on the nature and dose of the chemotherapy drugs used, but also on age and concomitant symptoms. CIPN is objectively assessed by assessing nerve function, quantitative sensory tests, clinical and rehabilitation examinations, and subjective measurements (questionnaires, scales).

Pharmacological strategies for the treatment of CIPN are very limited. The role of physical therapy in the treatment of CIPN is often overlooked and is not included in general oncology studies, and has not been studied enough to date. However, the work of a number of authors clearly indicates that in the absence of drug treatment, for patients suffering from CIPN, the use of physical therapy is important, which allows reducing, alleviating or compensating for existing symptoms and motor disorders.

According to the analysis conducted by Esther A. (2020), and others, therapeutic exercises (aerobic, resistance exercises, strength, a combination of sensorimotor exercises, yoga, aerobics, etc.) are most often used to alleviate the symptoms of CIPN.

Therapeutic exercises generate significant reductions in symptoms of CIPN in patients during short- and long-term follow-up. According to Snehil Dixit et al., exercises are highly effective in improving pain threshold and moderately effective in improving other symptoms of CIPN, but there is little evidence for improving tactile and vibration sensitivity. According to N.H. Seth, I. Qureshi, strength and resistance training exercises, endurance training, stretching, and nerve glide exercises have a positive effect on the quality of life, balance, pain, and

muscle strength in patients with CIPN. Strength training and balance exercises reduce symptoms of peripheral neuropathy, improve balance, and increase muscle strength without side effects in cancer patients. Closed kinematic chain exercises from a variety of starting positions significantly improve balance and quality of life in patients with CIPN. According to most scientists, exercises should not be prescribed in isolation, therefore, manual therapy methods, in particular massage, are effective in the treatment of CIPN. Prophylactic cryotherapy or compression therapy, which is used to prevent CIPN, reduces the risk of reducing the dose of chemotherapy. In world practice, physical therapists also use electrotherapy methods (electrical stimulation, photobiomodulation, vibration therapy, transcutaneous electrical nerve stimulation (TENS)), etc. to treat the symptoms of CIPN. Neurodevelopmental methods, such as sensorimotor training, are also used to alleviate the symptoms of peripheral neuropathy in cancer patients.

Conclusions: CIPN is a complication of chemotherapy that worsens the quality of life of cancer patients and can provoke a reduction in the doses of chemotherapy drugs, which will worsen the effectiveness of treatment. To alleviate the symptoms of CIPN, physical therapy is used, among which physical exercises, massage, electrophysiological methods are most often recommended and should be used in combination.

**Keywords**: chemotherapy-induced peripheral neuropathy, exercises, physical therapy.

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#### Psychoneuroimmunology in the context of health and disease

Psychoneuroimmunology is a scientific discipline that studies the ways in which the psyche – the mind and its emotions – and the nervous system of the body interact with each other. It is about the interaction between the body and the mind, an indestructible bond of emotions, physiology in human development throughout life, in health and in disease. The immune system does not work in isolation from our everyday experience.

The mind is an inseparable part of the body, and the body is equally an inseparable part of the mind. Some experts have come up with the concept of bodymind to express the true nature of things. From a physiological point of view, emotions are electrical and hormonal discharges of the human nervous system. Emotions affect the functioning of the main organs and the action of many biological substances that

circulate in the body and help control its physical state. The connection between the body and the mind must be perceived not only in order to understand the occurrence of diseases, but also the nature of health. If there is a connection between emotions and physiology, and if we do not inform people about it, we are depriving them of a very effective tool. Healing depends on experiential knowledge - full control over your life, acknowledging the reality of your body with all its animal dimensions. Stress occurs when our daily criteria are not met, which leads to a disruption of homeostasis. It is emotional competence that we need to acquire in order to heal.

**Keywords:** psychoneuroimmunology, health, disease, stress, rehabilitation, emotions, brain

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### Recovery of gait in a patient with opticneuromyelitis in the post-acute period of rehabilitation.

**Introduction.** Studies show that in Europe, the incidence and prevalence of opticaneuromyelitis ranges from 0.05 to 0.4 per 100,000 people. Average age of onset (32.6–45.7) and average time to first relapse (8–12 months). In the case of the more common recurrent form of the disease, which accounts for 80% to 90% of cases, women are overrepresented by a ratio of 5 to 10:1 over men.

Deterioration of gait function is one of the most common problems in patients with demyelinating diseases of the central nervous system. Gait is important for independence in daily activities and is essential for mobility and maintaining a person's overall health. Gait disorders lead to falls and fall-related injuries.

Gait disturbance in patients with demyelinating diseases of the central nervous system is one of the most critical factors that impairs the quality of life.

Gait dysfunction in this disorder is characterized by a decrease in gait speed, walking endurance, step length, as well as an increase in the metabolic costs of walking and an increase in gait variability.

**Material and methods:** aim of our study is to determine the impact of a physical therapy program aimed at restoring

walking in a patient with opticneuromyelitis.

Participant of our study: a 48-year-old woman diagnosed with opticneuromyelitis 1 year ago. According to the International Classification of Functioning (ICF) at the level of activity requires the assistance of one person in carrying out all types of movement and requires the full support of one person and the use of assistive devices when walking. During the examination of the patient, it is planned to use the following clinical tools: SCIM, manual muscle testing, modified Ashworth muscle spasticity scale, sensitivity examination, proprioception examination, "Up and go" test, 10-meter walk test, Berg balance scale, 6-minute walk test (6MWT), observational gait analysis.

Physical therapy measures will be aimed at practicing independent movement skills within the confines of the bed, selecting and teaching the use of assistive devices, increasing the muscle strength of the lower extremities, training endurance while walking and training balance.

**Expected results:** complete independence in carrying out all types of movement, independent use of aids, independent walking and increased muscle strength of the lower limbs. **Keywords:** physical therapy, opticneuromyelitis, gait.

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### Utilization of occupational therapy in outpatient rehabilitation care for patients with low back pain

Introduction: Musculoskeletal pain, including vertebrogenic pain, is among the most common reasons for visits to general practitioners and specialized clinics. Vertebrogenic conditions most frequently affect adults of working age; however, the age of affected patients is steadily decreasing. The importance of comprehensive healthcare, including therapeutic rehabilitation, occupational therapy, and preventive measures, is growing. Despite the crucial role of occupational therapy in rehabilitation, its use in outpatient practice in Slovakia remains limited. The aim of this study is to analyze the impact of therapeutic rehabilitation and selected occupational therapy interventions on pain, spinal mobility, and the abili-

ty to perform daily activities in a patient with low back pain. **Material and methods:** The research was conducted as a case study that included measurements, assessments, testing, a questionnaire survey, and comparisons of baseline and follow-up values. Disability was evaluated using the Roland-Morris Disability Questionnaire (RMDQ), and quality of life was assessed using the Sheehan Disability Scale, which covers work, social life, family life, and household responsibilities.

**Results:** The findings demonstrated a reduction in disability caused by low back pain, improved spinal mobility, and enhanced quality of life across all evaluated areas.

Conclusion: The results of this case study confirm the beneficial effects of therapeutic rehabilitation and targeted occupational therapy interventions on the health status of a patient with low back pain. These findings highlight the potential for broader application of occupational therapy in outpatient rehabilitation practice. The significance of occupational therapy

apy interventions lies in correcting disrupted lifestyle habits, supporting successful adaptation to new conditions, and positively influencing the overall health of patients.

**Keywords:** low back pain, lumbar region, physiotherapy, occupational therapy

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### Analysis of the relationship between subjective clinical results and objective gait analysis indicators in patients after total knee replacement

**Introduction:** Total knee replacement (TPK) is an effective method of treating advanced degenerative changes, but the process of evaluating its results requires both subjective and objective parameters. The purpose of this study was to evaluate the correlation between the results of subjective clinical scales and the parameters of objective gait analysis, including the Gait Deviatation Index (GDI) and Gait Variability Index (GVI) in patients after total knee replacement.

Material and methods: The study group consisted of 50 patients diagnosed with unilateral symptomatic knee osteoarthritis who underwent cementless endoprosthesis with posterior cruciate ligament retention. Patients' ages ranged from 52 to 79 years, with a mean of 67.4 years. Subjective assessment was performed using scales: Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), The Knee Society Score (KSS) and Visual Analog Scale (VAS).

Objective using the BTS Smart motion analysis system.

Results: The results show a clear improvement in subjective and objective parameters after TPK, but correlation analysis between the two showed limited correlation. The strongest correlation was observed between the functional subscale of the KSS and the GVI index, suggesting that the subjective functional assessment may be the most adequate reflection of changes in gait analysis. Despite the improvement, patients' gait parameters remain lower compared to the control group, indicating the need for further rehabilitation. These findings underscore the importance of a comprehensive approach to assessing the effectiveness of TPK, taking into account both patients' subjective experiences and objective kinematic measurements.

**Keywords:** total knee replacement, gait deviation index, gait variability index, clinical evaluation

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### The impact of exercise rehabilitation on the quality of life of patients with hematological cancers -review

Introduction: Hematological cancers occupy the 5th place among the most frequently diagnosed cancers. This group of diseases includes leukemia, lymphoma and plasmocyte myeloma. Due to the aggressive course of this group of diseases and intensive treatment methods, patients often experience deterioration in physical fitness, pain symptoms and fatigue. Therefore, it is important to evaluate the possibility of improving the quality of life of patients with hematological cancers by means of exercise rehabilitation methods.

Material and methods: Descriptive systematic review using articles available in the PUBMED database. The keywords "hematologic cancer," "exercise rehabilitation" were used in the search. Articles from 2023-2024 were considered.

**Results:** After analyzing the content, three articles corresponding to a chosen topic were selected. According to research, complex exercise interventions based on aerobic and resistance training resulted in greater improvements in physical fitness compared to standard level of care. Movement re-

habilitation improved physical fitness, increased oxygen capacity and muscle strength, and also reduced the intensity of pain and anxiety. These benefits were the same in patients of all ages except pain and physical fitness, which the younger group of patients experienced greater improvements. Physical exercise produced better results when performed at medium and high intensity compared to low intensity.

Conclusions: Physical exercise improves the quality of life and physical fitness of patients with hematologic cancers. People diagnosed with hematological cancer should participate in physical rehabilitation using both aerobic and resistance exercise.

**Keywords:** exercise rehabilitation, hematological cancer, physical exercise

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### Physical therapy in preparation for prosthetics for a patient with amputation of four limbs

**Introduction:** The rehabilitation of military personnel because of conflicts or traumatic events is an urgent and important task for the healthcare sector. Unfortunately, due to active hostilities in Ukraine, the number of wounded military personnel and civilians who require proper assistance from various specialists within a multidisciplinary rehabilitation team is increasing every day.

According to studies, limb injuries are predominant in the overall structure of injuries among ATO and JFO participants, accounting for 62.5%. According to Bespalenko's research, the absence of one limb due to amputation was observed in 84.3%, double amputation in 13.7%, and triple amputation (two lower and one upper limb) in 2.0%. The main cause of amputation was mine-blast wounds, which accounted for 78.4%. It was found that the lower limb was damaged more often at a rate of 62.22%, compared to 37.78% for the upper limb. In the structure of amputations, the thigh and lower leg were the most affected, each accounting for 29.31%, followed by the foot at 15.52%, the hand at 13.79%, the forearm at 8.62%, and the shoulder at 3.45%.

Physical therapy for military personnel with amputations is a complex and multifaceted process aimed at restoring physical functionality, psychological comfort, and social integration. Timely application of physical therapy can significantly speed up the process of returning servicemen to a full life.

Material and methods: The aim of our study is to determine the effect of a physical therapy program in preparation for prosthetics in a patient with four limb amputations. The participant in our study is a man who underwent amputation of both upper limbs at the level of the upper third of the forearm and amputation of both lower limbs at the level of the middle third of the tibia. According to the International Classification of Functioning (ICF) at the activity level, he is completely dependent on self-care tasks, such as dressing and undressing, eating and drinking, and maintaining body

hygiene. He has no movement capabilities in and out of bed. The examination will take place before and after the rehabilitation intervention. The following clinical instruments will be used during the examination:

- 1. The Barthel Activities of Daily Living Scale to determine a person's ability to perform activities of daily living and the level of assistance needed.
- 2. Trunk control test (TCT) to assess the patient's mobility in bed.
- 3. Goniometry to assess the active range of motion in the elbow and knee joints.
- 4. Manual muscle testing (MMT) to assess the strength of the muscles in the upper and lower limbs.
- 5. Measurement of the circumference of the stumps with a centimeter tape to assess the reduction of edema.
- 6. Analysis of the wheelchair skills test (WST) with a power chair to assess the ability to ride a wheelchair.
- 7. Visual analog pain scale (VAS) to evaluate the intensity of phantom pain in the upper and lower limbs.

Physical therapy measures will focus on improving functional mobility, increasing the range of motion in the knee and elbow joints, enhancing muscle strength in the upper and lower limbs, teaching skills to operate a wheelchair with an electric drive, forming the stumps of the upper and lower extremities in preparation for prosthetics, and reducing swelling as well as managing pain in the limbs.

Expected results: Restoration of normal active range of motion in the knee and elbow joints, increased muscle strength in the upper and lower extremities, successful formation of the stumps of the upper and lower limbs, and improvement of functional mobility and skills in using a wheelchair with an electric drive.

Keywords: physical therapy, amputation, preparation for prosthetics.

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#### Hippotherapy in children and adolescents with autism - literature review

Introduction: Hippotherapy is one type of animal-assisted intervention and is an alternative method of treatment. Equine-assisted therapies can include horseback riding, feeding and grooming, or simply the physical presence of a horse during a therapy session. Numerous benefits are noted with horseback riding may be physical, social, behavioral, emotional, sensory and cognitive. The purpose of this article was to evaluate the effectiveness of using hippotherapy with children and adolescents on the autism spectrum.

Materials and methods: The Pubmed database and Google Scholar search engine were searched. The review included papers published in the years: 2019-2024. The basis of the search was the keywords: autism spectrum disorder, animalassisted intervention, hippotherapy, therapeutic horseback riding. The necessary criteria for inclusion in the study were: the age of the patients from 6 to 12 years old, a clinical diagnosis of ASD, the ability to understand and follow simple commands, the informed completion of written consent from a guardian or parent, and the voluntariness of the children to participate in the study. Exclusion criteria were any serious medical condition, especially neurological (e.g., cerebral palsy, epilepsy) and orthopedic (fracture, serious trauma), and manifestations of disturbing behavior (e.g., putting the child at significant risk to himself or those around him). During the literature analysis, case reports and pilot studies were discarded. Four articles were considered for final evaluation.

**Results:** The first publication analyzed examined the impact of equine-assisted therapy on children and adolescents with autism. Positive observations were made across the

physical, social, behavioral and emotional spectrum. They showed positive effects throughout the intervention and in comparison with other control groups. The following article examines the effects of a therapeutic horseback riding program on social interaction and communication skills in children with autism. The Social Skills Rating Scales were used to assess the social skills of children with ASD. The potential role of hippotherapy as an effective complementary intervention approach for children with autism was noted. In the following article, each child underwent 20 individual weekly sessions lasting 45 minutes. Both before and after the 20 sessions, the children's psychosocial, neurocognitive and neuromotor abilities were assessed using questionnaires completed by parents. It was noted that hippotherapy was associated with improvements in adaptive behavior and coordination. In a recent publication, based on interviews with parents and hippotherapists, it was found that after therapy, children showed physical improvement, improved social skills and sense of responsibility, desensitization to stimuli, and improved communication skills and selfconfidence.

Conclusions: The results of the analyzed articles show that the introduction of hippotherapy into the treatment of children on the autism spectrum can contribute to better therapy results. There is a need for further studies with similar methodology. However, the presented results provide a favorable outlook on the use of hippotherapy for children on the autism spectrum.

**Keywords:** Autism spectrum disorder, animal-assisted intervention, hippotherapy, therapeutic horseback riding

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#### The use of virtual reality systems in frailty syndrome rehabilitation

**Introduction:** Frailty syndrome is a condition in older adults characterized by a decrease in the reserve capacity of multiple body systems and a reduced ability to cope with stressors associated with aging. Clinical indicators of physical frailty include decreased muscle mass, muscle weakness, slower movement, rapid exhaustion, and low physical activity levels.

The treatment of frailty syndrome is multi-component and incorporates various therapeutic approaches, such as virtual reality (VR) training. This study aimed to analyze the literature to evaluate the effectiveness of VR in the rehabilitation of older adults with frailty syndrome.

Materials and Methods: A literature review was conduct-

ed using four databases: PubMed, ScienceDirect, Scopus, and Web of Science. The search was performed using the following keywords: frailty syndrome, older adults, virtual reality, rehabilitation, and physiotherapy. A total of 1,295 articles were identified and assessed based on inclusion and exclusion criteria.

Results: After the initial database search and assessment of eligibility, six articles were included in this study. All six of the identified articles focused exclusively on the use of non-immersive virtual reality, highlighting a significant gap in the literature regarding the use of immersive virtual real-

ity training for patients with frailty syndrome.

Conclusion: Virtual reality offers significant benefits for the rehabilitation of frailty syndrome. Current evidence suggests that non-immersive VR therapy effectively improves the functional status of patient. Given the limited research on immersive VR, future studied should prioritize examining its capabilities. These studies are crucial for uncovering the full potential of this technology and establishing its role in designing evidence-based therapeutic interventions. Keywords: frailty syndrome, older people, virtual reality, rehabilitation

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### Comprehensive physiotherapy treatment for tension-type headaches - a case report

**Introduction:** Headaches are a serious problem in society, both health and economic. The etiology usually remains unknown. A significant percentage of patients seek help from a neurologist. Excluding the origin of pain related to the pathophysiology of the nervous system or vascular diseases, in differentiating the causes, overloads and tensions of muscles and soft tissues can be taken into account.

Material and methods: A 43-year-old man diagnosed with migraine in 2016 without significant improvement after pharmacological treatment underwent acupuncture therapy, obtaining partial relief of headaches for a period of several months. After the recurrence of symptoms, he used instrument therapy using a multi-needle applicator and the KAT instrument for six months in the range of muscles and soft tissues of the head and neck. In addition, he performed kinesitherapy. Before starting the therapy, palpation assessed

the mobility of the head muscles as poor. Increased tension of the scalene and trapezius muscles was also found.

**Results:** After a series of 15 treatments performed once a week and a similar series repeated after a 2-month break, a significant reduction in pain was achieved, combined with a change in the nature of the headache to a degree that did not require the use of NSAIDs. The frequency of pain attacks also decreased from 1-2 per week to 1 attack per month.

#### **Conclusions:**

- 1. Muscle and soft tissue therapy performed with instruments can be helpful in reducing pain and the frequency of migraine attacks.
- Neck muscle stretching prevents contractures and maintains the correct range of motion in the cervical spine, which may have a soothing effect on migraine headaches.
   Keywords: headache,

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### Is there a link between reaction time and sleep quality in professional football players?

**Introduction:** Football, with its dynamic nature, requires players to make instantaneous decisions in rapidly changing situations on the field. As such, reaction time (RT) is a key parameter in evaluating football players. Another crit-

ical factor influencing an athlete's performance and overall health is sleep, as its deprivation can significantly impair skills and physical capacity. The aim of this study was to assess the differences in reaction times between football players and non-athletes and to investigate the relationship between sleep quality and the reaction times exhibited by football players.

Materials and Methods: The study included 40 professional football players (20 women and 20 men) with a mean age of  $21.78 \pm 2.70$  years and an average football experience of  $9.35 \pm 3.67$  years. A control group was carefully matched to the football players based on age, gender, and BMI. Both groups were compared regarding reaction times—both simple and complex—as well as sleep quality.

Results: The results indicated that individuals actively participating in football training demonstrated shorter simple and complex reaction times compared to non-training individuals. However, no statistically significant differences were observed between the groups in terms of sleep qual-

ity assessment (p > 0.05). Furthermore, no correlation between reaction speed and sleep quality was found in either group (p > 0.05).

Conclusions: Football players demonstrate shorter reaction times compared to individuals who do not engage in football training. No significant differences in sleep quality were observed between football players and the control group. Moreover, no relationship between reaction times and sleep quality was identified. Further research is needed to clarify the causal relationship between the analyzed variables, determining whether football training improves reaction speed or if individuals with naturally faster reaction times are more inclined to pursue football as their sport of choice. Keywords: football, physical fitness, reaction time, sleep

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#### Impact of mild brain injury on physical therapy after lower limb

**Introduction:** Over the past 2 years of full-scale war, the military and civilian population have been confronted with shelling of the territory of Ukraine, mining of the frontline territory and other military operations at the front. All of this has become the cause of great traumatization. In particular trauma after mine, mine-explosive, spalls injuries, syndromes of prolonged compression due to collapse of buildings. In the conditions of the unleashed Russian war against Ukraine, this phenomenon is also unprecedented in nature, then there is a massive use of the latest methods of high-energy weapons, the impact of which is very noticeable for everything as a whole, and its effect on the central nervous system is especially noted. The number of cases of brain injury is so large that it has no analogues among other wars of recent hours. Blast injuries can not only result in limb amputation, but also damage brain structures. which in turn can limit users' activities during future physical therapy. Common complaints of such conditions include vestibular disorders, including dizziness, difficulty focusing, hypersensitivity to movement, vertigo, visual disturbances, and balance disorders. Most cases of combat trauma have multiple injuries that require a more individualized and prolonged period of physical therapy. There is an increased risk of additional injury after concussion, the main neuromuscular mechanisms: impaired dynamic balance, low voluntary muscle activation.

**Material and methods:** Analysis of scientific studies on the impact of concussion on the physical therapy process of patients after lower limb amputation. For this study, we used the method of scientific literature analysis. The search was

carried out in the scientific databases PubMed and PEDro. Results: We analyzed scientific studies related to the impact of mild traumatic brain injury on dynamic balance, which plays a significant role in the rehabilitation process of people after lower limb amputations. The inclusion criteria were: a history of mild traumatic brain injury, dynamic balance, and the year of publication of the study 2009-2024 (up to 15 years). 11 scientific studies that met the inclusion criteria were selected for our article. In total, about 210 participants who had mild traumatic brain injury took part in these studies, the average age of the participants ranged from 19 to 40 years. According to the analyzed studies, the impact of concussion on the balance of patients was revealed, which is an important factor in physical therapy of people after lower limb amputation. According to the results of the study (Johnston et al., 2020), patients who had a concussion within the past two years have a deficit in dynamic balance compared to the control group, i.e., sensorimotor control deficits can persist for 2 years. The study (Lynall at al,.2020) also found significant neuromuscular deficits that impaired balance control in patients after mild traumatic brain injury. Conclusions: Analyzing scientific studies on the impact of mild traumatic brain injury on the process of physical therapy, in particular on the balance of patients, we concluded that concussion has an impact on the process of physical therapy for people after amputation of the lower limb, because the equilibrium and balance in this group of patients is reduced, and this concomitant problem will be another additional factor that will affect the process of physical therapy. This review shows that the presence

of concussion as a concomitant problem, which is added to the amputation of the lower limb, will be an additional factor that must be taken into account when drawing up an individual rehabilitation plan for the patient.

**Keywords:** mild traumatic brain injury, physical therapy, amputation, analysis, balance.

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#### Specialized physiotherapeutic treatment after knee arthroplasty

**Introduction:** At the turn of the last decades, there has been a rapid development of technology, which has resulted in revolutionizing the methods of diagnosis and, above all, therapy of the most common diseases of the musculoskeletal system. For many patients, this disease poses a threat to their health and even life. Therefore, to prevent these consequences, multidirectional and comprehensive actions should be introduced. And the challenge is befitting the 21st century, because the achievements of recent years, especially in the field of modern physical medicine and orthopedics, have resulted in more and more patients returning to full fitness after serious and complicated injuries, diseases and accidents. Properly planned and skillfully conducted professional and properly directed physiotherapy is important in this respect. Degenerative disease of the musculoskeletal system is becoming a serious problem not only medical, but also economic in today's highly developed civilization.

Material and methods: Specialized physiotherapeutic treat-

ment after knee arthroplasty is based on many years of observation and rehabilitation of patients in the hospital ward and during outpatient rehabilitation. Patients were monitored by physiotherapists both during rehabilitation and in their free time. More than 500 patients took part in the medical project in 2022-2024.

Results: Based on many years of careful observation of patients. A significant increase in the overall efficiency and mobility of patients after implantation of a full knee prosthesis was noticed and observed over time. Moreover, it was noted that patients after comprehensive rehabilitation performed everyday activities with greater ease.

**Conclusions:** Comprehensive physiotherapeutic treatment results in: a reduction in pain, an increase in joint mobility, an increase in both muscle strength and endurance, ease of performing various daily activities, and a significant increase in the comfort of life.

Keywords: degenerative disease, arthroplasty, physiotherapy.

#### Kluszczyński Marek

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### Early specific rehabilitation of idiopathic scoliosis based on the concept of deep spinal muscle dystonia using the GraviSpine device

Current research indicates that idiopathic scoliosis can be defined as a multifactorial, subclinical disease of the nervous system manifesting itself in the musculoskeletal system. This approach provides the possibility of using the functional plasticity of the nervous and musculoskeletal systems to obtain a therapeutic effect in order to inhibit the development of IS. The method of spinal reflex balance (SRB) is the result of many years of clinical experience and research and was created on the basis of the hypothesis that IS can be initiated by disturbances in the resting tension balance of the deep muscles of the spine, e.g. the transverse-spinous muscles, a type of muscle dystonia. The presented SRB method aims to achieve a balance of the resting tension of the deep stabilizer

muscles, by symmetrizing afferent stimuli from sensory proprioceptors, position, movement and stretch reactions from the deep paraspinal muscles, connective tissue structures of the perivertebral spine and the pelvic girdle. The SRB method focuses on the use of early specific rehabilitation through the use of selected exercises from known specific physiotherapy methods (PSSE) Dobomed, Schrott, SEAS and Lyon and specially developed massage, i.e. a type of neurostimulation of paraspinal muscles. In addition, asymmetric breathing exercises are used combined with passive correction of curvature in antigravity relief on the GraviSpine device.

#### Knap V. 1,3, Ištoňová M. 1,3, Ondová P.1, Rimárová, K. 2

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#### Medial Tibial Stress Syndrome (MTSS) - prevention and physical therapy

Medial Tibial Stress Syndrome (MTSS) is a common overuse injury of the lower extremity presents as exercise-induced pain over the anterior tibia. The occurrence of this syndrome is most common in runners and other athletes, that are exposed to intensive weight-bearing activities such as jumpers. Common names for this problem include tibial stress syndrome, shin splints, soleus syndrome and periostitis. The incidence of MTSS ranges between 14% to 20% in runners, up to 35% in military personnel and in dancers it is present in 20% of the population. The pathophysiologic process resulting in MTSS is related to unrepaired microdamage accumulation in the cortical bone of the distal tibia, however this has not been definitively established. The pain is secondary to inflammation of the

periosteum as a result of excessive traction of the tibialis posterior or soleus, supported by bone scintigraphy findings of a broad linear band of increased uptake along the medial tibial periosteum. Prevention of MTSS includes the use of shock-absorbing insoles, pronation control inserts, and graded running programs. Patient education and a graded loading exposure program seem the most logical treatments. Conservative therapy should initially aim to correct functional gait, and biomechanical overload factors. The development of new technologies brings us modern and effective methods of treating Medial Tibial Stress Syndrome (MTSS) using physical therapy.

**Keywords:** Medial Tibial Stress Syndrome. Prevention. Physical therapy.

#### Konderla Michał<sup>1</sup>

<sup>1</sup>Śląskie Centrum Reumatologii, Ustroń

#### Evaluation of the effectiveness of sanatorium treatment of spinal pain

Introduction: Spinal pain is an important therapeutic problem of modern medicine and poses difficult choices for therapists in selecting appropriate treatment methods. Treatment should be directed at the cause of the disease, the period of the disease, and adjusted to the age, capabilities of the patient, as well as comorbidities. The overall procedure is aimed at reducing pain, maximally improving and maintaining the best possible patient fitness. Spa treatment is becoming very important, as it complements the treatment and stimulates reserves and regenerative processes. It is characterized by the use of naturally occurring medicinal products such as: climate, medicinal waters, diet and peloids. The aim of the study is to assess the effectiveness of the treatment of spinal pain among patients on a therapeutic stay in a sanatorium. Material and methods: The study involved 107 people, including 52 women (48.6%) and 55 men (51.4%) aged 26-57. The condition for inclusion in the research group was patients diagnosed with pain in individual spine sections not treated surgically in the chronic stage of diseases. The entire group underwent comprehensive rehabilitation. The research tool was the Oswestry questionnaire.

Results: Summarizing the issues of cervical spine fitness using the Oswestry questionnaire, the average before treatment was 16.77 points, and after treatment the average score decreased to 14.87 points. With the increase in the BMI, the intensity of the pain experienced increased. The average assessment of the fitness of the lower spine before treatment was 36.12%, and after treatment the average score decreased to 32.96%. The BMI had an impact on the level of pain experienced while sitting. The higher the body mass, the greater the discomfort while sitting.

**Conclusions:** Sanatorium treatment reduced the declared disability index and reduced the level of pain intensity.

Keywords: sanatorium treatment, spinal pain, physiotherapy

#### Korabiewska Izabela, Żerebiec Piotr, Czapłygin Andrzej, Żerebiec Jakub

Warszawski Uniwersytet Medyczny, Terapia Manualna Zamość Piotr Żerebiec, Samodzielny Publiczny Szpital Wojewódzki im. Papieża JP II w Zamościu, Uniwersytet Medyczny w Lublinie

#### Foot therapy in a holistic approach.

Following the topic delivered at the conference last year , "Lymphatic drainage and the membrane systems of the body" and the suggestion to develop it, we decided to focus on a more detailed discussion of the individual membranes, with a special emphasis in the current year, the lowest membrane, accumulating all mechanical disorders of the body the plantar cleft, foot and shin structures.

The concept of transverse membranes of the body was formed as a result of the analysis of anatomical and physiological relationships. The basis of the work is a thorough assessment of tensions (restrictions) in musculo-fascial structures, which are of key importance in the formation of dysfunctions. The lecture will pay special attention to the discussion of spe-

cific structures and mechanisms of the foot namely:

- Windlass mechanism anchoring of the foot,
- the functioning of the Hendricx shock absorber, as the most significant shock absorbing structure of the foot,
- the importance of the lower ankle joint for the biomechanics of the foot,
- the influence of the tarsal sinus on the proper distribution of fluids within the foot,
- the importance of the Chopart joint and Lisfranc joints for the proper function of the dome of the foot,
- Schwartz shock absorber a mechanism to prevent, "back sliding".

#### Kopytko Solomiia, Bas Olha

Lviv State University of Physical Culture named after Ivan Boberskyj

### Physical therapy for secondary lymphedema of the upper extremities after mastectomy (case report)

Introduction: Mortality from malignancy has decreased as significant advances in treatment have been achieved. Treatment of malignancy may include surgery, radiotherapy, chemotherapy, or a combination of methods. Secondary lymphedema occurs as a consequence of treatment for malignancies. The most common is lymphedema of the extremities. This condition is accompanied by swelling, pain, and limitation of range of motion. Therefore, a long-term complication after cancer treatment, such as lymphedema, can reduce the quality of life and cause disability due to functional impairment. It is important to use physical therapy for people with lymphedema, which is based on the comprehensive use of tools that would contribute to improving the activity of the musculoskeletal system, improving the quality of life and psychological state of the patient.

Material and methods: The study involved a patient who developed unilateral lymphedema of the upper limb 9 months after surgery and radiation for breast cancer. To assess the amplitude of movement, goniometry, measuring contours with a centimeter tape, and assessing pain using the VAS scale were used.

**Results:** The patient's right upper limb impairment included an increase in the contours of the affected arm compared

to the healthy one, a decrease in the range of motion in the shoulder joint, and increased pain during upper limb movements. As a result, functional limitations in self-care and daily activities arose. The rehabilitation program was implemented three times a week and consisted of therapeutic exercises, manual lymphatic drainage, compression bandaging, which were performed by a physical therapist, and an educational component of skin care training, recommendations for home exercises, and self-management of edema. After completing the intervention program, the patient had a decrease in the circumference of the right upper limb, in the area of the hand by 1 cm, the forearm by 2 cm, and the shoulder by 3 cm. The range of motion of flexion in the shoulder joint increased from 90 degrees to 170 degrees, and abduction increased from 95 degrees to 160 degrees. She resumed her previous activities, returned to work, and was independent in self-control of edema.

Conclusions: The rehabilitation program, which consisted of therapeutic exercises, manual lymphatic drainage, compression bandaging, and an educational component, led to a decrease in functional impairment in a patient with unilateral lymphedema of the upper limb.

Keywords: lymphedema; rehabilitation; physical therapy.

#### Korabiewska Izabela<sup>1</sup>, Kaźmierczak Ewelina<sup>2</sup>, Roguska Katarzyna<sup>1</sup>

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### Assessment of the effectiveness of selected physiotherapy methods in the treatment of cervical spine pain by physiotherapists.

Introduction: Cervical spine pain is now a common phenomenon resulting from degenerative changes and civilization factors, such as insufficient physical activity, sedentary lifestyle, non-ergonomic posture during computer work and rest, and stress. The purpose of this study was to present physiotherapists' evaluation of the effectiveness of selected physiotherapy methods used in the treatment of cervical pain

**Material and methods:** The study group consisted of 79 physiotherapists (60.8% women and 39.2% men) from all over Poland; an electronic survey questionnaire was used for the

study; statistical analyses were conducted using the IBM SPSS Statistics 27 package.

Results: In the treatment of cervical spine pain, physiotherapists preferred TENS currents, heat therapy and laser therapy. Of kinesitherapy, medical functional training, strengthening exercises and stretching exercises were rated best. On the other hand, deep tissue massage was rated higher than classical massage.

**Keywords:** physiotherapist, pain complaints, physiotherapy methods.

#### Koszarska Katarzyna<sup>1</sup>

<sup>1</sup>Student Neurological Club of the University of Rzeszow

# The problem of stigmatization of young patients after stroke and comparison of the recovery process using different therapeutic and behavioral approaches.

Introduction: Stroke, the second most common cause of death and disability worldwide, is increasingly affecting young and middle-aged people. They constitute a different group of patients, are more likely to be stigmatized in society and have lower self-esteem. The purpose of this study is to review the available literature on stigma in this group of patients, the factors affecting it, and to analyze the recovery period using different therapeutic approaches to enable the development of effective and targeted intervention programs. Material and methods: The source articles were taken from the PubMed database of scientific publications from 2021 to 2024. Patients between the ages of 18 and 60 were eligible. They used objective scales to assess stigma (SSS), the Barthel Index (BI), which assesses patients' ability to perform activities of daily living, and the PANAS scale of positive and negative emotions. In addition, a model of recovery using therapy based on Snyder's Hope Theory (SHT) was compared to standard post-stroke management.

Results: The influence of factors such as age, income, degree of disability in daily life, the impact of accompanying positive and negative emotions on the sense of stigma was shown. Comparing the recovery period under standard management and with the use of Synder's Theory of Hope, differences in the effectiveness of rehabilitation measures taken were indicated. The use of health education, establishing goals, building path beliefs and willingness, as well as detailed rehabilitation instructions resulted in better therapeutic effects, return of neurological function and ability to perform activities of daily living were at higher level than in the control group.

**Conclusions:** It is important to recognize the problem and take care of the recovery period multidisciplinarily, because after just one month of such therapy, the results showed significant differences.

Keywords: stroke, SHT, stigma

#### Kotlińska Aleksandra<sup>1</sup>

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### Evaluation of therapeutic response in patients with disorders of consciousness

Introduction: Disorders of consciousness (DoC) have been a major diagnostic, prognostic and therapeutic challenge for several years. By definition, DOC is a state of prolonged, altered (reduced) consciousness that is most often caused by cardiac arrest, traumatic brain injury (TBI), intracerebral hemorrhage, and ischemic stroke. Using neurobehavioral function tests, DOC can be divided into coma, vegetative state or state of minimal consciousness. Until now, a barrier to the development of targeted methods for restoring consciousness in DoC patients has been the lack of markers indicating the effectiveness of therapy. Currently, assessment of therapeutic response is possible through the use of repeated EEG measurements and the so-called "ABCD" model. This scale organizes sequential changes in brainwave recordings into four widely separated categories based on EEG examination to reflect the severity of thalamocortical deafferentation. Model A reflects the most severe brain damage, in which the EEG power spectrum is limited to values below 1Hz, while stage D is dominated by two brain wave frequencies of 8-13Hz and 20-35, which are characteristic of a healthy person. This allows an initial prognostic assessment of the patient, as well as monitoring the progress of therapy. **Material and methods:** work on the basis of the latest (2020-2024) scientific articles in the topic of the effectiveness of monitoring the state of disorder of consciousness using the ABCD model.

Results: The ABCD model in patients with disorders of consciousness has been shown to correlate with behavioral reactivity (measured by total GCS score indicating recovery from TBI) and consciousness (measured by specific scores on GCS subscales). This model allows us to understand the different levels of structural or functional deafferentation that occur in DoC patients, while at the same time, by assessing therapeutic efficacy, it enables the search for new therapies for patients with disorders of consciousness.

**Keywords:** Disorders of consciousness, EEG in DOC diagnosis and monitoring, "ABCD" model, neuromodulation

#### Krzykała Jakub<sup>1</sup>, Kasperkowicz Agnieszka<sup>1</sup>, Adamik Aleksandra<sup>2</sup>, Mikołajczyk Edyta<sup>3</sup>

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#### Soft Tissue Therapy in the treatment of cervical and thoracic spine pain

**Introduction:** Pain in the cervical and thoracic spine, which affects daily functioning, is a common issue arising from lifestyle habits and a lack of adequate prevention. Massage therapy is one method used to alleviate reported discomfort, positively influencing the quality of life of patients. The aim of this study was to evaluate the impact of soft tissue therapy techniques on pain levels and balance parameters.

Material and Methods: The study included 15 women aged 37–58 years with diagnosed cervical and thoracic spine pain. They underwent therapy involving soft tissue techniques over a cycle of 8 weekly sessions, each lasting 30 minutes. Targeted muscle groups of the cervical and thoracic spine, as well as the diaphragm, were treated. Balance and pressure distribution on the FreeMed Posture pedobarographic platform were assessed before and after therapy. Pain levels were evaluated using the Visual Analog Scale (VAS) and Laitinen

Pain Scale (LPS). Statistical analysis was performed using Statistica 13.3 software (Shapiro-Wilk test, Student's t-test, and Wilcoxon test).

Results: After completing the therapy, a statistically significant (p<0.05) reduction in pain levels was observed, as measured by the VAS and Laitinen scales. Significant improvements were noted in the reduction of the CoP sway length and ellipse area in tests performed with both eyes open and closed. Furthermore, pressure distribution on the feet showed substantial improvement.

**Conclusions:** The application of selected soft tissue therapy techniques significantly reduces subjective pain sensations and positively impacts patients' static balance.

**Keywords:** posturography, soft tissue techniques, pain, cervical spine

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### Gait analysis and functional assessment in individuals with cerebral palsy

Introduction: Cerebral palsy (CP) is a nonprogressive neurological disease that is one of the of the leading causes of motor limitations in children. Although damage to the nervous system does not worsen, periods of intense growth often exacerbate problems related to motor skills, physical performance, and motor function, further impeding daily functioning. CP significantly affects children's quality of life, challenging specialists in the search for effective therapeutic methods. Special attention is now paid to innovative technologies, such as robotic systems and advanced rehabilitation devices, which can help improve patients' muscle strength, motor function, and overall performance. This study evaluates the functional improvement and changing gait parameters achieved after a six-week rehabilitation program.

Material and Methods: Eighteen patients with cerebral palsy were evaluated. The group was divided according to the Gross Motor Function Classification System (GMFCS): I- 3, II- 9, and III- 6. Patients' ages were 12- 41 years (mean 11.06). Patients were subjected to a homogeneous technology-assisted rehabilitation program. They began with a warm-up on a stationary bicycle. Subsequently, strength training using elastic resistance on the JUPITER and TELKO device, body weight transfer training on the AFLA and GAMMA platform, gait re-education in an exoskeleton with functional electrostimulation, and training on the Zebris treadmill were applied. The assessment was performed using functional tests: 6 Minute Walking Test (6MWT), UP&GO, and gait analysis using Zebris HP Cosmos treadmill.

Calculations were performed using Statistica 13 software from

TIBCO and PQStat software from PQStat Software.  $\alpha$ =0.05 was used as the level of significance. A result was considered statistically significant when p< $\alpha$ . The normality of the distribution of the variables was tested using the Shapiro-Wilk test. Sphericity was examined using the Mauchley test.

Results: Patients showed a statistically significant improvement in functional tests: a decrease in the time to perform the UP&GO test and an increase in the distance in the 6MWT test. As for gait analysis performed with the Zebris HP Cosmos treadmill, parameters such as sagittal plane deviation, frontal plane deviation, stride length, or gait line length did not change statistically significantly (p>0.05).

Discussion: The results show significant functional improvements in the patients after the intervention. Reduced time to perform the UP&GO test and increased distance in the 6MWT test indicate improved mobility and physical fitness, reflecting better functioning in daily activities. These results are significant, as these tests are considered indicators of fall risk and mobility level. The lack of substantial changes in the other parameters of the gait analysis may be due to the diverse clinical picture of the patients and the small size of the group analyzed. This is the initial phase of the study. The target group is 60 patients, with 20 in each GMFCS group. Conclusions: Technology-assisted rehabilitation improved patients' motor function, stability, and postural control during gait. The lack of significant changes in the other parameters of gait analysis suggests that the improvement was mainly related to movement dynamics rather than modification of the gait pattern.

#### Kupczyk Mateusz<sup>1,2</sup>, Bak Ewelina<sup>1,3</sup>

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# The application of the Montessori Senior Method – Montessori Lifestyle® in working with individuals with Alzheimer's disease and other forms of dementia

Introduction: The Montessori Senior Method – Montessori Lifestyle\*, developed by Dr. Cameron Camp, is an innovative approach to working with older adults diagnosed with Alzheimer's disease and other forms of dementia. It is based on the philosophy of Maria Montessori, adapted from ear-

ly childhood education to meet the needs of seniors. The method focuses on promoting independence and cognitive stimulation. It has been successfully implemented at the "Niezapominajka" Day Support Center in Rzeszów, enhancing the quality of life for individuals with dementia.

Materials and Methods: A literature review and analysis were conducted using PubMed, SCOPUS, and ScienceDirect databases, with the keywords "Montessori," "Alzheimer's disease," "dementia" from 2014 to 2024 in both Polish and English. The collected articles (n=189) were subjected to selection and 17 articles were included in further analysis, focusing on the effectiveness of the Montessori Senior Method. Results: The studies indicate that the use of the Montessori Method can significantly increase seniors' engagement in activities (Douglas & Pędzel, 2022) and improve social interactions (Chan et al., 2021). In terms of mental health the method may improve mood (Bourgeois et al., 2024), reduce agitation (Chaudhry et al., 2020), and address hyperphagic behaviors (Kao et al., 2016). The method has a positive

impact on reducing abnormal eating behaviors, improving eating skills and preventing malnutrition (Zhu et al., 2024). Regarding the impact of the Montessori method on daily activities, further research with larger patient groups is needed (Chaudhry et al., 2020; Wilks et al., 2019).

Conclusions: The use of the Montessori Senior Method demonstrates how an appropriate adaptation of Maria Montessori's ideas can effectively support older adults in maintaining activity, independence, and dignity despite the challenges posed by illness. Further studies on the application of this method in working with individuals with dementia are necessary.

Keywords: Montessori, Alzheimer's disease, dementia.

#### Kushnir Anna, Fedchyshyn Bohdana, Kachmar Oleh, Hrabarchuk Nataliya, Lun Halyna

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### Review of effects of spinal manipulative therapy on neurological symptoms

**Introduction:** Neurological disorders are the leading cause of disability in the world. Neurological

symptoms significantly affect the well-being of the individual. Spinal manipulative therapy (SMT) is a complementary method often used for people with neurological disorders. This study aimed to review the existing literature on the effects of SMT on common clinical symptoms of neurologic disorders and the quality of life.

Material and methods: Narrative review was conducted through the literature published between January 2000 and April 2020 in English. The search was performed across four databases: PubMed, Google Scholar, PEDro, and Index to Chiropractic Literature. We used combinations of keywords related to SMT, neurological symptoms, and quality of life. Studies on both symptomatic and asymptomatic populations of different ages were included.

Results: 35 articles were selected. Evidence for the admin-

istration of SMT for neurological symptoms is insufficient and sparse. Most studies focused on the effects of SMT on pain, revealing its benefits for spinal pain. SMT may increase strength in asymptomatic people and populations with spinal pain and stroke. SMT was reported to affect spasticity, muscle stiffness, motor function, autonomic function, and balance problems, but these studies were limited in number to make conclusions. An important finding was the positive influence of SMT on the quality of life in people with spinal pain, balance impairments, and cerebral palsy.

Conclusion: Spinal manipulative therapy (SMT) may be beneficial for the symptomatic treatment of neurological disorders. SMT can positively affect the quality of life. However, limited evidence is available, and further high-quality research is required.

**Keywords**: spinal manipulative therapy (SMT), literature review

#### Kurobiowski Jakub<sup>1</sup>, Prus Michał<sup>1</sup>, Szmiłyk Michał<sup>1</sup>, Wójcik Beata<sup>1</sup>

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### The Impact of Functional Training on the Incidence of Injuries in Runners

The purpose of this study was to evaluate the impact of functional training on the occurrence of injuries in runners. Research was conducted, and the results provided information on how functional training affects the frequency of injuries resulting from inadequate preparation for engaging in this

type of sport. The impact of individual training components, such as warm-up and final muscle stretching, was assessed. The study was conducted at the Skra Warsaw Sports Club within an amateur running group called «I Run Because I Like It". Data was collected over the course of a year. The

study involved 200 men who regularly engage in running, aged between 30 and 35 years.

The participants were divided into two groups of 100 individuals each. The control group consisted of men who run and regularly attend functional training sessions as a supplement to their running practice. The experimental group consisted of 100 men who run but do not participate in functional training.

Questions addressed participants running experience and frequency of training. Runners were also asked about injuries and rehabilitation. The study used the diagnostic survey method, with a questionnaire prepared specifically for this research. It was observed that functional training improves the condition of the muscular and endurance systems, reducing the frequency of injuries among runners.

The research findings suggest that if stretching and warm-up exercises are regularly omitted, training can become unsafe. The type of running surface is less likely to cause injuries if it is softer. Hard surfaces require significant shock absorption, which increases the risk of injury. To avoid injuries, it is essential to use preventative measures provided by functional training. Injuries cannot be entirely avoided by limiting oneself to running training alone.

Keywords: runners, functional training

Kurobiowski Jakub<sup>1</sup>, Rząd Karolina<sup>1</sup>, Kozak Katarzyna<sup>1</sup> Academic **Supervisor:** Dr. Beata Wójcik<sup>1</sup>, Ph.D. in Health Sciences

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### Episodes of Pain in the Lumbar Spine – Can We Influence Them?

**Introduction:** The aim of this study was to determine the factors influencing the frequency of pain complaints depending on the physical activity undertaken, as well as identifying modifiable factors that could be implemented as part of physioprophylactic measures.

Material and methods: The research sample consisted of 228 individuals aged 18 to 60 years, including 137 women (60%) and 91 men (40%). The main study group included 133 individuals who regularly engaged in physical activity, while the control group consisted of 95 individuals who did not participate in regular physical activity. The research aimed to determine whether regular physical activity affects the frequency of lumbar spine pain and whether parameters such as the duration of physical activity, performing warm-ups before activity, as well as the frequency and type of physical activity, influence the experience of pain. The research was conducted anonymously using a self-designed online survey distribut-

ed via Google Forms between January and September 2023. Results: It was observed that women and individuals working in forced positions are particularly susceptible to pain complaints. Engaging in physical activity was found to reduce the occurrence of lumbar spine pain, especially in overweight and obese individuals, as it significantly reduced the frequency of such episodes. Physical activity-related factors contributing to better outcomes in preventing lower back symptoms include spending leisure time actively, engaging in physical activity for more than 30 minutes daily, ensuring ergonomic movements, and avoiding prolonged forced postures. Physical activity-related factors that did not significantly impact the frequency of lumbar spine pain complaints in the studied group included performing warm-ups before physical activity and the frequency of engaging in physical activity.

Keywords: physical activity, pain, spine

#### Kwarta Julia

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# Physiotherapy for chronic headache and migraine-what techniques can be most helpful? - literature review

**Background:** Chronic headaches and migraines are among the most common ailments that affect people around the world. While both conditions can cause significant discom-

fort, they differ in their causes and nature. Headaches cover a wide spectrum of complaints, from tension headaches to migraines, which are a complex neurological disorder. Mi-

graine is characterized by recurrent, often intense attacks of headache accompanied by symptoms such as nausea, hypersensitivity to light (photophobia) and sound (phonophobia). Although chronic headache and migraine are common health problems, their treatment remains a challenge, and the role of physiotherapy is still not fully understood. The objectives of this study are to evaluate the effectiveness of physiotherapy techniques in reducing the pain associated with chronic headaches and migraines. As well as to determine which therapeutic methods are most effective in alleviating these symptoms. Materials and Methods: Current literature from the PubMed database on the use of physiotherapy in the treatment of headaches and migraines was reviewed. Studies published in reputable medical journals evaluating the effectiveness of various physiotherapeutic methods were analyzed. In particular, manual therapies, physical exercise and relaxation techniques were included. The review made it possible to gather current knowledge on the effectiveness of physiotherapy in alleviating these complaints.

**Results:** Manual therapy is effective in reducing pain, improving quality of life and reducing the need for medication

in migraine patients, without causing serious side effects. Strength training with biofeedback proves more effective in reducing pain in the second and third weeks after the intervention compared to manual therapy, but both methods improve patients' functioning equally well. Muscle relaxation (PMR) reduces the frequency of migraines. And IASTM (instrument-assisted soft tissue mobilization) therapy is effective in reducing the frequency of headaches, improving neck alignment and reducing headache-related disability.

Conclusions: Based on the data presented here, it can be concluded that various treatments for chronic headache offer specific benefits tailored to patients' needs. Manual therapy, strength training with biofeedback, PMR and IASTM differ in their mechanisms of action, but all are effective in relieving symptoms and improving function. Key findings indicate that the choice of method should depend on the specifics of the problem, such as the type of pain, the degree of dysfunction or the patient's goals, and that integrating different approaches can yield even better therapeutic results. **Keywords:** Migraine Disorders, Headache, Physical Therapy Modalities

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## The influence of selected factors on the effects of rehabilitation in terms of mobility and manual function of the hand in people after stroke

**Introduction:** The aim of the study was to assess the influence of age, time since stroke, sex, side of paresis and upper limb dominance on the effects of rehabilitation in mobility and manual function of the hand in stroke patients.

Material and methods: The study included 50 patients with hemiparesis following stroke. Measurements of the range of hand mobility were made with the R 500 Goniometer. Manual hand dexterity was assessed using the Box and Blocks test. The tests were conducted twice before and after the completion of a 3-week rehabilitation program in both the dominant and non-dominant hands. A logistic regression model was used to assess the influence of selected factors on the effects of hand rehabilitation.

**Results:** There was a significant influence of sex and side of paresis on the rehabilitation effect in relation to the range of left arm flexion and extension mobility in the studied group (p<0.05). It was noted that men had an almost 4.5-fold higher chance of improving range of motion compared to women (p<0.05), while those with right-sided paresis had a lower chance of improving mobility than those with left-sided paresis (p<0.05). Then the influence of factors on the

likelihood of the effects of rehabilitation was examined using the Box and Blocks test. The influence of the predictor 'time from stroke' was noted. It was found that a later start of rehabilitation after stroke causes a potential decrease in the likelihood of a positive effect of rehabilitation in the above test, but only for the non-dominant hand (p<0.05).

Conclusions: Sex and time since stroke were significant factors influencing hand motor skills. In men, a reduction in the possibility of the desired effect of therapy was observed, as well as a later start of rehabilitation after stroke, which resulted in a potential decrease in the likelihood of a positive effect of rehabilitation in hand motor skills. In men, compared to women, a significantly greater chance of improving the range of motion of radial abduction, in both the right and left hand, and a higher chance of improving flexion and extension of the left hand, were also observed. Keywords: stroke, hand, manual functions, rehabilitation

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## The role and tasks of a physiotherapist and occupational therapist in the therapeutic team in neurological departments

Introduction: A physiotherapist and occupational therapist are people who deal with comprehensive therapy by preventing the development of disabilities in chronically ill patients or conduct therapy by using therapeutic methods to restore the functionality of patients or help and support patients in adapting to life in the environment in a new way. Through their work, a physiotherapist and occupational therapist help improve the patient's physical, mental and social condition, which in consequence leads to help in obtaining the maximum possible independence of the sick person. The duties of a physiotherapist and occupational therapist include activities that are aimed at therapeuticizing patients in their optimal functioning to the extent of their psychophysical capabilities. Objective of the work. To learn about the level of knowledge of physiotherapists and occupational therapists about their role and tasks in working with neurological patients in neurological departments.

Material and methods: The study involved 153 physiotherapists and 126 occupational therapists working in neurological departments. The study was conducted between October

2024 and January 2025. An individual interview questionnaire consisting of 15 questions regarding information on the role and tasks of a physiotherapist and occupational therapist in neurological departments was used for the study.

#### **Conclusions:**

Based on the results obtained, the following was noted:

- 1. An average level of knowledge was observed regarding the role of a physiotherapist and occupational therapist in the therapeutic team, which may indicate the need to include this professional group in broader clinical information on the health status of patients.
- 2. A high level of knowledge was noted in the group of physiotherapists and a low level of knowledge among occupational therapists regarding the use of methods of working with neurological patients, which may indicate the need to create an education standard and thus unify education programs and a training system for occupational therapists.

**Keywords:** physiotherapist, occupational therapist, patient, neurological department

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# Functional assessment of football academy players using the Functional Movement Screen system

**Introduction:** Modern sports place increasing physical demands on players, which results in an increased risk of injury. Functional Movement Screen (FMS) is a tool that allows for a comprehensive assessment of mobility, stability and coordination, «catching» potential dysfunctions that may lead to injuries. The study focused on the analysis of FMS results in young footballers to assess their functional fitness and identify areas requiring improvement.

Material and methods: Fifty young footballers from the Kielce academy (aged 15 to 17) were assessed by the FMS. A set of seven functional tests allowed us to assess the range of movement, movement patterns and stability of the players. Additionally, the subjects completed questionnaires to collect information about their activities outside of training,

position on the pitch, injury history or contusions.

Results: The average score of the academy players was 18.6 out of 21 possible points. Based on the theory of the creators of the FMS system, a score of  $\leq$ 14 may indicate an increased risk of injury. The biggest problem among the subjects occurred during the deep squat test, where the average score was 2.1.

Conclusions: Despite achieving a good FMS total score, the results of the deep squat test indicate significant problems with the movement pattern. The average score is significantly lower than the average in the other tests, which suggests the need to focus on further diagnostics and implementation of appropriate forms of therapy.

Keywords: functional, movement, screen, footballers

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### Women's knowledge of the effect of body weight on the menstrual cycle

**Introduction:** The menstrual cycle is an indicator of the normal functioning of a woman's reproductive system and its disorders are not only a gynecological problem. The midwife's role in caring for a woman with these abnormalities is primarily one of support and education. The main aim of this study was to assess women's knowledge of the influence of body weight on the menstrual cycle.

Material and methods: The study involved a group of 250 women of reproductive age, ranging from 16 to 48 years. The method used was a diagnostic survey, the technique - a survey questionnaire and the tool - a questionnaire of own authorship, containing 22 questions. The collected responses were analysed and statistically processed using Excel. A statistical significance level of p<0.05 was adopted.

**Results:** The results of the questionnaire show that more than half of the respondents (51.4%) subjectively assess their existing knowledge of the influence of body weight on the men-

strual cycle as good. Most women are able to assess the regularity of their menstrual cycle (67.2%), calculate and assess BMI (76.9%). As many as 94.7% believe that regular physical activity is not the main cause of menstrual disorders.

#### **Conclusions:**

- 1. The percentage of women with knowledge of the causes of menstrual disorders is very high.
- 2. Regular physical activity does not influence the onset of menstrual disorders.
- 3. Women, irrespective of their age, believe that anorexia and underweight are factors influencing the occurrence of menstrual disorders.
- 4. Women with a higher level of education are more aware of the impact of anorexia and underweight on the occurrence of menstrual disorders.

**Keywords:** menstrual cycle, menstrual disorders, body weight, physical activity

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## The Effectiveness of Using Schroth Therapy in the Correction of Scoliosis in Children Aged 10–11 Years

Introduction: Scoliosis is a common spinal disorder among children that can lead to significant health complications if left untreated. Early intervention is critical to prevent the progression of the condition and to improve the overall quality of life. The Schroth method, a specialized form of physical therapy, focuses on posture correction, muscle strengthening, and breathing techniques. This study aims to assess the effectiveness of a physical therapy program based on the Schroth method for children with early stages of scoliosis. The therapy program was specifically designed to address the individual needs of each child, ensuring personalized and targeted interventions to optimize treatment outcomes (Grivas, T. B 2022).

Material and Methods: The study was conducted on a group of 20 children aged 10–11 years diagnosed with early-stage scoliosis (Cobb angle 10–20°). Participants were selected based on specific inclusion criteria: absence

of other musculoskeletal disorders, no previous scoliosis treatment, and willingness to participate. The Schroth-based therapy program was developed and included individualized exercises tailored to each participant's scoliosis type. The program consisted of three 60-minute sessions per week over a 12-week period. Evaluations were conducted using standardized tools, such as X-ray imaging to measure the Cobb angle, functional movement tests, and quality-of-life questionnaires.

Results: After completing the 12-week program, significant improvements were observed in the participants. The average reduction in the Cobb angle was 5° among 70% of the participants. Additionally, improvements in posture symmetry and muscle strength were noted. Participants reported reduced pain levels and increased confidence in their physical appearance. Functional movement tests indicated enhanced flexibility and balance.

#### **Conclusions:**

- The Schroth therapy method proved effective in reducing scoliosis parameters in children with early-stage scoliosis.
- Regular and consistent therapy sessions contributed to improved physical function and posture.
- This method is recommended for broader implementation

in pediatric rehabilitation settings.

- Future research should focus on long-term outcomes and comparisons with other physical therapy methods.

**Keywords:** Schroth method, scoliosis, physical therapy, pediatric rehabilitation, posture correction.

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### Clinical case of a patient with Vissers-Bodmer syndrome

Introduction: Vissers-Bodmer syndrome is rarely mentioned in the literature, due to just recent discovery of the CNOT1 and CNOT9 genes and their mutations. The clinical picture of Vissers-Bodmer syndrome is important due to its rare manifestations and variability of symptoms. The symptoms of the syndrome include delayed physical, intellectual and motor development, as well as various neurological disorders, but the severity of these symptoms can vary significantly in different patients. The aim of this work is to draw attention to the variability of clinical manifestations of Vissers-Bodmer syndrome, to emphasize the importance of genetic studies, in particular the detection of mutations in the CNOT1 gene and the early start of rehabilitation.

Materials and methods: The study was conducted at the Elita Rehabilitation Center. The study focused on the clinical data of a two-year-old girl with psychomotor developmental delay. Genetic tests to determine chromosomal abnormalities and detect mutations in the CNOT1 gene, including karyotyping and exome sequencing, were performed in Cologne, Germany on 12.08.2024. The presence of a chromosomal abnormality was confirmed - 47, XXX. Triplex-X syndrome. Genetic testing revealed the presence of Vissers-Bodmer syndrome caused by mutations in the CNOT1 gene. Objective examination at the age of 2 years upon admission to rehabilitation: A girl with low physical development. Does not follow simple

commands. Is not interested in toys, food. Small hands and feet. Epicanthus on both sides. Eyes are deeply set. Hypotonia of the trunk, muscle tone of the limbs is diminished. Tendon reflexes reduced. Displays emotional instability. Articulates indistinctly individual syllables and words. Sits with difficulty. Unable to stand and walk. According to the DENVER II test, her development corresponds to a child of 8 months. Self-care: eats, drinks and dresses only with help.

Results: The girl underwent a rehabilitation course according to the Kozyavkin Method at the Elita Rehabilitation Center from 02.09.2024 to 18.09.2024. After the rehabilitation according to the Kozyavkin Method, muscle tone increased. The volume of active movements increased. She began to rise near the support and walk with side steps, holding on to the support. Conclusion: A case study of patients with Vissers-Bodmer syndrome highlights the role of mutations in the CNOT1 gene in the development of severe neurodevelopmental disorders. The variability of clinical manifestations requires increased awareness of this syndrome in the medical community. Timely diagnosis and new genetic tests based on detected mutations in the CNOT1 gene can significantly improve the treatment outcomes, quality of life and rehabilitation of patients with Vissers-Bodmer syndrome.

Keywords: Genetic Diseases, Genetic Testing, CNOT1, CNOT9

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# Concept of supporting clinical decisions in the field of rehabilitation and orthopedic physiotherapy

**Introduction:** One of the modern methods of minimizing errors in the course of diagnostics and treatment is to support this process with IT systems. There are many systems supporting the diagnosis and treatment of patients: HELP System,

DXPlain System, ISABEL System, IBM Watson Clinical Decision Support System, MET, TxDENT System, WCT, VRneck SOLUTION, Medfile, RSQ Physio, FINEZJO, AsPhys, Physical Therapy Case Files, X-ray Interpretation, UBC Radiolo-

gy, CaseStacks, RadiologyAssistant, however, none of them proposes a global approach to the diagnosis and treatment of patients requiring physiotherapy in accordance with the latest medical knowledge in this field. The aim of the project is to create an IT tool that comprehensively supports the clinical decision system in physiotherapy practice (rehabilitation). Material and methods: It is planned to: create an encyclopedic knowledge base regarding individual disease entities in the field of orthopedics; linking physiotherapeutic diagnostics with the International Classification of Diseases and Health Problems ICD-10 and the International Classification of Functioning, Disability and Health ICF; creation of a database regarding the history and physical examination and additional tests corresponding to and leading to a precise diagnosis; introduction to the disease database and determination of contraindications and adaptation of individual physiotherapy procedures (scope of medical rehabilitation). In addition, a comparative analysis (consistency test) of the diagnosis made by a physiotherapist or doctor and by the Clinical Decision Support System will be carried out.

Conclusions: The result of the project will be an IT tool based on artificial intelligence algorithms, which would allow achieving: convergence of the diagnosis of the Clinical Decision Support System with a group of experienced clinicians at the level of 80-100%; convergence of the assessment of the imaging examination of the Clinical Decision Support System with a group of experienced clinicians at the level of 80-100%; convergence of recommended physiotherapy treatments with the Clinical Decision Support System at the level of 90-100%; warning against the use of treatments that are a contraindication to the use of physiotherapy at the level of 90-100%. Such action would significantly contribute to improving the quality of physiotherapy services and support making clinical decisions that are best from the point of view of the orthopedic patient's dysfunction.

Keywords: rehabilitation, physiotherapy, artificial intelligence

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# An Attempt to Assess the Impact of Implementing Pain Prevention Strategies for the Lumbosacral Spine on Discomfort Levels After Rehabilitation Treatment

**Introducion:** Lower back pain is a widespread civilization-related issue primarily caused by a sedentary lifestyle, lack of physical activity, and obesity. The aim of this study is to assess the impact of implementing pain prevention principles for the Lumbosacral section of the spine on the level of perceived discomfort after completing rehabilitative treatment

Material and methods: The study was conducted using a questionnaire-based method, with surveys administered at two time points: before the start of rehabilitation treatment and ten weeks after its completion. A total of 39 patients aged 21 to 79 years (mean age 58) participated, including 29

women (74%) and 10 men (26%), all diagnosed with lower back pain syndrome.

Results: Patients in Group A demonstrated greater awareness of the need for regular physical activity, and their back pain was characterized by lower intensity and reduced occurrence. Conclusions: The presented findings indicate that education on spine pain prevention, combined with kinesiotherapy and physiotherapy treatment, yields better results 10 weeks after the conclusion of treatment compared to using kinesiotherapy and physiotherapy alone.

Keywords: lower back pain syndrome, prevention, physical activity.

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### **Use of Physiotherapy in Scar Treatment**

Introduction: The aim of this paper is to present and compare selected physiotherapeutic methods used in scar treatment, which play a key role in rehabilitation and post-injury care. Scars, resulting from wounds, surgical operations, or injuries, can lead to health problems, limiting the range of motion, tissue functionality, and also affecting the aesthetics and well-being of the patient. Physiotherapy supports skin regeneration, improves tissue elasticity, reduces scar visibility, and also alleviates pain and itching, improving physical function and quality of life for patients. The paper discusses methods such as massage, shockwave therapy, electrotherapy, and light therapy, as well as their effectiveness in scar treatment.

**Materials and Methods:** The data for this paper were obtained from a literature review based on the Google Scholar database, covering studies published in the last 5 years.

An analysis was made of the results of studies on the use of physiotherapy in scar treatment, focusing on the effectiveness of various methods in accelerating the healing process and improving the appearance of scars.

**Results:** Research has shown that physiotherapy is a highly effective tool in scar treatment, positively influencing the healing and tissue regeneration process. Physical therapies improve the size, thickness, and mobility of the skin around the scar, which promotes tissue elasticity and reduces the risk of adhesions.

Conclusions: Regular use of physiotherapy treatments affects the pigmentation of scars, reducing their visibility. Importantly, physiotherapy decreases pain and itching, improving patient comfort. Additionally, the improvement in scar aesthetics has significant psychological importance.

Keywords: scar, physiotherapy, rehabilitation

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# Assessment of the level of functioning and self-esteem in wheelchair users with spinal cord injury

Introduction: In the case of wheelchair users with spinal cord injury (SCI), one of the key aspects of rehabilitation is the assessment of the patient's functional level, which is closely related to the subjective assessment of self-worth, because physical limitations can affect the perceived independence, self-confidence and sense of agency. For people after SCI who use a wheelchair, the functional level often shapes their self-image and largely determines their life satisfaction. The aim of this study was to assess the functional status and self-esteem levels in individuals with spinal cord injury (SCI) who use wheelchairs.

Material and methods: The study included 30 individuals with spinal cord injury (SCI) undergoing therapy in rehabilitation centers located in the Podkarpackie Voivodeship. The study group enrolled 11 women (36.67%) and 19 men (63.33%) who use wheelchairs. The level of spinal cord injury among the respondents is illustrated in Figure 1. The average time since the injury was just under 3 years (2.82 years) (SD = 1.96). The functional status of the patients was assessed us-

ing the Barthel Index, while self-efficacy was evaluated with the General Self-Efficacy Scale. Pain levels were measured using the VAS scale.

Results: The statistical analysis revealed a strong positive correlation between the level of injury and the degree of disability (rs = 0.76; p = 0.0001). A moderate positive correlation was observed between injury severity and self-efficacy (rs = 0.55; p = 0.0016) as well as between injury severity and self-esteem (rs = 0.41; p = 0.0237). A moderate positive relationship was also identified between the time since injury and functional status (rs = 0.55; p = 0.0018), as well as between functional status and self-efficacy (rs = 0.69; p = 0.00003), and functional status and self-esteem (rs = 0.53; p = 0.0026). Additionally, a moderate positive correlation was noted between self-efficacy and self-esteem (rs = 0.48; p = 0.0067). Furthermore, a moderate negative correlation was found between pain levels and self-efficacy (rs = -0.56; p = 0.0013), suggesting that lower pain levels were associated with higher self-efficacy. In the VAS scale, scores ranged

from 2 to 7 points, with a mean of 4 ( $\pm 1$ ).

Conclusions: The results indicate that a higher level of spinal cord injury is associated with high er levels of disability, leading to lower levels of both self-efficacy and self-esteem. Additionally, the longer the time since the injury, the better

the functional status of the participants. Higher functional status correlated with higher levels of both self-efficacy and self-esteem. Lower pain levels were associated with higher self-efficacy.

Keywords: spinal cord injury, functional status, well-being

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### Balneotherapy in the alleviation of menopausal symptoms

Introduction: The menopause period is associated with many physical and psychological symptoms that can affect women's daily lives. Balneotherapy, i.e. treatment with mineral waters, can be an alternative or complementary to traditional treatments for these complaints. Objective: To evaluate the role of balneotherapy in alleviating menopausal symptoms. Literature characteristics: Balneotherapy can be part of a comprehensive approach to alleviating menopausal symptoms. Studies have shown the beneficial effects of mineral baths on menopausal symptoms by, among other things: relieving pain and improving joint function: mineral waters, especially those rich in sodium, magnesium, calcium and sulphur, have anti-inflammatory and analgesic effects. Mineral baths can reduce pain associated with osteoporosis, arthritis and general joint complaints. The elements contained in mineral waters (such as sulphur) can improve blood circulation, which can have an impact on reducing swelling, improving skin quality and overall recovery. Studies show that regular use of balneotherapy can reduce the severity of hot flashes and improve cardiovascular function in menopausal women. Balneotherapy is also stress-reducing and mood-enhancing: warm water has a relaxing effect and can improve mood. In addition, thermal waters containing minerals can aid mental recovery, reducing the mood changes that are common during menopause. Mineral waters, especially sulphuric waters, can help treat skin problems such as dry skin, reduced elasticity or irritation. Thermal water can moisturise the skin, improving its condition. Bathing in mineral water can help improve sleep quality, reducing symptoms such as insomnia and night sweats. Warm water relaxes the body and helps to reduce tension, which can lead to better sleep.

**Conclusions:** Balneotherapy, due to its therapeutic properties, can provide important support in the treatment of pain, skin problems, mood and sleep disorders that are common during menopause.

Keywords: Balneotherapy, menopause, women's health

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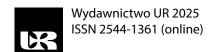
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# Knowledge and attitudes of "Generation Z" women on the impact of physical activity on pregnancy

**Introduction:** Women should have knowledge about physical activity in pregnancy, because its appropriate form, in consultation with a doctor, can have a beneficial effect on the health of the mother and baby. Lack of activity often results from. This is why it is important to increase awareness, especially among Generation Z women. The aim of the work was to assess the state of knowledge and attitudes of women of "generation Z" about the influence of physical activity on the course of pregnancy.

Material and methods: A diagnostic survey method using a questionnaire was used. The study was conducted among 316 women aged 18-25 years and was conducted online between 20/12/2021 and 23/02/2022. Analysis of differences between qualitative variables was carried out using the  $\chi 2$  independence test. A statistical significance level of p<0.05 was adopted.

**Results:** As the results of the study showed, women's knowledge of the subject is not satisfactory, but as many as 95 per cent of them are aware that activity during pregnancy



is important. A similar percentage (around 90 per cent) were also aware that it can affect the course of pregnancy, child-birth and the health of the woman and child in the post-partum period.

**Conclusions:** Only one-quarter of respondents had a low level of knowledge about the impact of physical activity on pregnancy. Women with higher education and living in large cities were more likely to have a higher level of knowledge.

There is a need to raise awareness about this and family and other pregnant women play an important role in motivation. The internet is crucial in education. It is important to popularise the understanding of the role of physical activity in pregnancy so that women can use it for health.

**Keywords:** generation Z, physical activity, pregnancy, knowledge and education

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# The effect of physical training and pelvic floor muscle training on urgency urinary incontinence, fall risk, and balance disorders

Introduction: Aging is a natural process influenced by genetic and epigenetic factors, leading to a decline in morphological, functional, and cognitive abilities. Consequently, the capacity to perform daily activities decreases, resulting in a reduced quality of life. The aim of this study was to evaluate the effect of physical training and pelvic floor muscle training with dual cognitive tasks on symptoms of urgency urinary incontinence in elderly women. The secondary aim was to assess the impact of these interventions on static and dynamic balance, fear of falling, and fall risk.

Material and Methods: The research was conducted as an experimental study. The study sample consisted of 88 elderly women with urgency urinary incontinence (average age  $75 \pm 4.3$  years). Participants were randomly divided into an experimental group (n = 40) and a control group (n = 40). The intervention lasted 12 weeks. Both groups participated in physical training (strengthening exercises for the lower limbs and pelvis, balance exercises) three times a week for 30 minutes. The experimental group additionally received education on the anatomy, physiology, and function of the pelvic floor muscles and underwent specific pelvic floor muscle training in various positions, including exercises with dual cognitive tasks, twice a week for 30 minutes. Urinary leakage symptoms were evaluated using a modified Voiding Diary, the International Consultation on Incontinence Question-

naire (ICIQ-SF), and the OAB-q questionnaire. Balance was assessed using the "Timed Up and Go" (TUG) test and the "Timed Up and Go with a dual task" (TUG-DT) test. Static and dynamic balance and fall risk were assessed using the Tinetti scale. Fear of falling was evaluated using the Falls Efficacy Scale (FES).

**Results:** After 12 weeks, significant differences (p  $\leq$  0.001) were observed in the experimental group, favoring improvements in the number of daily voids (from 7.6 to 5.3), nocturnal voids (from 2.1 to 0.7), frequency of urgency urinary incontinence episodes (from 1.8 to 1.0), OAB-q SS score (from 40.8 to 17.6), and OAB-q HR score (from 61.2 to 83.8). Balance and fall risk, as assessed by the Tinetti scale (from 19.2 to 23.2), also showed significant improvements (p  $\leq$  0.001). Fear of falling, measured by FES (from 80.0 to 71.5), demonstrated significant differences (p  $\leq$  0.05) with a small effect size in favor of the experimental group.

Conclusion: Pelvic floor muscle training with dual cognitive tasks proves to be an effective intervention for improving urinary leakage symptoms. Additionally, this intervention has a positive impact on reducing fall risk and significantly alleviates fear of falling in elderly women with urgency urinary incontinence.

**Keywords:** elderly women, muscle training, pelvic floor, fall risk

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# Opportunities and challenges in prehabilitation for patients before oncological treatment

Introduction: The aim of this study is to present the benefits and potential application of prehabilitation in patients before oncological treatment. Prehabilitation, which involves preparing patients for treatment through the implementation of appropriate physical and psychological interventions, increases survival rates after treatment, accelerates recovery, and improves overall physical and psychological parameters of patients. In the context of oncological treatment, prehabilitation plays a crucial role in preparing patients for invasive medical procedures.

Material and Methods: A review of current scientific studies from the last 10 years available in the PEDro and PubMed databases was conducted. The focus was on research related to prehabilitation in the context of oncological treatment and its impact on improving treatment outcomes, recovery time, and the quality of life of patients.

Results: Prehabilitation is an extremely valuable tool in preparing patients for invasive medical procedures, such as oncological treatment. It is particularly helpful for older patients and those with chronic diseases, for whom surgery carries a higher risk of complications. Its application can significantly reduce the risk of complications, shorten hospitalization time, improve functional status, and enhance the quality of life of patients after surgery.

Conclusions: Despite its numerous benefits, prehabilitation is still not a standard practice in medicine, primarily due to the lack of systemic solutions and time and financial constraints in healthcare facilities. However, the growing body of research indicates the need for broader implementation of prehabilitation in clinical practice.

Keywords: prehabilitation, oncology, surgery

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### Rehabilitation of patients with axillary web syndrome suffering from breast cancer – review.

Introduction: Breast cancer is the most common malignant cancer among women. Very often, patients require extensive surgeries with the removal of the lymph nodes of the armpits, which are most often metastasized by this cancer. A common complication of such procedures is axillary web syndrome. It is a condition that involves limited mobility in the shoulder joint with simultaneous pain and resistance occurring in the armpit area. Patients with axillary web syndrome require comprehensive rehabilitation, which is necessary to return to full mobility.

Material and methods: A systematic review using PubMed's database of scientific articles. The keywords "axillary web syndrome," "breast cancer" and "rehabilitation" were used in the search. Articles from 2023-2024 were considered.

Results: After the analysis, 5 articles were obtained that corresponded to the topic of the work. The rehabilitation of patients with axillary web syndrome should be based on physiotherapy methods such as manual therapy which con-

sists of techniques of musculo-fascial relaxation or soft tissue mobilization, resistance exercises or kinesiotaping, and on the combination of such activities with manual lymphatic drainage. The results of these studies highlight the essence of comprehensive rehabilitation treatment. With appropriate actions, significant reduction of pain and restoration or improvement of mobility of the shoulder joint were achieved. An increase in muscle strength within the upper limb was also demonstrated. The patients' quality of life was significantly improved by the rehabilitation methods used.

**Conclusions:** Comprehensive rehabilitation brings significant improvement and reduction of pain in breast cancer patients who also suffer from axillary web syndrome. However, rehabilitation plans need to be better refined. It is also important to continue to look for forms of rehabilitation that can give better results.

**Keywords:** rehabilitation, breast cancer, axillary web syndrome

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## Systematic review of a rehabilitation used in regaining upper limb function in patients who suffered from brain stroke.

Introduction: In European Union brain strokes affect 1,100,000 patients a year and cause approximately 440,000 deaths a year. In Poland, in 2021, 72,000 cases of brain stroke and 7,000 stroke-related deaths were noted, mostly in the acute phase of disease. It's predicted that by 2030, there will be 70 million people worldwide who have survived a brain stroke. 60-70% of the patients who survived brain stroke suffer from complications related to upper extremities. 17-40% of patients who survived brain stroke experience spasticity of upper limbs that impairs their everyday activity. Only 20% of patients with severe hemiparesis regain total functionality of upper limbs. On the contrary, 80% of patients who suffered from mild hemiparesis regain total function of upper extremities. Main goal of this systematic review is to evaluate the influence of the rehabilitation on regaining upper limb function in patients who experienced brain stroke. Materials and Methods: Systematic review was conducted according to PRISMA guidelines. Information retrieval was conducted in December 2024. PUBMED database was searched for randomised, controlled clinical trials, in which the impact of used rehabilitation on regaining upper limb function after brain stroke was evaluated. Results: 25 articles fulfilling inclusion criteria were included in this systematic review. These articles included a total number of 1461 people. Most participants experienced ischaemic stroke in the acute, subacute or chronic phase. Results showed that various types of physiotherapy (like robot-assisted therapy, vagus nerve stimulation, motor control training with virtual reality assistance, mirror therapy, myofascial therapy with the use of a tennis ball, or therapy with Kinect) can significantly improve the outcomes of the rehabilitation. Conclusions: Total number of 1461 patients were included in 25 clinical trials, that were analysed in this systematic review. Results point out that training based on innovative methods of physiotherapy as well as conventional physiotherapy improve upper limb activity, increase muscle strength, joint mobility and improve quality of life. However, due to the small number of articles included in this review, there is a further need for randomized controlled trials in this topic in order to draw a comprehensive conclusion. Keywords: brain stroke, physiotherapy, rehabilitation of upper limb,

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# Comprehensive Strategy for Combating Childhood Obesity: The Effectiveness of Personalized Lifestyle Changes

Introduction: Childhood and adolescent obesity is a global health issue that significantly affects the physical and psycho-emotional well-being of the younger generation. It is associated with the development of severe metabolic disorders and chronic diseases. A comprehensive approach that combines personalized nutritional strategies, physical activity, and psychological support is the most effective treatment for this condition. Family involvement in the correction process is a crucial factor in achieving long-term results. Based on an analysis of contemporary scientific data and two years of personal experience, this study aims to assess the effectiveness of a comprehensive lifestyle

modification program incorporating personalized nutrition, physical activity, and psychological support in children with overweight and obesity.

Materials and Methods: A literature review was conducted using PubMed, Medline, Cochrane Library, and other databases, along with an evaluation of clinical cases of children with obesity who underwent rehabilitation at the Edem Clinic Medical Center. The study assessed changes in anthropometric parameters, metabolic markers (lipids, glucose, leptin, 25-(OH)D), oxidative stress levels, and physical activity. Data were collected before the program, during the intervention, and six months after its completion.

Results: Six months after completing the program, a stable weight reduction of 7–10% from baseline was observed. The body mass index (BMI) decreased to age-appropriate norms (from 28.4 to 26.5 in the first case and from 26.1 to 24.6 in the second). Total cholesterol levels decreased from 6.1 to 5.3 mmol/L and from 7.0 to 5.8 mmol/L, respectively. Triglyceride levels dropped, while high-density lipoprotein (HDL) cholesterol levels increased. Improvements were also observed in vitamin D levels (from 30.0 to 40.0 ng/mL and from 21.0 to 50.0 ng/mL), leptin levels (from 17.69 to 14.0 ng/mL and from 19.25 to 12.0 ng/mL), and inflammatory markers (high-sensitivity C-reactive protein <2 mg/L). Daily physical activity increased from 5% to 15% of waking hours,

and sleep quality and duration improved.

Conclusions: A comprehensive rehabilitation program combining personalized nutrition, physical activity, and psychological support has proven effective in correcting metabolic disorders and improving the quality of life of children with obesity. The results highlight the importance of early intervention, a multidisciplinary team approach, and individualized strategies. Expanding the implementation of such programs in clinical practice and community-based obesity prevention initiatives is recommended.

**Keywords:** obesity, children, personalized nutrition, physical activity, psychological support, metabolic disorders, rehabilitation.

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### Effectiveness of Hydrotherapy in the Rehabilitation of Patients with Knee Osteoarthritis

Introduction: The aim of this study is to assess the effectiveness of hydrotherapy in the rehabilitation of patients with knee osteoarthritis, comparing it with land-based exercises in terms of joint function improvement, pain reduction, and quality of life. Hydrotherapy, as a form of active rehabilitation in a water environment, combines the therapeutic properties of water with appropriately selected movement exercises. It works on the joints by reducing the load, which improves the range of motion, reduces pain, and supports rehabilitation by teaching proper movement patterns and improving joint stability. Additionally, water-based exercises reduce the risk of injuries and overload, which is particularly important for individuals with limited mobility. The goal is not only to improve knee joint function but also to enhance overall physical fitness and quality of life.

Materials and Methods: A literature review was conducted using PubMed and Google Scholar databases from the last 10 years, analyzing studies on hydrotherapy and its comparison with land-based exercises in the rehabilitation of patients with knee osteoarthritis.

**Results:** Hydrotherapy is an effective rehabilitation method for knee osteoarthritis, particularly in reducing pain and improving joint function and quality of life.

Conclusions: Although there are no significant differences in short-term functional outcomes between the methods, water exercises offer additional value in the long-term improvement of patients' psychological and social well-being and promote greater motivation for continued rehabilitation compared to land-based exercises.

Keywords: hydrotherapy, knee osteoarthritis, rehabilitation

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# Temporomandibular disorders in patients with multiple sclerosis – preliminary reports

**Introduction:** The main aim of the study was to assess the incidence of temporomandibular joint disorders (TMDs) in

patients with multiple sclerosis (MS). Moreover, to investigate whether there is a relationship between the occurrence

of symptoms of disorders in the masticatory system and the degree of disability associated with disease.

Materials and Methods: The study was conducted at the Specialist Hospital of St. Łukasz in Końskie (Poland) and in private physiotherapy practice from October 2023 to November 2024. The study used an original survey questionnaire, the questionnaire of the European Academy of Craniomandibular Disorders (EACD) and the Research Diagnostic Criteria for Temporomandibular Joint Disorders (RDC/TMD). People from the study group were diagnosed according to the McDonald criteria and examined using the Expanded Disability Status Scale (EDSS).

**Results:** People from the study group reported TMDs significantly more often (p < 0.05; ES = 0.52 - 0.86) based on EACD (pain on opening the mouth: 86.7%; facial pain: 57.8%; joint

blockage: 28.9%; headaches: 75.3%). The diagnosis of TMDs was confirmed (with RDC/TMD questionnaire) in 57.8% of people from the study group and 13.3% of people from the control group (p < 0.05). Patients most often presented with muscle pain and disc displacement with reduction (p < 0.05). The degree of disability (EDSS) did not significantly affect the occurrence of TMDs (p > 0.05).

#### **Conclusions:**

- 1. The study showed that temporomandibular disorders are more common in people with multiple sclerosis.
- 2. The degree of disability had no impact on the occurrence of disorders in the the masticatory system.

**Keywords:** multiple sclerosis (MS); temporomandibular joint (TMJ); temporomandibular disorders (TMDs)

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# The impact of workload on the functional disorders occurrence of musculoskeletal system in Information Technology staff

Introduction: Today, the usage of computers at work is essential and it is playing an important role in terms of quality of work as well as the amount of work which is done. On the other hand, working with a computer brings many risks, which are faced today by many Information Technology (IT) workers, who spend most of their time in one rigid position and thus develop incorrect and unhealthy moving habits. Disproportionate static load of the musculoskeletal system leads to musculoskeletal disorders that negatively affect their physical and mental condition and ultimately reduce working efficiency.

Material and Methods: The research took place at GlobalLogic company and Bonuvis company. We evaluated and assessed 42 IT staff (20 staff from GlobalLogic and 22 staff from Bonuvis) in the period of January 2020 and March 2021 before and after the intervention. The sample was consisted of 14 women and 28 men in the age of 23-41 years. We identified the functional disorders occurrence of the musculoskeletal system in IT staff using examination procedures according to Janda. We examined the function of 10 muscles with a tendency to shorten, 6 muscles with a tendency to weaken and 7 movement stereotypes. In the form of an individually created questionnaire, we evaluated the musculoskeletal pain occurrence in IT staff. We compared the values separately for men and women before and after the intervention, we expressed the differences as a percentage and interpreted them with graphs. We evaluated the ergonomics of the work and the technical equipment of the working environment in the IT employees of both companies, we compared their results and expressed them in percentage. After identifying the musculoskeletal system functional disorders, we recommended applying ergonomic principles in the workplace while working with a computer in a selected sample of IT staff to make their work more effective. We developed a draft for compensatory exercises, and we have put them into practice for 2 months.

**Results:** Using Janda's procedures, we identified musculoskeletal functional disorders in IT staff. After the analysis, we found the shortened muscles occurrence in IT staff before the intervention in 41% of men and in 43% of women. After 2 months of compensatory exercises, there was an adjustment of muscle imbalances in women to 17% and in men to 18%. 30% of women and 26% of men had weakened muscles before regular exercise. After the intervention, an adjustment was made for women to 17% and for men to 14%. We identified a disorder of movement stereotypes in 32% of men and 34% of women. After the intervention, there was an adjustment for both sexes, to 17%. By evaluating the workplace ergonomics, we found out that all IT employees of GlobalLogic were using an ergonomic chair at work, while in Bonuvis the chair was used by 80% of employees. 60% of employees from GlobalLogic and 48% from Bonuvis had set their working monitor properly. In the usage of the ergonomic keyboard and mouse, companies had the same percentage. 30% of employees from GlobalLogic and 20% from Bonuvis used ergonomic aids at work. The results of our survey pointed on

the lack of technical equipment of workplaces (to a greater extent in the company Bonuvis), which led to insufficient adherence of ergonomic principles and subsequently to the occurrence of functional disorders of the musculoskeletal system and to muscle imbalances. Through a targeted exercise program, we noticed favorable changes in the frequency of limitations and the feeling of pain.

Conclusions: It is necessary to adjust working habits of IT

staff by the ergonomic principles. One way is to prevent the consequences leading to health problems is to allow IT staff employees to use a well-equipped gym during working hours, just as it is in GlobalLogic company, or by training staff, so that IT staff will gain a general overview of ergonomics.

**Keywords:** IT staff, functional disorders, ergonomics, compensatory exercise

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# Effect of therapeutic concepts on activities of daily living in a patients after a stroke in the chronic stage

Introduction: The aim of the presented work was to evaluate the impact of the use of standard rehabilitation treatment (the Bobath and Kabat concept) and the Autoreflexed prenatal, postnatal therapeutic positions (APPP\*) concept on activities of daily living (ADL) and quality of life in a patients after a stroke (CMP) in the chronic stage, more than a year after the attack, in the form of a case study.

Material and methods: The study sample consisted of 76 probands, both male and female, diagnosed with CMP in the chronic stage at least one year or more after the attack with a mean age of 57,20 ± 4,3 years rehabilitated in the Specialized Medical Institute Marína in Kováčová. They were randomly divided into two groups, experimental and control. Patients were treated in two phases, 6. days a week, 4 weeks. Activities of daily living and quality of life were assessed before

and after treatment with the Barthel index.

**Results:** There were no significant differences in the ADL scores in Barthel index in individual sections and total score between the groups after treatment. There were significant improvements in both groups in most of the parameters studied  $p \le 0.001$ .

Conclusions: In conclusion, we can say that therapeutic rehabilitation with concepts has a positive effect on symptoms and CNS. Results after treatment were comparable, the improvement can be interpreted on the basis of inhibition of the central nervous system and the results have a comparable, positive effects on ADL in patients in the chronic stage after CMP.

Keywords: APPP concept, stroke, activities of daily living

#### Orchel Izabela

BTL POLSKA Sp. z o.o.

### Robotics in the comprehensive improvement of the upper limb (BTL)

Presentation of innovative ALEX RS and R-Touch Elite robotic devices. These two devices enable upper limb therapy in neurological patients, in particular after stroke and spinal cord injuries. Discussion of the mechanism of action and presentation of sample exercises using virtual reality.

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### The Application of FSM Microcurrent Therapy in Post-Exercise Recovery: Potential for Athletes and Physically Active Individuals

Introduction: The aim of this article is to review the available scientific literature on the application of Frequency Specific Microcurrent (FSM) therapy in post-exercise recovery and sports rehabilitation. The central thesis suggests that FSM is an effective and non-invasive method for supporting regenerative processes and reducing pain, contributing to improved physical performance among athletes and individuals leading an active lifestyle.

Materials and Methods: The PubMed database was searched using keywords such as frequency specific microcurrent, post-exercise recovery, sports rehabilitation, and non-invasive therapy. The analysis included only scientific articles published within the last 15 years to ensure the relevance and currency of findings. The selected studies focused on the application of FSM in recovery, pain reduction, and sports rehabilitation. Both clinical studies and case reports demonstrating practical applications of FSM in sports and medical contexts were considered.

#### **Results:**

- Curtis et al. (2010): The study demonstrated that FSM significantly reduces delayed onset muscle soreness (DOMS) after intense physical exertion. The application of microcurrents resulted not only in faster pain relief but also in an overall improvement in athletes' well-being. This indicates potential benefits for athletes requiring short recovery pe-

riods between competitions.

- Naclerio et al. (2019): The study found that combining FSM with resistance training led to significant improvements in muscle strength and endurance. Moreover, participants reported reduced fatigue following workouts, suggesting that FSM may support muscle adaptation to training loads.
- Ranker et al. (2020): FSM therapy applied to patients with knee osteoarthritis resulted in pain reduction and improved joint function. The therapeutic effects persisted for an extended period after treatment, indicating its long-term benefits in sports rehabilitation.
- Adams and McMakin (2017): The use of FSM was shown to reduce chronic pain and postoperative adhesions. Patients experienced improved tissue flexibility and range of motion, which is particularly relevant in the process of returning to full fitness after sports injuries. Additionally, the therapy reduced the need for pharmacological interventions among patients.
- McMakin and Oschman (2012): FSM therapy proved particularly effective in soft tissue regeneration by reducing inflammation and accelerating repair processes. The study also highlighted FSM's role in enhancing tissue blood flow, which may contribute to faster recovery after intense physical effort. **Keywords:** FSM microcurrents, post-exercise recovery, sports rehabilitation, non-invasive therapy

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### Application of the GMFM-ALL scale in physical therapy for childhood leukemia

Introduction: The annual incidence of childhood neoplasms worldwide is 16.5 cases per 100,000 children, with more than half of affected children reaching adulthood. Two-thirds of children with leukemia experience long-term complications caused by treatment. Physical functioning in such children often deteriorates, particularly due to chemotherapy, especially when using vincristine, which can induce peripheral neuropathy. Early comprehensive rehabilitation helps re-

store mobility, motor skills, and functional independence, improving quality of life during and after treatment. Despite the proven effectiveness of rehabilitation, additional research is needed on the impact of physical exercise on a child's condition, as well as effective assessment methods that are disease-sensitive and tailored to the child's age and abilities.

**Material and Methods:** To achieve the set objectives, a literature review was conducted using the PubMed database, along

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with assessments based on the GMFM-ALL scale.

Results: To ensure the effectiveness of rehabilitation programs, it is essential to use standardized indicators that allow the assessment of patient conditions and the adaptation of interventions to their individual needs. Based on a literature review, we identified validated methods recommended for children with oncological diseases, such as the Gross Motor Function Measure Acute Lymphoblastic Leukemia (GMFM-ALL) or GMFM-88, which allow for tracking motor skill changes considering the primary diagnosis. The GMFM-88 scale includes 88 tasks in five categories: A (lying and rolling); B (sitting); C (crawling and kneeling; D (standing positions); and E (walking, running, and jumping). Tasks from sections D and E are especially valuable for children with acute lymphoblastic leukemia (ALL) as they assess functional skills required for daily life. The method requires minimal equipment and poses a low risk of injury, which is crucial for children at increased risk of fractures due to osteopenia. Gross Motor Function Measure Acute Lymphoblastic Leukemia (GMFM-ALL) is a modified version of GMFM-88. An example of using the GMFM-ALL scale is the assessment results of a 2-year-old child with acute lymphoblastic leukemia, intestinal obstruction, and cachexia. Assessments were conducted before and after three weeks of physical therapy, with comparative analysis showing significant improvement in indicators.

For instance, in Block A: Lying and Rolling, the initial test results showed the child scored only 14 points: **Supine position:** head turns while maintaining symmetric limb positions – 3 points; touches hand to hand along the midline

− 3 points; raises head to 45 degrees − 3 points; fully bends the right and left knee − 1 point each; reaches for a toy with the right and left hands across the midline − 1 point each; **Prone position:** lifts head up − 1 point. After physical therapy, significant improvements were observed, with the child scoring 26 points: **Supine position:** the first three tasks were also scored 3 points each, as listed above; reaches for a toy with the right and left hands across the midline − 2 points each; rolls onto the stomach via the left and right sides − 2 points each; **Prone position:** lifts head up − 3 points; pushes up onto forearms, straightens elbows − 1 point; props on right and left forearms, extends the left and right hands forward − 1 point each; rolls back onto the back via the left and right sides − 2 points each; rotates right and left 90 degrees, propped on limbs − 1 point.

Conclusions: For assessing motor changes in children with ALL, setting physical therapy goals, and conducting analysis, it is crucial to perform rehabilitation assessments using the GMFM-ALL scale. The results of a three-week physical therapy program demonstrated a significant positive impact on the child's motor skills and physical condition, as confirmed by GMFM-ALL scale indicators. The physical therapy approach focused on identifying gross motor impairments, which this scale diagnoses with its 88 tasks and detailed monitoring of all motor skills—from supine movements to standing—is essential for improving the quality of life for children with severe diseases. The condition of such patients changes during primary treatment, requiring timely attention.

**Keywords:** physical therapy, leukemia, GMFM-ALL, children.

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### Professional independence of a physiotherapist - legal fiction or reality?

Introduction: The profession of physiotherapist was first regulated in Poland in the Act of 15 September 2015 on the profession of physiotherapist which is still in force. Physiotherapist is a medical profession whose essence is the provision of specific health services in the field of medical rehabilitation. Article 2 of the above Act states that the profession of physiotherapist is an independent medical profession. On the other hand, Article 4 section 2 of the Physiotherapist Act contains a general list of professional activities of a physiotherapist - it specifies the scope of the subject matter of this profession. The aim of the presentation is to determine whether the professional independence of a physiotherapist, as defined in the Act of 15 September 2015 on the profession of physiotherapist, is a legal fiction or a reality in the Polish health care system.

Material and methods: The author reviewed the current legal acts concerning the profession of physiotherapist and medical rehabilitation in Poland. First of all, the analysis included the Act of 15 September 2015 on the profession of physiotherapist and normative acts concerning the health insurance system, in particular the Regulation of the Minister of Health of 6 November 2013 on guaranteed benefits in the scope of medical rehabilitation. Additionally, the analysis included relevant, but sparse in this case, literature. The work used the analytical-synthetic method and conducted an analysis of the legal status.

**Results and conclusions:** The analysis of the legal status shows that the Act of 15 September 2015 on the profession of physiotherapist is the only legal act of statutory rank that directly indicates the professional independence of a

physiotherapist. In addition, the right of a physiotherapist to refuse to perform an order, regulated in the above act, should be considered an instrument of this independence(art.6). However, other legal regulations, in particular those concerning public health insurance, as well as art. 4 of the above act justify the conclusion that the independence of a physiotherapist is relative. Firstly, the scope of the professional independence of a physiotherapist is influenced by their education and professional experience. As stated in the act, a physiotherapist who does not have an appropriate period of experience in the profession may provide health services within the scope resulting from their professional title, only on the basis of a referral from a doctor or another physiotherapist who has the right to independently provide health services in the field of physiotherapy. In addition, a physiotherapist with a technical degree and a bachelor's degree cannot qualify for physical therapy and kinesitherapy, order medical devices, or issue opinions and rulings.

Secondly, the professional independence of a physiotherapist depends in practice on the sphere of practice (public or private). In the case of private services, especially those carried out in the form of professional practice, it is generally full, whereas in the case of the health insurance system, the independence of a physiotherapist depends on the place of provision of services/type of guaranteed service. In the light of legal regulations, the widest scope of independence concerns outpatient and home medical rehabilitation services, but it also depends on the level of education of the physiotherapist. Its manifestation is a physiotherapy visit (in practice, patient diagnostics and selection of treatments). To sum up, the professional independence of a physiotherapist is relative, dependent on several of the above-mentioned factors, and its potential, especially in the case of specialists, is not fully utilized in the health system.

Keywords: physiotherapist, profession, independence, law.

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### Evaluation of the rehabilitation program for patients after surgical treatment

of subcarpal tunnel syndrome

Introduction: Shoulder girdle pain currently affects around 30% of the population and occurs in every age range. It can lead to functional impairment and consequently to a significant reduction in quality of life. Nowadays, the number of patients suffering from shoulder girdle joint pain is increasing. Subacromial tightness syndrome is defined as a set of symptoms accompanying the compression of structures such as the rotator cone and the subacromial bursa by the shoulder process. It is thought to be the cause of up to 65% of cases of shoulder girdle pain. The purpose of this study was to evaluate the improvement program for patients after surgical treatment of subacromial tightness syndrome.

Material and Methods: The study describes rehabilitation program that is the subject of this evaluation and other ex-

emplary programs. The study group included 30 patients who underwent surgery for the presence of subacromial compartment syndrome. The patients were operated on by the same orthopedist and underwent rehabilitation at one of Krakow's private rehabilitation clinics. The range of motion in the shoulder girdle joints and the level of pain at the first and last examination were examined and compared.

Results: All qualified patients achieved improvements in active and passive mobility and a reduction in pain levels. The condition in which patients started therapy and its length had a significant impact on the final results. Premature termination of the therapy resulted in lower results in terms of mobility as well as pain.

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# Evaluation of the effects of gait therapy on a rehabilitation treadmill in neurological patients

**Introduction:** the aim of the study was to evaluate the effects of therapy using a rehabilitation treadmill equipped with modules for gait analysis and training. The therapy consisted of an individually tailored rehabilitation program including treadmill exercises.

Material and methods: fifty patients (32 males and 18 females) hospitalised at the Neurological Rehabilitation Unit of SP ZOZ in Przeworsk were studied. The mean age of the patients was 61 years (the youngest was 27 years, the oldest was 88 years), the mean number of training days was 14 (from 6 to 21 days). Patients with the following disease entities were studied: polyneuropathy, stroke, multiple sclerosis, intervertebral disc disease. The following gait parameters were considered: cycle time, stride length (difference in stride length between the right and left foot), cadence (number of steps per minute), and foot rotation (difference in right and left foot angles). Patients underwent gait assessment on the first and last day of therapy.

Results: the applied rehabilitation program influenced the lengthening of the gait cycle time, the lengthening of the stride length of the right and left lower limb, the reduction of the difference in stride length between the right and left leg, the increase in the number of steps per minute, while it had no significant effect on the angles of foot position in the support phase. Symmetry in the alignment of the right and left feet improved slightly.

#### **Conclusions:**

- 1. The greatest improvement was noted in symmetry of foot angles in patients with MS. 2. Patients with stroke and polyneuropathy have significantly improved cadence ( the number of steps per minute has decreased, which translates into a longer stride).
- 3. In all patients, the gait cycle time increased at a similar level.
- 4. The greatest improvement in step length symmetry was seen in patients with intervertebral disc disease.

Keywords: rehabilitation, treadmill, training, neurology

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### Frailty syndrome as a challenge of modern medicine

Introduction: Nowadays, human life expectancy has increased thanks to rapid medical advances. For the public health sector in economically developed countries, it is anticipated that caring for an ageing population will be one of the major challenges of the coming century. In the geriatric population, frailty syndrome is a major problem. It complicates and adversely affects the treatment of seniors. Frality is a potentially reversible condition; however, preventive measures are needed to prevent progression and development of complications.

Materials and methods: For the literature search, the PubMed database was searched to identify articles on 'frailty syndrome' (FSS). Articles published between 2019 and 2024 were considered. The keywords used in the searches were: 'frailty syndrome', "frailty assessment", "frailty syndrome interventions" and related terms in Polish and English.

**Results:** WHO defines healthy ageing as 'the process of developing and maintaining functional capacity that enables well-being in old age'. The key indicator of health is not the

number of diseases, but the maintenance of functional capacity. Frailty is the transitional stage between independence and disability, characterised by reduced functional reserve and greater vulnerability to stressors. Frailty is a key indicator of disability risk and quality of life. Rehabilitation plays a key role in preventing and reducing the development of frailty syndrome, particularly through its impact on improving physical ability, metabolic and mental function in older people. Conclusions: 1. An ageing population increases the importance of the problem of frailty syndrome, which is a condition intermediate between healthy ageing and disability. 2. Early recognition and interventions are key to prevent the transition from frailty to disability. 3. Frailty results from the interaction of many factors, such as ageing of organ systems, chronic inflammation, reduced functional reserve, sarcopenia and chronic diseases. 4. Physical activity, especially resistance and endurance exercise, is one of the most effective ways to improve muscle function, balance and metabolic health.

Keywords: frailty syndrome, ageing, rehabilitation, prevention.

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### Assessment of anterior-posterior spine curvatures in people with intellectual development disorders

Introduction: There are few scientific reports on the assessment of body posture in people with intellectual development disorders (IDD), especially the shape of the spine in the sagittal plane. Researchers have focused mainly on postural stability and mobility of people with IDD. Aim: The objective of this study is to assess body posture in the sagittal plane in people with mild and moderate intellectual development disorders.

Material and method: The study was conducted at the UNICEF Special School in Rzeszów. 159 people with mild and moderate IDD were qualified, including 80 women and 79 men aged 10-23. The control group (CG) consisted of 159 people and was consistent with the age and sex of the study group. The Mora 4G CQ Elektronik System device was used to assess body posture. Statistical analyses were

performed using the following tests: Mann-Whitney U, t-test, Spearman's rank correlation coefficient and Pearson's linear correlation.

**Results:** Women with IDD had significantly greater lumbar-sacral spine inclination (p=0.041) and upper thoracic spine (GAMMA) (p=0.000), as well as higher thoracic kyphosis (KP) (p=0.019), greater posterior trunk tilt (p=0.000) compared to women with CG. Men with IDD had significantly greater GAMMA inclination (p=0.000), greater KP (p=0.001) and lumbar lordosis (p=0.013) compared to men with CG.

**Conclusions:** People with mild and moderate IDD are characterized by increased thoracic kyphosis.

**Keywords:** intellectual disability, kyphotic posture, lordotic posture

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# Developmental support device "Ola" - innovative support for therapy of children with autism spectrum disorders

**Introduction:** The aim of this study is to present the potential benefits of using the developmental support device "Ola" in the therapy of children with autism spectrum disorder (ASD).

Materials and methods: The study involved 10 children diagnosed with autism spectrum disorder, including 8 children with high-functioning autism (without intellectual disability) and 2 children with autism and intellectual disability (mild and moderate levels). The study was based on continuous observation, with a particular focus on results obtained at the beginning and end of a series of therapeutic sessions.

These sessions were conducted once a week over a two-month period. The assessment primarily focused on aspects related to arousal regulation, sensory issues, and the frequency of challenging behaviors.

**Results:** The study results indicate a positive impact of the device on the analyzed aspects.

**Conclusions:** The use of the developmental support device "Ola" in children with autism spectrum disorder may represent a valuable supplement to therapy, especially in terms of its impact on arousal regulation.

Keywords: child, autism spectrum disorder, therapy.

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### Therapy for a Patient After Anterior Cruciate Ligament (ACL) Reconstruction: Restoration of Full Function

Introduction: Anterior cruciate ligament (ACL) reconstruction procedures are commonly performed in sports orthopedics, especially in physically active individuals. A key element in restoring full knee functionality and enabling the return to sports is a properly planned and executed rehabilitation program. The aim of this study was to assess the effectiveness of an individually tailored rehabilitation program in restoring full knee joint function in a patient who underwent ACL reconstruction.

Material and Methods: This study discusses the case of a 27-year-old man who, after a knee injury and arthroscopic surgery using a semitendinosus tendon graft, participated in a comprehensive therapeutic program. The rehabilitation process was divided into four stages, focusing on improving the range of motion (ROM) in the joint, muscle strengthening, knee stabilization, developing proprioception, and preparing for physical activity. The patient's progress was regularly assessed using functional tests, ROM measurements,

and muscle strength evaluations, enabling adjustments to the program based on current needs.

Results: The rehabilitation outcomes were significant. The range of motion in the operated knee improved from 60° to 135° in flexion and from -10° to full extension. Muscle strength in the operated leg, initially 45% of the strength of the healthy limb, achieved full parity after nine months of rehabilitation. Functional tests, including the single-leg hop test, Lachman test, and Pivot shift test, confirmed the restoration of knee stability and functionality. The patient was able to safely return to amateur football, regaining his pre-injury level of performance.

**Conclusion:** The individually tailored and dynamically adjusted rehabilitation program contributed to the full restoration of knee function, enabling the patient to return to an active lifestyle and sports at the pre-injury level.

**Keywords:** ACL, anterior cruciate ligament, knee joint, therapy

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## Mechanism of action and application of percutaneous electrolysis - a review of available studies

**Introduction:** Percutaneous needle electrolysis (PNE) is a modern technique that finds application in a variety of musculoskeletal disorders, especially tendinopathies. PNE has gained popularity among physiotherapists in recent years and is increasingly used worldwide. The purpose of this study is to present the mechanism of action, effectiveness and safety of using percutaneous electrolysis in musculoskeletal disorders.

**Materials and Methods:** Available studies on PNE published in PubMed, Google Schoolar databases over the past 15 years were reviewed based on keywords.

Results: The technique involves the application of a continuous, high-intensity galvanic current via an acupuncture needle under ultrasound guidance to precisely reach the damaged tissue area. This triggers a local inflammatory response, which induces phagocytosis and regeneration of damaged tissue. It has been studied that PNE causes a significant increase in the expression of genes involved in tendon repair

and remodeling such as Cox2, Mmp9 and Vegf. And it also increases the levels of prostaglandins, cytokines (e.g. IL-1, IL-6, TNF- $\alpha$ ) and growth factors (e.g. VEGF, TGF- $\beta$ ) which accelerates the repair processes. Hence, studies have shown the effectiveness of PNE in tendinopathy of the patella ligament, Achilles tendon, supraspinatus muscle lateral epicondylitis of the humerus, plantar fasciitis, carpal tunnel syndrome, among others.

#### **Conclusions:**

- Percutaneous electrolysis stimulates regenerative processes in damaged tissues by, among other things, affecting gene expression.
- The safety and effectiveness of percutaneous electrolysis have been demonstrated in several musculoskeletal disorders, mainly tendinopathies.

**Keywords:** percutaneous needle electrolysis (PNE); tendinopathy; mechanism of action; efficacy and safety

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# Effects of Buerger's exercise on d-dimers level in patients after hip arthroplasty

**Introduction:** D-dimer assays are commonly used in clinical practice to exclude a diagnosis of deep vein thrombosis with ultrasounds exams. Deep Vein Thrombosis (DVT) is a fatal complication of hip arthroplasty. Ultrasounds exams are helpful in DVT rehabilitation to control the deep vein thrombosis in lower limbs. The aim of our study was to examinate the role of Buerger's exercise on d-dimer levels after hip arthroplasty.

Material and methods: The study included 46 patients after hip arthroplasty, mean age was 69 years, min.44, max.85, M:F 1:2; with BMI, mediana 32,65, SD±5,2. 24 patients performed Buerger's exercise and a control group of 22 patients - isometric exercises. D-dimer levels were examinated at admission and after 4 weeks of rehabilitation. Ultrasounds exams were performed using Hitachi Arietta Ultrasound.

**Results:** Analysis of the early results showed a statistically significant decrease (p<0,01) in d-dimers levels in patients with Buerger's exercices (p=0,03) and in control group

(p=0,001). Initially, the study did not show any difference in the impact of Buerger's exercise and isometric exercise on d-dimers levels. Moreover, no influence of age, gender, BMI was found on the d-dimers levels at admission. In ultrasonography study: 16 % (n=7) patients with old thrombosis, 23% (n=10) patients with inefficient perforators were found. Conclusions: Buerger's exercise and isometric exercise reduced the risk of DVT after hip arthroplasty. This study confirmed the significant impact of exercises on the d-dimers levels after hip arthroplasty. However, D-dimer cannot be used to exclude DVT without ultrasound confirmation. Ultrasonography allowed to differentiate new, active from old thrombosis in deep inferior limbs veins. The role of pre-rehabilitation with physical exercices in patients with high risk of DVT may be very helpful in the future.

**Keywords:** D-dimers, Buerger's exercise, hip arthroplasty, ultrasonography.

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# Individualization of physical rehabilitation based on quality of life assessment in children with cerebral palsy

Introduction: Cerebral palsy (CP) is a complex neurological disorder characterized by multifactorial clinical manifestations. This condition affects not only motor activity but is also associated with impairments in cognitive, speech, visual, and auditory development, which may worsen over time (Piscitelli D. et al., 2021). The effectiveness of rehabilitation in CP depends on an individualized approach that considers both objective clinical data and the subjective perception of quality of life (QoL) by patients and their families. Objective of the Study: To identify specific features of the quality of life in younger school-age children with cerebral palsy to develop patient-oriented rehabilitation strategies.

Material and methods: The study included 30 children aged 6–12 years with a confirmed diagnosis of spastic hemiparesis CP. The following methods were used: Gross Motor Function Classification System (GMFCS) for motor assessment; functional skill assessment using the Box and Block Test and the

Manual Ability Classification System (MACS); goniometry to analyze joint range of motion; manual muscle testing (MMT) to determine muscle strength; the Ashworth Scale for spasticity evaluation; pain assessment using a modified Visual Analog Scale (VAS). Quality of life was evaluated using the specialized CP QOL-Child questionnaire completed by the children's parents. The results were statistically processed. Results: The analysis revealed significant impairments in joint range of motion, reduced muscle strength (as measured by MMT), and increased spasticity (p<0.05) in patients with varying forms and levels of CP (GMFCS I-IV). Motor impairments and high pain levels (VAS score: 7.4 ± 0.21 out of 10) further complicated the children's functional activity. Despite these challenges, the overall QoL score, as determined by parents using the CP QOL-Child questionnaire, was 61.4% (377.1  $\pm$  4.3 points out of 549), indicating a degree of adaptation to their condition. However, the QoL questionnaire responses identified key health issues requiring prioritized intervention in the rehabilitation process.

**Conclusions:** Planning a rehabilitation program for children with cerebral palsy should be based not only on objective clinical data. It should also take into account the impact of

the disease on quality of life. A patient-centered approach enables rehabilitation interventions to be more effectively tailored to the unique needs of each child.

**Keywords:** neurological disorders, hemiparesis, children, physical rehabilitatio

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# Effect of kinesiotaping following training inducing ankle stabilisers fatigue on balance and weight bearing ankle dorsiflexion range of motion in male football players

**Introduction:** This study investigate whether kinesiotaping applied to the ankle joint after exercise causing fatigue of the muscles stabilising this joint has an effect on the ability to maintain static balance, dynamic balance and weightbearing ankle dorsiflexion range of motion in male football players without ankle pain and instability.

Material and methods: The study included 50 men aged 18-30 years, practising football, randomly assigned to the study group (subjected to kinesiotaping for the ankle joint application) or the control group (not subjected to kinesiotaping application). Exam 1st was performed by the participants prior to a 20-minute physical exercise causing fatigue of the muscles stabilising the ankle joint. Kinesiotaping was then applied to the men assigned to the study group. Exam 2nd was performed after exercise. Research tools were the Flamingo Balance Test (FBT), the Y-Balance Test (YBT), and Ankle Lunge Test (ALT). The following tests were used in

the analyses: Student's t-test for independent varia-bles or non-parametric Mann-Whitney U test, Student's t-test for dependent variables or the Wilcoxon signed-rank test.

**Results:** In the case of FBT, the values of the differences in 1st and 2nd examination results did not yield statistically significant results (p>0.05). In the case of YBT, and ALT, the values for the differences between 1st and 2nd examination in the men in the study group were greater than in the men from the control group (p<0.05).

Conclusions: Kinesiotaping applied to the ankle joint after exercise causing fatigue of the muscles stabili-sing this joint has a beneficial effect on the ability to maintain dynamic balance and weight-bearing ankle dorsiflexion range of motion, whereas it does not significantly improve static balance in male football players without ankle pain and instability. Keywords: ankle, physical functional performance, football

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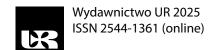
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# Long-term evolution of gait patterns abnormalities in young children with cerebral palsy treated with botulinum toxin injections and integrated/intensive rehabilitation

**Introduction:** Patients with CP present with complex gait disorders that evolve with age, contributing to reduced activity and participation in social life. The study aimed to assess the changes in gait pattern disorders over 5 years.

Material and methods: The study enrolled 200 patients with bilateral spastic CP aged 13 to 46 months. During the five-

year follow-up period, patients were included in a rehabilitation process that included physiotherapy, orthotics, multilevel botulinum toxin injections (BTX-A), and serial casting. The gait assessment was carried out by analysing two-plane video recordings. The results of the measurements were presented using the Modified Amsterdam Gait Classification (AGC).



**Results:** In 83% of patients, the gait pattern during the stance period did not change. The number of patients walking with extended knee and with foot-flat

increased from 13 to 28 and from 14 to 27 for the right and left limbs (RL/LL), the number of patients walking with extended knee and no heel contact

decreased from 132 to 106. Flexion patterns were presented by 55/54 subjects at baseline (RL/LL) and 66/67 at the time of the last assessment. The rate of foot drop during the swing

period decreased from 175/177 to 163/161 (RL/LL). The limitation of knee extension in the terminal swing phase increased from 129/128 to 145/144 (RL/LL).

Conclusions: The stability of the gait pattern was demonstrated with a small percentage of deterioration in the direction of the crouch gait. This confirms the effectiveness of integrated rehabilitation, in preventing the development of severe gait disorders in patients with CP.

Keywords: CP, Gait Pattern, BTX-A, Rehabilitation

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# Assessment of lower limb alignment of individuals from the Podkarpackie Province with mild and moderate intellectual disabilities aged 13-23 years compared to a peer group

Introduction: There is a paucity of reports in the literature on assessing the lower limb axis among people with intellectual disabilities. Reports of lower limb abnormalities in people with Down syndrome are available. Compared to their peer group, people with disabilities experience delayed physical development.

Material and method: A total of 750 people took part in the study; as a result of the recruitment process, 50 females aged 19.38±2.59 years and 50 males aged 17.84±2.68 years with mild and moderate intellectual disability without comorbidities from the Podkarpackie Province were recruited for the study proper. The control group consisted of 50 females aged 18.42±3.30 and 50 males aged 17.36±3.02. The control group was matched for consistency in anthropometric parameters. The CQ Cam HD4 Electronik System apparatus assessed the lower limb axis. In the statistical analysis, the tests used were: Shapiro-Wilk, Student's t, Mann-Whitney U, Chi2, Spearman's rank correlation, ES effect size index (Cohen's d, Glass's rg). The level of statistical significance was taken as p<0.05.

**Results:** The lower limb conformation of women in the control and study groups differed significantly in most pa-

rameters. OKP (p=0.003, rg=0.44, average effect strength), RK-K (p<0.001, d=0.77 effect strength high), SKKK (p<0.001, d=0.85, effect strength high), KKKL (p=0.017, d=0.50, average effect strength), KKKP (p<0, 001, rg=0.88, effect strength very high), KU-PL (p<0.001, d=0.74, effect strength high), KU-PP (p<0.001, rg=0.45, average effect strength), KKPL (p=0.044, d=0.41, average effect strength) and KKPP (p=0.017, d=0.50, average effect strength). In the control group, KSZ (p=0.001, rg=0.11, low strength of effect)

The lower limb axes of men in the control and study groups differed for some parameters. The results in the study group were statistically significantly higher for the parameters KKKP (p<0.001, rg=0.74, strength of effect very high), RK-K (p=0.002, d=0.63, average strength of effect), SKKK (p=0.037, rg=0.19, low strength of effect), KU-PL (p=0.005, d=0.58, average strength of effect) and KU-PP (p<0.001, d=0.80, high strength of effect). The control group had higher OKK (p=0.013, d=0.50, average strength of effect), KSZ (p=0.044, rg=0.19, low strength of effect)

**Conclusions:** People with mild and moderate intellectual disabilities, especially women, have more valgus lower limbs. **Keywords:** intellectual disability, lower limbs, valgus

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## Proprioception and the deep stabilization system: Challenges and solutions in prevention and rehabilitation

Introduction: Proprioception, the body's ability to perceive its position and movement in space, is a fundamental component of motor control and postural stability. The deep stabilization system (DSS), comprising core muscles and connective tissues, plays a pivotal role in maintaining spinal and joint stability, particularly during dynamic movements. Disruptions in proprioceptive feedback and DSS function can lead to a cascade of biomechanical imbalances, increased risk of injury, and chronic musculoskeletal disorders.

Material and methods: This presentation explores the interplay between proprioception and DSS dysfunction, focusing on the implications for prevention and rehabilitation. Key topics include neuromuscular adaptations in response to proprioceptive deficits. the role of proprioceptive training in restoring DSS integrity and the evidence-based strategies

for assessment and intervention.

**Results:** By integrating insights from recent research and clinical practice, this presentattion provides a comprehensive framework for addressing proprioceptive impairments and optimizing the function of the deep stabilization system in diverse populations.

Conclusions: The relationship between proprioception and the deep stabilization system underscores their critical role in maintaining postural control and preventing musculo-skeletal dysfunction. Addressing proprioceptive deficits and deep stabilization system impairments requires a multidimensional approach that integrates assessment, targeted training, and evidence-based interventions.

Keywords: Proprioception. Stabilization. Rehabilitation.

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# Assessment of the effectiveness of auto-relaxation of the plantar fascia on motor parameters within the superficial posterior band

**Introduction:** Self-myofascial release (SMR) is a technique that increases the range of motion within the myofascial sequence in the course of which it was used. SMR may be a helpful method in reducing increased tension within anatomical tapes.

Material and method: The research was conducted on a group of 30 healthy people, practicing recreational running at a distance of 13-15 km x3 per week, aged 20-30 years, with the average age of the examined women  $23.4 \pm 1.5$  years and men  $24.1 \pm 1$  years. Statistical analysis was performed using IBM SPSS Statistics 26. The subjects rolled a massage ball in a standing position, the area from the heel bone to the toes, focusing on the central part of the plantar fascia and the places where they felt increased tension (according to the methodology described by Grieve et al. [Journal of Bodywork & Movement Therapies, 2015], for a period of 3 minutes, with the strongest pressure, but without causing pain. Range of motion measurements were made using the Sit and Reach test, in 3 trials with a time interval of 15 seconds, from which the best result was selected. HMS lacrosse balls made of EPP material (diameter 6 cm) were used for the

autofascial release procedure. An average increase in the range of motion was obtained by 3.86 cm (SD = 2.11 cm).

Results Fascial auto-relaxation has a positive effect on the range of flexion movement within the posterior superficial tape. Working on one of the structures of the myofascial tape affects the flexibility of the entire tape. The greater the initial range of flexion movement within the posterior anatomical tape, the smaller the difference achieved in the range of flexion movement within the TPT. The higher the BMI of the subjects, the higher the difference obtained in the range of flexion movement within the superficial posterior band. Running does not have a significant statistical impact on the difference in the range of flexion movement within the posterior superficial band. The male gender predisposes to obtain greater differences in the range of flexion movement within the posterior anatomical band as a result of the use of SMR.

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### Assessment of the functional status of amateur basketball players after ankle sprain injury based on the FMS test

**Introduction:** The aim of the study was to assess the functional status of amateur basketball league players after a sprained ankle injury based on the FMS test.

Material and Methods: The research covered a group of 30 players of the amateur basketball league in Krakow, players of the amateur basketball league in Krakow called «Krakowski Nurt Basketu Amateurskiego» (KNBA). The research group consisted of 18 (60%) people after a sprain injury of the ankle joint, and the control group consisted of 12 (40%) people without a sprain injury. The average age of the respondents was 26.43 years. Sports characteristics of the respondents: 1-5 training sessions per week, 10-30 matches played per season. The diagnostic method was a questionnaire and a functional examination based on the FMS test. The research results were subjected to statistical analysis using a Microsoft Excel spreadsheet (the adopted level of statistical significance was 0.05).

Results: Of the individual exercises included in the FMS

test, the highest-scoring exercise among the competitors was the trunk stabilization test - push-up with an average of 2.60 points. for all players, for the control group the average was 2.92 points, and for the research group 2.39 points. The worst-scoring test was the trunk rotational stability test with an average of 2.07 points. for all players, for the control group the average was 2.08 points, and for the research group 2.06 points. The average value of the FMS test result for the research group was 15.50 points, and for the control group 17.33 points, and in total for all players the average point value was 16.23 points.

**Conclusion:** The final results showed that amateur league players have a good functional condition based on the FMS test. Athletes without a history of ankle sprain injury achieve better functional status in tests. Previous sprain injuries of the ankle joint lead to instability and have a negative impact on the functional condition of players in amateur basketball leagues.

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# Assessment of the impact of gum chewing on functional disorders of the stomatognathic system in a group of women teachers

**Introduction:** The aim of the study was to assess the impact of chewing gum on the occurrence of functional disorders of the stomatognathic system in a group of women teachers.

Material and Methods: The research covered a group of 74 women, professionally active primary school teachers, aged 24-55 (average age 39). An original questionnaire was used for research purposes. The results were analyzed statistically using a Microsoft Office Excel spreadsheet and the Statistica program. The statistical analysis used tables of the so-called feature distribution. multivariate or convergence, non-parametric Pearson's  $\chi 2$  test and Cramer's V-coefficient (statistical significance p<0.05).

Results Research has shown that stress is a factor that contributes to the occurrence of stomatognathic system disorders. The emerging pain and muscle tenderness in the speech apparatus were statistically significant in relation to the stress felt by the respondents. Other symptoms, such as sleep disorders, tinnitus and bruxism, were not statistically significant in terms of increased stress and its impact on the occurrence of disorders in the stomatognathic system. The moment of chewing the gum also turned out to be crucial - most of the respondents felt pain in the speech organ while chewing the gum. There was no significant relationship between the length of service and the occurrence of masticatory system disorders. The frequency and duration of chewing gum do not affect the stomatognathic system and the pain symptoms occurring within it.

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### A systematic review of robotic devices used in rehabilitation of the lower limb after stroke

Introduction: Stroke is one of the leading causes of death and disability worldwide. Studies show that stroke survivors have deficits in motor function in 80% of cases. In recent years, in addition to traditional rehabilitation, new technologies have been used after stroke, among others, and such as robotic devices to assist in the process of returning impaired functions after stroke. The purpose of this study was to review robotic devices with an impact for improving gait function in patients after stroke.

**Material and methods:** The review was conducted by searching PubMed, Web of Science, and Scopus databases, including randomized clinical trials that evaluated the effects of rehabilitation in the return of gait function in poststroke patients. The search was conducted in December 2024

in accordance with accordance with PRISMA guidelines.

**Results:** The review included 40 articles fulfilling the inclusion and exclusion criteria. The study participants were post-stroke ischemic and hemorrhagic, in the acute, subacute and chronic periods. The study used a review of the latest robotic devices as an adjunct to traditional rehabilitation for improving gait function in post-stroke patients.

Conclusions: In the review analysis, it can be concluded that supplementing limb allows for more intensive exercises and greater patient motivation. As well as for faster improvement of gait function in stroke patients.

**Keywords:** stroke, rehabilitation, lower limb, gait, robot rehabilitation

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# The impact of rehabilitation programs on the quality of life of patients with osteoporosis: the role of the nursing and physiotherapy team – literature review

**Introduction:** Osteoporosis is a chronic disease characterized by a decrease in bone mineral density, leading to an increased risk of fractures. Osteoporosis fractures, especially within the spine and hip, significantly worsen the quality of life of patients, causing pain, limited mobility and loss of independence. The aim of this literature review is to evaluate the impact of rehabilitation programs on the quality of life for patients with osteoporosis, with particular attention to the role of the nursing-physiotherapy team.

**Material and method:** A systematic review of the literature from 2016 to 2022 was conducted, including scientific articles, reports and publications in the field of medicine, epidemiology and healthy lifestyle, regarding rehabilitation in osteoporosis.

**Results:** Research shows that regular physical activity, especially resistance exercise, contributes to improved motor function, increased independence and reduced pain in patients with osteoporosis. Rehabilitation programs play a

key role in the management of fractures, being an important part of preventing further injuries and improving patients' quality of life.

#### **Conclusions:**

- 1. Rehabilitation programs implemented by the nursing and physiotherapy team play an important role in improving the quality of life of patients with osteoporosis.
- 2. Regular physical activity, especially resistance exercise, contributes to increase muscle strength, which supports body stability and reduces the risk of falls.
- 3. Educating patients about fall prevention and the importance of regular physical activity is crucial for effective rehabilitation
- 4. The cooperation of nurses and physiotherapists in the implementation of rehabilitation programs is essential for achieving positive results of therapy.

**Keywords:** osteoporosis, rehabilitation, nursing care, physiotherapy

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# Evaluation of the effect of Bobath therapy on the functional performance of a patient with the primary progressive form of multiple sclerosis - a case report

Introduction: Neurorehabilitation is an important part of rehabilitation. The growing number of patients, the great medical, social and economic importance of deficits of the nervous system cause a growing interest in more and more effective therapeutic methods directed at improving the functional performance and maintaining the independence of patients with chronic and progressive diseases for as long as possible.

Material and Methods: Bobath therapy directed at improving balance and agility of movement carried out in a patient diagnosed with primary progressive form of multiple sclerosis undergoing immunomodulatory treatment. Effects of 3 msc therapy (pre- and post-test) verified by tests: 2-minute walk test, FES -1, BERG Balance Scale.

**Results:** After 3 msc of therapy conducted 3 times a week, improved postural stability, improved trunk control and the ability to perform any movement with the upper limb while standing were obtained. The improvement in fitness translated into test results: 2-minute walk test: 52m: 65m; BERG Balance Scale 35:36; FES-1: 46:43.

Working on short-term goals such as trunk control and increasing selectivity of movements and sensorimotor integration enabled the achievement of functional goals such as improving the quality of gait and maintaining standing, and improving upper limb function with a stable trunk.

**Keywords:** Bobath method, multiple sclerosis, functional performance,

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### The Role of Pulmonary Physiotherapy in Preventing Complications of Post-COVID Syndrome

**Introduction:** The COVID-19 pandemic has left significant health consequences, including prolonged dyspnea, fatigue, and reduced quality of life in patients after recovery. The aim of the research was to assess the effectiveness of pulmonary physiotherapy in improving respiratory efficiency, reducing symptoms, and preventing complications associated with post-COVID syndrome.

Material and methods: The paper includes a literature review of articles published in the last 5 years in scientific databases such as PubMed, Google Scholar, and ScienceDirect. The review was conducted using the keywords: "COVID-19," "pulmonary physiotherapy."

**Results:** Breathing exercises, such as IMT, significantly improved respiratory muscle strength, reduced dyspnea, and enhanced physical fitness. Programs combining endurance and respiratory exercises, such as those in the RECOVE tri-

al, effectively improved overall physical condition, reduced fatigue, and enhanced patients' quality of life. Home-based therapies using simple devices proved to be both effective and accessible to a broad patient population.

#### **Conclusions:**

- 1. Pulmonary physiotherapy is a key component in the treatment of post-COVID patients, improving respiratory function and quality of life.
- 2. Rehabilitation programs should be individualized, combining respiratory and general exercises tailored to the patients' capabilities.
- 3. Further research on optimal rehabilitation protocols is needed to address the diverse needs of patients.

**Keywords:** COVID-19, pulmonary physiotherapy, dyspnea, quality of life, respiratory rehabilitation

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### The Type of Feedback and the Function of the Pelvic Floor Muscles in Ultrasound Imaging – A Pilot Study on a Group of singing Women

Introduction: The pelvic floor muscles have many functions. This study focuses on their supportive role and the conscious engagement of these muscles. During vocal exercises, instructors often recommend consciously working the pelvic floor and abdominal muscles (similar to physiotherapists when working with patients, especially when we do not objectively monitor muscle activity). Do these movement instructions actually stimulate the muscles we want to engage?

Materials and Methods: Seventeen women aged 20 to 26 years were examined. In addition to gender and age, the inclusion criteria for the study included active engagement in singing (at least once a week), no history of childbirth, no gynecological surgeries, and no symptoms of stress urinary incontinence. Participants were asked about \ pain in the lumbar spine and pelvis, their physical activity (besides singing), and their subjective assessment of physical activity. The study involved

checking by ultrasound whether there was movement of elevation or descent of the bladder during movement instructions and while observing the screen in real-time.

Results: Among the selected movement instructions (engage your core muscles, pull the tampon up with the vagina, stop the urine stream, tighten your pelvic floor, look at the screen – try to lift the bladder), «stop the urine stream» most effectively engaged the elevation movement of the bladder (in the study). Almost 100% of the participants reported experiencing pain in the lumbar spine or pelvis (in the past year).

Conclusions: It is likely that the most natural action, such as stopping urination, instinctively triggers bladder elevation. More studies are needed on larger, diverse groups, as well as the addition of more objective measurements in the research. It is concerning how many participants report pain.

Keywords: feedback, ultrasound, pelvic floor.

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### Physiotherapy and orthopaedics in the treatment of TFCC injury

Introduction: The triangular fibrocartilage complex (TFCC) is the cartilage itself, - type of disc that connects the ulnar bone with the carpal bones. It also consists of numerous ligaments, a structure similar to meniscus (homologous to the meniscus), and the tendon of the extensor carpi ulnaris (ECU) muscle. The main functions of this complex include cushioning the wrist, allowing for ulnar and radial movements, as well as rotational movements, and providing stability. The aim of the following work is to present to interested parties the topic of TFCC injuries, the possibilities of surgical treatment, and physiotherapy.

**Material and methods:** To create this work, a review and analysis of the literature (based on the PubMed database). This is a preliminary review that presents a classification of injuries, prognosis, and some examples of exercises.

Results: The literature presents good and very good results of

surgical treatment using various methods, as well as positive effects of conservative treatment. However, currently, there are few studies regarding conservative treatment, and they involve small groups. Given that cartilage itself has a low healing potential, it should be considered that conservative treatment may require a longer time. It is also worth to noting that many TFCC injuries remain asymptomatic.

Conclusions: The literature review, although limited, should be continued. Studies involving larger groups of participants would be useful. There is no single protocol for physiotherapy for TFCC injuries, and it may be difficult to create one for general. The TFCC is a small area but contains many structures; injuries can vary, and individualization of treatment, from a biopsychosocial perspective, seems to be a primary indication for any treatment.

Keywords: injury, overload, wrist, TFCC

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### The use of therapeutic ultrasound in EBP - cases study

Introduction: The use of ultrasound in the treatment of heel spurs, tendon damage and fractures has long been known. According to EBM or EBP, the duration of therapy, the number of treatments in a series, the selection of the correct ultrasound wave parameters depending on indications and long-lasting effects after UD therapy are not used in physiotherapy practice due to restrictions resulting from regulations introduced by the payer of medical services. From an economic point of view, shortening the treatment time for fractures, tendon injuries or heel spur treatment is a factor contributing to faster recovery and improving the quality of life of patients. The use of correct ultrasonic wave parameters in the treatment of fractures is associated with better callus formation, in tendon damage with greater tendon strength, and in the case of heel spurs with reduced inflammation and, consequently, pain reduction. All this leads to a faster recovery of the patient. Aim: The aim of the study was to assess the effectiveness ultrasound in the treatment of heel spurs, tendon injuries, and fractures, depending on treatment parameters, through long-term observations—a case study approach.

Materials and Methods: The study analyzed several clinical cases involving the treatment of heel spurs, tendon injuries, and bone fractures using ultrasound therapy in long-term observations. Functional tests, subjective evaluations of therapy effects (SOET), and the Laitinen scale were used to assess outcomes.

**Results:** The observations revealed significant functional improvements, a substantial reduction in pain thresholds, and long-lasting positive therapeutic effects following ultrasound treatment. These results varied depending on the diagnosis and the specific ultrasound wave parameters applied.

Conclusion: Clinical studies on the effectiveness of ultrasound in treating conditions like heel spurs, tendon injuries, and bone fractures are still ongoing. The selection of appropriate techniques and ultrasound wave parameters, with a focus on individualized therapeutic approaches, is critical. The promising results suggest that LIPUS may be advisable as a monotherapy for the treatment of functional disorders and pain.

**Keywords:** ultrasound, physical therapy, heel spur, bone healing, tendon damage, pain

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# Long-term effect of platelet-rich plasma treatment of inflammatory changes in the medial and lateral epicondyle of the humerus

Introduction: Pain in the musculoskeletal system, which prevents proper functioning and performing daily activities, encourages the development of newer and newer treatment methods. One of them is the use of platelet-rich plasma. Many authors emphasize the effectiveness of the modern method, but at different times after the therapy. Aim of the study: Long-term evaluation of the effects of cell-rich plasma treatment of inflammation in the medial and lateral epicondyle of the humerus.

Material and method: The study included a group of 27 people with lateral and medial epicondylitis of the humerus, who underwent PRP (Platelet Rich Plasma) therapy. The study was conducted using an original questionnaire using the

VAS pain assessment scale and measurement tests (range of motion, circumference, muscle strength of the elbow and wrist joints). The patients were examined three times: before plasma administration, one month after administration and 2 years after therapy. The following tests were used for statistical analysis: Friedman's Anova, Dunn's post-hoc test and Wilcoxon signed-rank test. The level of statistical significance of differences was assumed to be p<0.05.

**Results:** Pain complaints in the affected limb were determined on a scale from 0 to 10 points at an average level of 8.26 points  $\pm 1.2$  points in measurement I, at an average level of 1.3 points  $\pm 1.1$  points. in measurement II and at an av-

erage level of 0.74 points  $\pm 0.81$  points in measurement III. The results of three subsequent measurements were not equal (p=0.001). Significant differences were observed between the results obtained in measurement I in relation to II and in measurement I in relation to III. The results of measurement II and III did not differ statistically significantly. None of the activities that were difficult for the subjects in measurement I were reflected in measurement II and III. Significant differences were observed in the case of hygiene activities (p=0.007), dressing (p=0.001), holding objects (p=0.001), carrying objects up to 1 kg (p=0.001), carrying objects 2-5 kg (p=0.001), carrying objects 6-10 kg (p=0.001) and driving a car (p=0.001). With the passage of time, the activities that were difficult for the subjects were fewer and fewer. It was shown that among the subjects in measurements I, II and III the ranges of motion in the elbow joint in the directions of P flexion, L flexion and P pronation were not equal. In the case of P flexion, the result of measurement I was statistically significantly lower compared to the result obtained in measurement II (p=0.001) and compared to the result obtained in measurement III p= (0.001). In measurements II and III the results were similar. The strength of the P and L flexors as well as the P and L extensors was not equal in the three measurement periods. The increase in flexor muscle strength occurred after each subsequent measurement, in the case of the right limb there were significant differences between the results of measurement I compared to II (p=0.001) and III (p=0.001) as well as between the results of measurement II compared to III (p=0.006). It was shown that the range of motion in the wrist joint was not equal in three subsequent measurements in the case of P flexion, L flexion, P extension and L extension movements. The range of motion of P flexion, P extension and L extension systematically increased in each subsequent measurement. Statistically significant differences were confirmed in measurement I compared to III (p=0.001) in the case of both P and L extension (p=0.001). There was no equality between the muscle strength of the wrist joint in the P flexors, L flexors, P extensors and L extensors. The muscle strength of the L flexors, P extensors and L extensors systematically increased in each subsequent measurement (p=0.001).

Conclusions: Platelet-rich plasma treatment of lateral and medial epicondylitis of the humerus reduced pain and improved upper limb function lasting up to 2 years after therapy.

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# Application of ICF to assess functioning, activity and participation of people with significant disabilities - preliminary results

**Introduction:** Comprehensive assessment of health status and functional ability is a key element of diagnostics of people with significant disabilities. The aim of the study was to assess functioning, activity and participation of people with significant disabilities based on ICF.

Materials and Methods: The study involved 250 people aged 18 years and over with significant disabilities. Functions, Activity and Participation were assessed according to ICF qualifiers defining the scope of the problem or limitation.

**Results:** The greatest scope of the problem in terms of functions in the studied group of people was demonstrated in the

ICF categories of Sensation of pain (b280) and Exercise tolerance functions (b455). The greatest limitations in activity and participation were found in the ICF categories of Doing housework (d640), Using transportation (d470), Walking (d450) and Maintaining body position (d415).

**Conclusions:** The results of the study indicate that the ICF assessment of Function, Activity and Participation provides a valid framework for assessing health-related problems in people with significant disabilities.

**Keywords:** ICF, categorical profile, disability, functional status, activity and participation

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### Assumptions of the scientific project "Assessment of functioning and living environment of people with a significant degree of disability based on ICF"

Introduction: The use of a comprehensive model of assessment of functioning and environment enables individualization of planned support based on reliable and uniform diagnostics of people with a significant degree of disability. The aim of the project is to create conditions for providing optimal support to people with a significant degree of disability in the field of social and professional rehabilitation by developing and validating a categorical profile based on ICF. Materials and Methods: The study involved 250 people aged 18 and over with a significant degree of disability.

The project was divided into the following stages:

- 1) Preparation of the first version of the categorical profile based on the ICF classification.
- 2) Formulation of questions and mapping of tools for assessing individual ICF categories included in the created categorical profile.

- 3) Conducting the study using the categorical profile.
- 4) Statistical verification of the proposed assessment model.
- 5) Preparation of the report and dissemination of the study results

Results: A categorical profile was created to assess the functioning and living environment of people with a significant degree of disability based on 14 codes from Body Functions, 21 codes from Activity and Participation, and 16 Environmental Factors.

**Conclusions:** Based on the implemented scientific project, a model for assessing the functioning and living environment of people with a significant degree of disability was developed based on the ICF classification.

**Keywords:** ICF, categorical profile, disability, functional status, living environment

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# Application of ICF to assess the living environment of people with significant disabilities - preliminary results

**Introduction:** The interaction between health status and barriers occurring in the immediate environment of people with disabilities can lead to limitations in activity and participation in daily activities. The aim of the study was to assess the living environment of people with significant disabilities based on the ICF.

Materials and Methods: The study involved 250 people aged 18 and over with significant disabilities. Environmental factors were assessed according to ICF qualifiers defining the scope of the barrier or facilitation.

Results: The greatest barriers in the group of people studied were found in the ICF categories Architectural designs, construction and building materials and technologies enabling access to facilities in buildings for private use (e.g. apartment block, house) (e1551) and Healthcare services, systems and policies (e580). The greatest facilitations in the scope of ICF environmental factors were indicated in the scope of Food (e1100) and Friends, peers, colleagues, neighbors and members of the local community (e325).

Conclusions: The results of the study indicate that the assess-

ment of the living environment in accordance with the ICF is an important element in the assessment of the functioning of people with a significant degree of disability. Optimization of the surrounding living environment can contribute to a

greater degree of independence, even with existing health problems in people with disabilities.

**Keywords:** ICF, categorical profile, disability, functional status, living environment

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### Physiotherapy after arthroscopy and subpopliteal osteotomy – case report

Introduction: Osteotomy is a surgical procedure aimed at transferring the load of the knee to healthier cartilage by restoring the correct knee axis and consequently prolonging the knee's functionality. The advantages of osteotomy include: preserving one's own tissues and bones, the possibility of pain relief, inhibition of progression of degenerative knee disease, the possibility of avoiding or postponing the need for alloplasty by 10-15 years, the possibility of restoring full physical activity, especially in younger patients.

Material and methods: Patient aged 60, active, not overweight, with good knee joint mobility, knee pain only during activity or prolonged knee loading, meeting the criterion for implementing longer postoperative rehabilitation and limb offloading, i.e. walking on crutches for 8 to 10 weeks. After left knee arthroscopy: meniscus repair, microabrasion on the tibia at the site of cartilage defect and opening of the knee marrow cavity and after popliteal osteotomy of the

left knee - limb axis correction by 6.5 degrees was achieved. Physiotherapeutic procedure was carried out in accordance with the protocol, additionally in each of the four phases: I

- in-hospital stage and early stage of home convalescence, II
- subacute stage, III progressive loading and strengthening and IV return to full activity an antigravity treadmill was used, which allows for precisely graded gait training with even 100% unloading. Conclusions: As a result of arthroscopy and left knee osteotomy, pain symptoms were reduced (VAS scale) and the patient's functional condition (LLFI Question-naire) improved. Return to work occurred 10 weeks after the surgery. Complete recovery, defined as "painfree" return to full activity, including non-restrictive exercise, may take 6 months or longer. Proper postoperative physical therapy is integral to the success of the surgery.

**Keywords:** popliteal osteotomy, arthroscopy, physical therapy.

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# Evaluation of longitudinal and transverse foot arches in a group of secondary school students with consideration of body weight

Introduction: The foot is an anatomical structure that supports the whole body and influences activities such as standing, walking and running. The correct formation of the foot ensures optimum performance of the foot and the efficiency of the balance and cushioning mechanism. Any deviation from the prevailing norms can result in disorders in distal parts of the body, if only by affecting the posterior superficial muscle band. The aim of this study is to analyse the parameters of longitudinal and transverse arches of the feet under weight-bearing conditions, considering the influence of body weight on the occurrence of foot defects.

Material and methods: The study group consisted of 41 students (24 K, 17 M) of the I Liceum Ogólnokształcące im. Ks. Jana Twardowskiego in Dębica, aged 15 to 18 years. The research method used was a podoscopic examination using a 2D Podoscan under conditions of foot relief. The values of Clarke's angle, Wejsflog index were statistically analysed. Body height and weight were measured, and BMI was calculated using a personal scale with a RADWAG height meter.

**Results:** The largest number of participants (31) represented a normal BMI value (in the centile range 25-85). Overweight (6) and obesity (1) were observed more frequently than un-

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derweight (3). Among the subjects, 43.9% showed the correct value of Clarke's angle in both feet. Referring to the Wejsflog index, 48.78% of the subjects have correct transverse arches in both feet. A BMI above normal values has been shown to influence the value of foot angles and indices assessed in this study. Conclusions: Based on the results of the data analysis, body weight and height play a key role in shaping the sole of the

foot. These two parameters influence the biomechanics of the foot, determining its structure, pressure distribution and foot contact area, which can have important implications for its function and health.

Keywords: longitudinal and transverse arches of the feet, Clarke's angular index, Wejsflog index, 2D podoscan

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# Monitoring the effects of CBD therapy using QEEG in supporting the rehabilitation of children with drug-resistant epilepsy"

Introduction: Epilepsy is one of the most common neurological disorders, affecting both children and adults, with approximately 30% of cases being resistant to pharmacological treatment. Cannabidiol (CBD) has garnered increasing interest as an adjunctive therapy, particularly in severe forms such as Dravet syndrome and Lennox-Gastaut syndrome. Quantitative electroencephalography (QEEG) is a promising tool for monitoring changes in the bioelectrical activity of the brain in patients treated with CBD.

Materials and Methods: The literature analysis was conducted based on 10 clinical publications from the ScienceDirect and PubMed databases, covering 400 children with drug-resistant epilepsy. The studies evaluated the effects of CBD therapy (0.5–50 mg/kg/day) on seizure frequency, duration, and intensity, as well as changes in QEEG recordings. Effectiveness was assessed using clinical response and QEEG data.

**Results:** More than half of the patients experienced a reduction in seizure frequency, and some achieved complete remission. While certain patients showed improvements in QEEG recordings, the data were heterogeneous. Reported adverse effects included fatigue, diarrhea, and drowsiness, which in some cases led to treatment discontinuation.

Conclusions: The results indicate the potential of CBD as an adjunctive therapy for drug-resistant epilepsy, particularly in reducing seizures among pediatric patients. Monitoring therapy effects with QEEG provides valuable diagnostic insights; however, interpreting the results requires high specialization. Further controlled studies are essential to conclusively determine the long-term efficacy and safety of CBD therapy and its impact on QEEG patterns in this population. Keywords: CBD, drug-resistant epilepsy, pediatric rehabilitation

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### Development of Physical Therapy in Galicia in the Second Half of the 19th - Early 20th Centuries

Introduction: The development of physical therapy in Europe in the 19th century was primarily associated with hydrotherapy, which was very popular at that time. Trips to get well "on the water" became fashionable in increasingly large social circles. At the same time, new sanatoriums had been established, most often located near large cities, where a number of different procedures like therapeutic gymnastics, physical therapy and massage were used. The aim of this

investigation was to find out how this process took place in Galicia, particularly in its capital - Lviv.

Material and methods: An analysis of archival sources was conducted in the following libraries: Danylo Halytskyi National Medical University, Lviv Regional Scientific Medical Library, Ivan Franko Lviv National University, Lviv National Scientific Library of Ukraine named after V. Stefanyk, Ivan Boberskyj Lviv State University of Physical Culture.

Results: The beginnings of the oldest physical therapy and hydrotherapy center in Lviv were connected with Franciszek Medvei. On May 1, 1859, he launched the "Department of Gymnastics and Hydropathy Treatment" and began to practice physical therapy methods at the Kiselka sanatorium, but hot medical baths existed in this place already at the end of the 18th century. F.Medvei, not being a doctor himself, had to hire a doctor. Dr. Francis Getcher who presented the newest methods of hydrotherapy, as well as therapeutic gymnastics grounded on the method of the Swedish doctor Ling and dietetics, known in Western Europe.

Another well-known institution was the "Mariivka" sanatorium put into operation in 1890 by industrialist Emil Bryer. Two buildings were intended for patients, and in the third, there were devices for physical therapy. There were, among others, two rooms for hydrotherapy, electric baths, an electrotherapy room, a gym. Dr. Zakrevsky, who worked in a sanatorium, was the first in Galicia to introduce mud treatment with volcanic fango. As it can be seen from numerous advertisements in the press, therapeutic massage was also introduced in the "Mariivka" sanatorium. Physiotherapy in "Mariivka" was supplemented with physical work and excursions, diet therapy treatment using the Weitz-Mitchell system was carried out here.

Dr. Kazimierz Soletskyi's Health House was another one of the best private clinics in Lviv in the 19th and early 20th centuries. A physical therapy center "Sanatorium - Solecki Lwów" was also organized in this modern clinic. Mineral, gas and electric baths, phototherapy, inhalation and radiation therapy were used here. Treatment was provided to patients who were in the clinic, as well as in the outpatient clinic.

Another physical therapy medical institution in Lviv at the beginning of the 20th century was the sanatorium of Dr. Yevhenius Weigel. Any person who was suffering from any types of diseases, except for infectious and mental ones was admitted to the sanatorium. The letter were given treatment at the sanatorium of Dr. Jan Sventkovskii. The sanatorium also provided domestic help.

Among others we also have to mention the sanatorium of Karol Bratkovsky with mineral baths with the addition of carbonic acid, using the apparatus of Prof. Nemilovich, as well as peloid, iodobromine, iron, salt and sulfate baths. Dr. J. Lyubich-Voitkovskii was the initiator of bringing mechanic therapy devices to Galicia from Stockholm. He together with Dr. Antoni Gabryshevsky opened the modern Zander Boarding House in Lviv in 1908. Another very famous hydrotherapy institution in Lviv was the Bath House of St. Anna. It was built on the site of a water spring, which was famous for healing water among the inhabitants for centuries. In 1888 the group of dilapidated buildings was purchased by Ferdinand Gross, and within two years he transformed it into an exquisitely furnished bathing center equipped with marble and zinc baths, Roman steam baths, and a spacious pool with spring water. St. Ann's Bathhouse was open throughout the year, with separate sections for women and men. Since 1909, there has been a medical office under the leadership of doc. E. Kovalskyi. Conclusions: The activities of the sanatoriums and hydrotherapy centers of Galicia before the First World War were not limited to hydrotherapy, they successfully introduced various forms of physical therapy, which primarily included therapeutic gymnastics, physical therapy, and massage. Restorative treatment carried out in Lviv hydrotherapy facilities (especially in the sanatoriums "Kiselka" and "Mariivka") had features of complex physical rehabilitation, and its

level did not differ from European physical therapy clinics.

Keywords: hydrotherapy, physical therapy, therapeutic gym-

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### Problems and rehabilitation challenges in cauda equina syndrome - a case report

nastics, Galicia

**Introduction:** The aim of this study is to analyse the causes of cauda equina syndrome and to recognise the difficulties that the patient's rehabilitation process may pose.

Material and methods: A 36-year-old patient with symptoms of cauda equina damage admitted to the Rehabilitation Clinic for comprehensive rehabilitation. History of chronic lumbar spine pain of variable intensity persisting for a year. Untreated for chronic diseases. Allergies, addictions denied. In October 2024 there was an exacerbation of right lower

limb radiating pain, paresthesias, left lower limb's muscle weakness. On XcdX, the patient developed urinary and faecal retention and weakness of superficial sensation, involving the abdominal integuments from the umbilical region downwards, the right lower limb in its entirety and the left lower limb up to the knee. She was urgently admitted to the Department of Neurosurgery, where diagnostic imaging was performed. Magnetic resonance imaging showed a 7.5mmx 15mm wide subarachnoid herniation compressing the men-

ingeal sac and nerve roots, 4mm canal stenosis, S1 lumbalization. She was treated surgically.

**Results:** After the implemented surgical treatment and rehabilitation, an improvement in general physical performance was achieved, the symptoms of the cauda equina syndrome disappeared. Completely independent in activities of daily living. **Conclusions:** Lower back pain is one of the most common

reasons for patients presenting to GPs. The onset of symptoms of cauda equina damage requires urgent diagnosis and surgical treatment, followed by appropriately selected specialist rehabilitation

**Keywords**: cauda equina syndrome, surgical treatment, rehabilitation

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### Physical activity assessment of pregnant women and weight gain

Introduction: Current recommendations clearly emphasize the benefits of undertaking physical activity during pregnancy. It can reduce the risk of excessive weight gain Turing pregnancy and the incidence of obstetric complications. Due to the increasing number of obese pregnant women, studying the impact of physical activity on weight gain in pregnancy is important. The results may increase public awareness of this important issue and contribute to more effective prevention of obesity and perinatal complications. Objective: To evaluate the impact of physical activity during pregnancy on weight gain. Material and methods: To obtain data, the study used a diagnostic survey method and an author's survey questionnaire. The study was conducted in the form of online in the group, "Moms and toddlers 2023, the best group for moms" and face-to-face at the John Paul II City Hospital in Rzeszow from 19.12.2023 to 25.01.2024. The  $\chi$ 2 test of independence was used in the statistical study. A statistical significance level of p<0.05 was adopted.

Results: The study showed that most of the women surveyed

(52.0%) limited physical activity during pregnancy. However, women who were physically active before pregnancy (52.0%) and urban residents (73.9%) were more likely to engage in physical activity during this period. The study proved that physical activity has a positive effect on normal weight gain during pregnancy-pregnant women undertaking physical activity accounted for 71.4% of respondents who achieved the recommended weight gain Turing pregnancy. Only 23.2% of the women surveyed were recommended to undertake physical activity during pregnancy.

Conclusions: It is necessary to implement effective education on the benefits of engaging in physical activity during pregnancy in order to change the current trend of reducing it. It is equally important to increase women's awareness of the impact of weight on Materna and child health and of the potential risks of obstetric complications. Such an approach could help reduce the percentage of overweight and obese pregnant women and improve obstetric outcomes.

Keywords: physical activity, pregnancy

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# The role of nurses and physiotherapist in the treatment of obesity and its health complications

**Introduction:** Obesity is a serious health issue that affects many aspects of physical and mental well-being. It is a major cause of numerous health complications, such as type 2 diabetes, cardiovascular diseases, and joint pain. An integrated approach, involving collaboration among physio-

therapists, nurses, and other specialists, plays a crucial role in treating obesity.

**Materials and methods:** This study employed a systematic review method of literature and online resources. The review was conducted using the following scientific databas-

es: PubMed, Scopus, and Web of Science. Articles published between 2010 and 2024 were analyzed. The scientific reports focused on the role of nurses, the potential of physiotherapy, obesity, and health complications associated with obesity. The inclusion criteria encompassed scientific publications in Polish, published between 2010 and 2024, that were available in full text and contained up-to-date information relevant to the topic. The exclusion criteria included articles not directly related to the subject of the study or not referencing contemporary research in the discussed area.

**Results:** Obesity requires a holistic approach that addresses the physical, psychological, and social needs of patients. Physiotherapists contribute to weight reduction through exercise therapy and improving physical fitness. Nurses mon-

itor patients' health, provide health education, and offer emotional support. Modern technologies, such as mobile applications and monitoring devices, enhance the effectiveness of rehabilitation. Challenges related to motivating patients to adopt lifestyle changes are also discussed.

**Conclusion:** Collaboration between physiotherapists and nurses is fundamental to effective obesity therapy. The role of these professionals in the therapeutic process includes both practical and educational activities that enable patients to achieve long-term health improvements and a better quality of life.

**Keywords:** obesity, physiotherapy, nurse, interdisciplinary collaboration

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## Stroke in a young person as a diagnostic, therapeutic and rehabilitation problem - a case report

**Introduction:** Analysis of stroke risk factors and presentation of diagnostic, therapeutic and rehabilitation management.

Material and methods: The patient, a woman in her 30s, until the onset of the disease was not treated for chronic diseases or cancer, and has not required hospitalization to date. No use of hormonal contraception, no history of embolic incidents. Patient after 2 episodes of generalized seizures without loss of consciousness, diagnosed and treated in the Neurology clinic - diagnosed SAH. On day 22, the patient's condition worsened. The patient suddenly developed nausea, vomiting and severe localized pain in the occipital region. Left hemiparesis, decreased visual acuity, double vision and signs of central type VII nerve damage were also observed. SAH and intracerebral hemorrhage were diagnosed. After 2 days, the diagnosis was expanded and a DSA examination was performed, which showed complete obstruction of the

sagittal sinus of the brain, the transverse and sigmoid sinuses of the right brain, and the right internal jugular vein. In the treatment process, low-molecular-weight heparin was administered, thrombectomy was performed and rehabilitation was started.

**Results:** Significant improvement in large and small motor skills was achieved. Ashworth scale assessment of the upper and lower left limb - 0. Brunnström scale of upper limb/hand/lower limb - 5/5/6. Barthel scale - 100/100.

Conclusions: Cerebral venous thrombosis is a rare condition and presents a difficulty in diagnosis. Magnetic resonance imaging, DSA or CT scanning is required for an accurate diagnosis. Comprehensive rehabilitation contributes to reducing the negative effects of stroke and making the patient more independent and self-reliant in basic activities of daily living.

Keywords: SAH, CVT, stroke

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### The relationship between the type of delivery methods and blood pressure in children and adolescents

Introduction: Arterial hypertension is the most important modifiable risk factor for cardiovascular disease and the leading cause of premature death worldwide. Data from repeated blood pressure measurements, from early childhood to early adulthood, support the association of elevated blood pressure (BP) in adolescence with hypertension in adult life and normal BP in childhood with absence of hypertension in middle age. Numerous studies indicate that type of delivery may be one of the most important determinants of BP in later life.

Material and methods: Ultimately, 747 children and adolescents aged 4-15 years were included in the study. Anthro-

pometric measurements, blood pressure measurement and assessment of prenatal factors were performed.

**Results:** Delivery by caesarean section increases the risk of higher blood pressure - in this group there are 43.5% of such cases compared to 38.8% in a group of naturally born children. The difference is statistically significant ( $p = 0.015^*$ ). Arterial hypertension was found in 23.5% of children born naturally.

**Conclusion:** Caesarean section increases the risk of elevated blood pressure in childhood.

**Keywords**: childbirth, delivery, caesarean section, blood pressure

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### Physiotherapy in a patient after multi-organ injury: a case report

Introduction: Physiotherapy in multiple trauma is a long-term process with a wide spectrum of effects. The physiotherapy program should be individually tailored to the patient, depending on their general condition and injuries, which requires defining the most important goals of each stage of rehabilitation and trying to achieve them. This study aimed to present a comprehensive physiotherapy treatment for a patient with a multi-organ injury aimed at improving the patient's function and physical fitness.

Material and methods: A 57-year-old man after a motorcycle accident with fractures of both femurs, dislocation of the upper and lower ankle joints, rupture of the 9th thoracic vertebra (Th9) and post-traumatic subarachnoid hemorrhage (tSAH) was admitted to the Rehabilitation Clinic with the Early Neurological Rehabilitation Subunit at KSW No. 2 in Rzeszów for rehabilitation. On admission, the patient was a bedridden person with impaired communication (mixed aphasia), lim-

ited mobility of the lower limbs, weakened muscle strength of the trunk and lower limbs, and significant pain (VAS = 8). The twelve-week physiotherapy program included: individual therapy, exercises using modern devices based on biofeedback, verticalization, gait re-education, and occupational therapy. **Results:** The comprehensive physiotherapy treatment significantly improved the patient's health. The patient left the ward walking independently without orthopedic equipment, assistance from another person or the need for further care. **Conclusions:** Physiotherapy of each patient with a multi-organ injury should be individually tailored to the patient's condition and needs. Defining goals, intensive and systematic physiotherapy bring measurable results, especially when the patient has access to various and modern forms of rehabilitation.

**Keywords:** subarachnoid hemorrhage, SAH, multi-organ trauma, gait re-education, physiotherapy, rehabilitation

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# Assessment Activity and Participation according to the International Classification of Functioning, Disability, and Health (ICF) in the oldest old hospitalized with acute geriatric unit

**Introduction:** A comprehensive assessment of health status and functional capacity is a key element in the diagnosis of an older person during hospitalisation. The aim of this study was to assess activity and participation using the International Classification of Functioning, Disability, and Health to classify the physical health of older people hospitalised in an acute geriatric ward in south-eastern Poland.

Material and Methods: A total of 281 people aged 80 years and older who were hospitalised in a geriatric ward in south-eastern Poland were included in the study. Activity and participation were assessed using a set of ICF categories designed to assess dependency. The relationship between health satisfaction and self-rated quality of life and disability index was assessed using a linear regression model.

**Results:** The greatest activity limitations in the study group were found in the ICF entities of Walking (d450), Under-

taking a single task (d210) and Carrying out daily routine (d230). The activity and participation disability index increased statistically significantly with the age of the subjects. Subjects with lower health satisfaction and self-rated quality of life had a statistically significantly higher disability index in the ICF activity and participation categories.

Conclusions: The results of the study suggest that the ICF-compliant assessment of activity and participation is an appropriate framework for assessing health-related problems in the oldest people in the oldest age groups. The results may suggest that the standard comprehensive geriatric assessment procedure in geriatric wards should be extended to include additional ICF-based measures.

**Keywords:** Aging, Health, International Classification of Functioning, Disability and Health

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### Non-pharmacological methods of treating spasticity in people with neurological disorders – a systematic review of the literature

Introduction: Spasticity is defined as a disorder of sensorimotor control resulting from upper motor neuron damage, manifested by intermittent or persistent involuntary muscle activation. Abnormal motor control caused by spasticity can lead to progressive functional limitation. The literature recommends using an interdisciplinary therapeutic approach in the treatment of spasticity. The aim of the review is to analyze scientific reports on non-pharmacological methods of treating spasticity in people with various neurological disorders. Material and methods: A literature review was conducted using the PubMed and Science Direct databases and the key

words: Non-pharmacological intervention, Spasticity, Rehabilitation, Disability, Adult. The inclusion criteria were: publication year 2014-2024, randomized controlled trial, age of the study participants 18 years or over, chronic disease or condition after invasive and non-invasive damage to the central nervous system. Exclusion criteria were: year of publication earlier than 2014, cross-sectional studies and meta-analyses, articles evaluating pharmacological and/or surgical interventions in the treatment of spasticity. After verification of the selected works, 21 scientific articles were included in the final analysis.

Results: It was found that effective non-pharmacological methods used in patients with spasticity include individual physiotherapy involving work on improving the range of motion, regulation of muscle tone, neurophysiological methods (Vojta, Bobath), vibration therapy, electrotherapy with electrostimulation, verticalization and orthopedic supplies. Conclusions: Despite the documented beneficial effects of many non-pharmacological interventions in the treatment

of spasticity in the literature, the optimal timing, type, and intensity of therapy remain poorly defined. Interdisciplinary spasticity treatment programs should include a range of individualized and goal-oriented therapies tailored to the specific needs of the patient.

**Keywords:** Spasticity, Non-pharmacological intervention, Rehabilitation

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# Reliability and validity of the MCS Zebris in the assessment of cervical spine range of motion compared to the CROM device

Introduction: To date, no studies in Poland have evaluated the reliability of the Zebris MCS system. Various methods for measuring spinal range of motion, such as the Zebris system and the CROM goniometer, are used both in diagnosing disorders and in planning and evaluating the effectiveness of therapy. The aim of this study was to assess the reliability and validity of the Zebris system in measuring cervical spine range of motion in a population of young adults in Poland and to compare the results with those obtained using the CROM device, which is considered the standard for such measurements. Materials and Methods: The study involved 61 healthy participants. Each participant underwent two measurements, conducted two weeks apart, by two independent raters. The cervical spine range of motion was measured in a seated position, across three planes of motion. An ultrasonic Zebris system was used for the measurements, and its results were compared with those obtained using the CROM goniometer.

Reproducibility was assessed by comparing two measurements performed by the same rater, while reliability was evaluated by comparing the results obtained by the two raters. Results: The analysis demonstrated a high level of agreement between the two measurements and between the results obtained by the two raters, with Intraclass Correlation Coefficients (ICC) exceeding 0.9. The comparison of the Zebris and CROM results showed similar accuracy for both devices, confirming their validity in measuring cervical spine range of motion. Conclusions: This study confirms the high inter-rater and intra-rater reliability of the Zebris device in assessing cervical spine range of motion. The comparison with the CROM device indicates that Zebris can successfully serve as an alternative in daily clinical practice. Both devices provide precise and consistent assessments of therapy outcomes, enabling reliable and accurate monitoring of treatment progress. Keywords: cervical spine, spine range of motion, Zebris device

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### Assessment of gait symmetry in selected age groups

**Introduction:** Symmetry in relation to gait is analyzed as the ideal correspondence between external kinematics and external kinetics for the right and left lower limbs. The aim of the study was to assess gait symmetry in subjects of different ages, based on the symmetry coefficient and selected timespace parameters of the Walk protocol.

Material and methods: The analysis included 104 participants, divided into two age groups. The first group included 53 people

aged 20 to 30 years, and the second group included 51 people aged 60 to 80 years. All subjects underwent gait assessment using the BTS G-sensor motion analysis device using the Walk protocol. The assessed gait distance was 7 meters. Static calculations were performed using the following methods depending on the analyzed data: Shappiro-Wilk test, Chi2 test, Student's T test or Anova depending on the number of response variants, Kruskall Wallis test or Wilcoxon test for

quantitative variables with a non-normal distribution, Pearson or Spearman test depending on the distribution. P values lower than 0.05 were considered significant.

**Results:** 1. The average step length, both left (p=0.033) and right (p=0.015) was significantly greater in the student group compared to the senior group. 2. The right limb stance phase was significantly lower in people with a mixed work mode compared to sedentary work (p=0.011), and the right limb stance phase reached higher medians in people with a sedentary work mode compared to people working standing (p=0.015). 3. Post hoc analysis between the mode of work performed and the right limb step length showed that people working in a mixed mode had significantly higher medians

compared to those working in a standing mode. 4. Pelvic rotation disorders occurred significantly more often in the senior group, constituting 56.90%, compared to the young group 11.30% (p<0.001). 5. In the stance phase (34%) and transfer phase (39%), the left lower limb symmetry disorder dominated in the young group, and in the senior group in the stance phase (59%) and transfer phase (53%), the left side symmetry disorder also dominated. Support phase disorders occurred significantly more often in the senior group.

**Conclusions:** The symmetry coefficient, as well as some timespace parameters, change with age. These changes also apply to physical activity.

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# Planning physiotherapy in the course of musculoskeletal cancer in children and adolescents – what to keep in mind.

**Introduction:** Cancer affects not only adults but also children. In Poland, about 1100 – 1200 new cases of malignant neoplasms are diagnosed annually in the group of children and adolescents. Bone and soft tissue cancers account for 7% of all cancers in children.

Material and methods: Treatment of bone and soft tissue cancers in children is much more intensive and the prognosis is better than in adults. Localized forms of cancer in both soft tissue sarcomas and primary bone tumors promise a cure rate of 70% - 80%. Unfortunately, in disseminated disease, the prognosis is much worse and amounts to about 20% - 40%. The disease itself and comprehensive, intensive treatment lasting on average from 12 to 24 months carry the risk of both early and late complications. They lead to a reduction in the physical activity of patients, a decrease in their physical performance, growth and development disorders. Therefore, it is extremely important to provide these patients with physiotherapeutic care from the very beginning of treatment. Children and adolescents affected by muscu-

loskeletal cancer after sparing, mutilating or thoracotomy procedures are patients who require a lot of attention, patience, understanding, but at the same time confident guidance through the rehabilitation process on the way to fitness. The high degree of curability of young patients obliges us, physiotherapists, to make the most of their physical potential during and after treatment.

Results: In order to guide children and adolescents through the treatment process of musculoskeletal cancer and after its completion, it is important to know the basic rules of precaution and safety during physiotherapy. Compliance with them will allow patients to plan and implement the rehabilitation process in an optimal way, in accordance with their current capabilities, improve their quality of life at every stage of treatment and enable an active return to the family and peer environment.

**Keywords:** physiotherapy, musculoskeletal neoplasms in children and adolescents, saving operation.

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## The Application of Modern Physiotherapeutic Methods to Improve Motor Function in Children with Arthrogryposis

**Introduction:** Arthrogryposis multiplex congenita (AMC) is a congenital condition of the musculoskeletal system characterized by joint contractures and limited limb mobility. This presentation focuses on the role of physiotherapy in the comprehensive treatment of children with AMC, emphasizing the importance of individualized therapeutic approaches.

Materials and Methods: A review of scientific literature available on PubMed was conducted using the keywords: «arthrogryposis,» «physiotherapy,» «rehabilitation,» and «children.» Selected articles were evaluated for quality and clinical relevance. The analysis included randomized controlled trials, systematic reviews, and case reports discussing the effectiveness of physiotherapy in children with AMC.

**Results:** The literature review yielded the following key findings:

– Early physiotherapy intervention improves range of motion and motor function.

- Manual therapies and strengthening exercises were the most frequently recommended methods in the reviewed publications.
- Innovative technologies, such as exoskeletons and electrical stimulation, show promising results but require further research.
- Multidisciplinary collaboration was repeatedly highlighted as a crucial component of effective therapy.

Conclusions: The literature review confirms that physiotherapy plays a pivotal role in the treatment of children with arthrogryposis, enhancing their motor functions and quality of life. There is a clear need for further research into advanced therapeutic methods, particularly in the context of utilizing cutting-edge technologies.

**Keywords:** «arthrogryposis,» «physiotherapy,» «rehabilitation,» «children.»

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# Effect of maternal physical well-being on pulse oximetry test results in the newborn baby

Background: The physiological development of pregnancy influences the condition of the newborn after birth and its personal development. In assessing the baby's well-being, the pulse oximetry test can detect slight hypoxia associated with the presence of congenital heart defects while still in the asymptomatic period. The purpose of this study is to evaluate the influence of maternal physical well-being (sociodemographic and clinical variables) on the measurement of saturation in the newborn.

Material and methods: The material consisted of 203 mother-child pairs, staying after delivery (2022-2023) in the Specialized Hospital in Jaslo. The method of verification of the clinical condition of the newborn was medical records. A diagnostic sheet was drawn up to assess maternal well-being. The obtained results were statistically processed, taking p<0.05 as the level of significance

Results: Analysis of the material showed that the results of the

pulse oximetry test of newborns were within the physiological normal range, for 58% of the children studied, the results in the first minute of life exceeded 95%. Neonatal saturation levels were influenced by the time of delivery (p=0.001) and the manner of its termination (p=0.001), while the mother's age (p=0.221), place of residence (p=0.340), diseases (p=0.805) and/or co-morbidities with pregnancy (p=0.515), Covid-19 inter (p=0.729) and body mass index (p=0.827) did not significantly affect the child's saturation score.

Conclusions: Time of termination of pregnancy and mode of delivery differentiate neonatal saturation levels due to respiratory and circulatory adaptation disorders. Pulse oximetry testing is a useful complementary test in the diagnosis of neonatal hypoxemia.

**Keywords**: physical well-being, mother, saturation level, newborn baby