

**Резюмета от публикации на  
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**I. Публикувана монография.**

**Галина Мръцкова. Рехабилитация при COVID-19 Приложение на физикалните фактори при персистиращи ревматични и мускулно-скелетни симптоми след COVID-19.** Стара Загора „КОТА” страници 272, коли 17, формат: B5; ISBN: 978-954-305-635-4

**Резюме:** Появата на SARS-CoV-2 (тежък остър респираторен синдром-коронавирус-2) през 2019 година, предизвика развитата се в следствие пандемия от COVID-19. Създадена се пандемична обстановка, постави нови предизвикателства пред съвременната медицина и създаде нови проблеми за разрешаване от системите на здравеопазване в световен мащаб. Въпреки, че засяга основно респираторната система, COVID-19 вече се приема за мултисистемно заболяване, което протича тежко, често завършва летално и има широк спектър от клинични изяви. Към този момент са събрани доказателства, които сочат, че коронавирусната инфекция протича не само с белодробни, но и с кардиоваскуларни, неврологични, мускулно-скелетни, чернодробни, бъбречни, дерматологични, психосоциални, и когнитивни нарушения.

Според, някои изследователи между 10% и 20% от пациентите преживели остър симптоматичен COVID-19 ще развият клинична картина с персистиращи прояви, продължаващи повече от месец след острия симптоматичен COVID-19 като: умора, неразположение след натоварване, болки в мускулите и ставите, диспнея, главоболие, включително и неврокогнитивни оплаквания, като мозъчна мъгла, затруднение при изпълнение на дейности от ежедневието.

Основно дейността на Физикалната и рехабилитационна медицина е насочена, не само към функционалното възстановяване на пациенти с хронично протичащи и водещи до трайни увреждания заболявания, но и към пациенти в реконвалесцентен период, и към такива с множествена нозология, и коморбидитет. Целта на рехабилитацията е да се намали продължителността на лечението и да се постигне оптимално функционално възстановяване, и независимост в ежедневието.

Рехабилитацията при пациенти преживели COVID-19 и такива с пост- COVID-19 синдром (PCS), изисква създаването на нови модели на рехабилитационно поведение, ясно и точно отдиференциране на пациентите, които се нуждаят от рехабилитация, преценка на ефективността и безопасността на рехабилитационните стратегии, предварителна оценка на възможните проблеми и компликации, адекватен подбор на физикални модалности, които да са ефективни в процеса за постигане на оптимално функционално възстановяване. Създават се нови възможности за развитие пред Физикалната и рехабилитационна медицина, като телемедицината, и в частност телерехабилитацията, като ефективна алтернатива при пациенти с COVID-19, както и пациенти с хронични заболявания.

**Монографията съдържа 272 страници, 30 фигури, 7 таблици и 4 приложения с 4 таблици, които следват последователността на основните раздели. Библиографията включва 681 автори, като 61 са на кирилица, а 620 на латиница.**

Съдържанието е разделено на няколко части: въведение, пет отделни раздела, в които са систематизирани актуалните научни познания по темата, собствени клинични проучвания, заключение и приложения. Към всеки раздел е представена литературна справка за цитираните автори.

**Първата част** на монографията е въведение, което синтезирано представя предизвикателствата от появата на COVID-19 и проблемите, които той поставя, както пред цялата медицинската общност, така и пред медицинските специалисти, работещи в областта на Физикалната и рехабилитационна медицина в часност.

Във **втората част** е направено кратко описание SARS-CoV-2 вируса, обобщена характеристика на острата COVID-19 инфекция и особености при наблюдаваните клинични симптоми на остро инфектиране с вируса причиняващ COVID-19.

**Част трета** проследява процеса на терминологично уточняване и дефиниране на състоянието, което се наблюдава след COVID-19. Подробно са описани симптомите и клиничната характеристика на продължителния COVID-19 (Long COVID) и синдрома след COVID-19 (Post-COVID syndrome (PCS)). Представени са спецификите в клиничната картина при персистиращи симптоми от страна на дихателната, сърдечно-съдовата и нервна системи, симптомите, които се наблюдават при засягане на отделителната, ендокринната храносмилателната, и хепатобилиарната системи, както и на дерматологичните изяви в следствие на COVID-19. Обстойно е описано въздействието на SARS-CoV-2 вируса върху мускулно-скелетната система. Представена е патологичната характеристика на процесите, водещи до увреждане на тъканите участващи в състава на опорно-двигателния апарат, както и влиянието на COVID-19 върху процесите на стареене и дегенерация на мускулно-скелетната система.

**Част 4** е съществен раздел от монографията. В нея се описват проблемите, касаещи рехабилитацията при COVID-19 в различните етапи на заболяването. Представени са най-често използваните методи за оценка на клиничното и функционално състояние на пациентите след преживан COVID-19. Разгледани са състава и ролята на рехабилитационния екип, участващи в процеса на рехабилитация. Третиран са основните аспекти при прилаганите физикални средства за функционално възстановяване на пациентите, преживели COVID-19. Съществен елемент от този раздел е направения преглед на описания до момента световен опит, както и на опита на водещите български специалисти в областта на рехабилитацията, през различните етапи на функционално възстановяване при пациентите с COVID-19. Като акцент са изведени основните препоръки за рехабилитация в острата и подостра фази на COVID-19. Детайлно са описани насоките за рехабилитация при пациенти с продължителни симптоми на COVID-19 и пост COVID-19 синдром. В отделни подраздели са представени основните препоръки за рехабилитация на дихателната, сърдечно-съдовата и нервната системи, както и при ревматичните, и мускулно-скелетните симптоми. Представени са и препоръки за гериатрична рехабилитация и за рехабилитацията в

домашни условия при пост - COVID-19 синдром. Накратко е обобщено, описаното в световната литература въздействие на Традиционната китайска медицина при продължителен и пост COVID-19 синдром.

**Част 5** е посветена на представянето на събраните до момента научни доказателства, които са публикувани в световни и български научни източници, касаещи потенциалните терапевтични ефекти от приложението на факторите на Физикалната медицина при пациенти след преживян COVID-19. В началото на раздела са описани възможните ползи от прилагането на електролечебните фактори. На първо място са разгледани докладваните бенефиси от приложението на токовете с ниска честота и ниско напрежение (НЧТ), които включват: приложение на Нервно-мускулната електрическа стимулация (NMES) при пациенти, провеждащи лечение в интензивно отделение с апарат за изкуствена белодробна вентилация, за профилактика на венозен тромбоемболизъм и при хронични заболявания на дихателната система и след COVID-19. На второ място е представен терапевтичният ефект от прилагането на Транскутанната електро-нервна стимулация (TENS) при пациенти с болкови синдром и мускулно-скелетна патология, при COVID-19 и постковидни състояния. В следващ подраздел е обобщено, научното познание и физиологичните механизми на действие на средночестотните токове (СЧТ), както при мускулно-скелетна патология, така и при клиничното им приложение при пациенти със заболявания на респираторната система. В отделни подраздели са разгледани публикуваните научни изследвания от приложението на терапията с: токове с висока честота и високо напрежение (ВЧТ), нискоинтензивното импулсно магнитно поле; съвременните терапевтични подходи при светлолечение; Фотобиомодулацията и Инфраред терапията; Deep Oscillation® терапията при различни нозологични единици, включително и при заболявания на дихателната система при пациенти с COVID-19 и при постковидни състояния. Разделът завършва със синтезирано описание на възможностите и предимствата от прилагането на естествените физикални фактори за профилактика, и рехабилитация след COVID-19. Представени са някои основни предимства на българските климатични и балнеологични курорти, както и възможностите на климато-балнео-калолечението за възстановяване след преболедуване от SARS-CoV-2 инфекция. Споделен е опита на световните и водещите българските изследователи в тази област.

**Част 6** представя авторският принос при разглежданият основен проблем, касаещ рехабилитацията при COVID-19 и в частност приложението на физикалните фактори при персистиращи ревматични и мускулно-скелетни симптоми след COVID-19. Изследователската част, включва наблюдението на 138 пациенти с персистиращи ревматични и мускулно-скелетни симптоми след COVID-19. Проследени са демографските характеристики на пациентите като цяло и са проследени спецификите по пол. Проследени са възраст, пол, телесно, тегло, ръст, ИТМ, професия образователен статус, спортна активност. Проучена е средната продължителност на мускулно-скелетните симптоми, проведено лечение (хоспитализация или домашно лечение на острата инфекция), като не е установена връзка в проучената група от 138 пациенти на връзка между ИТМ и тежестта на протичане на заболяването и проведеното болнично лечение. Проучени са данните, касаещи насочващия лекар-специалист за рехабилитация, активността на пациента при търсенето на рехабилитация, както и данни за предхождащи физиотерапевтични интервенции.

Представени са в табличен вид данни за разпределението на пациентите, според симптомите и причините за посещение при лекар ФРМ, които включват: Болка в гърба, Умора, Болка в мускулите, Болка в ставите, Задух, Затруднение при физическа активност, Ограничена работоспособност, други причини. Направен е анализ на придружаващите заболявания (Таблица 5). От лечение с преформирани физикални фактори са изключени 9 пациенти с противопоказания за електротерапия. Те провеждат рехабилитация, която включва само комплекс от терапевтични упражнения, които са съобразени с общото им състояние с облекчена дозировка и продължителност на кинезитерапията.

Описан е апробиран, собствен диагностичен алгоритъм, който включва методи за оценка на клиничното състояние (подробна анамнеза, анализ на придружаваща медицинска документация, образни и клинично-лабораторни изследвания, общ соматичен и специализиран статус). Специфичните методи на изследване включват: соматоскопия, функционални тестове (Тест на Ott, Тест на Shober, Тест на Tom Mayer, тест обем на движение (гониометрия). Тестове и въпросници за самооценка на болката в мускулите и ставите и степента на умора: Оценка на болката по Визуално-аналогова скала за болка (VAS). Числова скала за оценка (Numerical Rating Scale (NRS)) за оценка на миалгия и артралгия. Brief Fatigue Inventory (BFI) за кратко описание на умората през последните 24 часа. Изработени са критерии за включване и изключване в проучването.

В този раздел, подробно е описан терапевтичният курс, включващ комплексна рехабилитация с преформирани физикални фактори и кинезитерапия. Включени са 129 пациенти от всички насочени за провеждане на амбулаторна физиотерапия. Пациентите са разпределени на случаен принцип в две групи. В група 1 (G1) са включени 67 пациенти, които провеждат рехабилитация, която включва многокомпонентна програма за електролечение Транскутанна електр-онерна стимулация (TENS) и Кинезитерапевтичен комплекс (КТ). В група 2 (G2), са включени 62 от наблюдаваните пациенти. Рехабилитационната програма включва: транскутанно приложение на средночестотен интерферентен ток (ИФТ), модулиран в ниската честота и КТ. Рехабилитационният курс включва: десетдневно лечение в амбулаторни условия. Пациентите са проследени в два времеви периода: преди началото на терапевтичния курс и непосредствено след приключване на рехабилитационния курс. Направен е анализ на динамиката на наблюдаваните симптоми вътре по групи и са сравнени резултатите между двете групи. Проследени са симптоми, които включват умора, миалгия, артралгия, болка в гърба (предхождащи болки в областта на аксиалния скелет не са обект на настоящето проучване и не са описани, като персистиращи симптоми от мускулно-скелетната система). Анализирани са резултатите при соматоскопия, и функционалните тестове: Тест на Ott, Тест на Schober, Тест на Tom Mayer и тест обем на движение в шиен, торакален и поясен отдел. При извършения анализ на резултатите от направеното проучване в динамика се установява вътрегрупова редуция на проследените симптоми, като не се наблюдава значима статистическа разлика в резултатите по отношение на умора, миалгия, артралгия, болка в гърба. Което, вероятно е предпоставка проучването да продължи и да се разшири, с цел да се верифицират по-точно предимствата на методиките и да се прецени, евентуално преимуществата или недостатъците на методиките, по отношение на определена симптоматика. В направеното проучване, авторът не наблюдава нежелани странични ефекти при комплексното приложение на ИФТ и TENS в комбинация с терапевтични упражнения.

В обобщаващ подраздел към глава 6, са представени накратко основните акценти и изводи от направеното изследване, относно ефективността и безопасността на приложената многокомпонентна рехабилитационна програма при пациенти с ревматични и мускулно-скелетни симптоми след COVID-19, и наблюдаваните терапевтични ефекти.

**Част 7** е заключителната част на монографията, в която са синтезирани, основните насоки за рехабилитация при пациенти с ревматични и мускулно-скелетни симптоми след COVID-19, на базата на собствения и обобщения изследователски опит. Процесът на проучване на мускулно-скелетните симптоми при пациентите с пост COVID-19 симптоми продължава и днес, което е предпоставка за провеждането на още по-детайлни и задълбочени проучвания в предвид на това, че поради краткия период от развитието на пандемията, все още не са напълно изяснени всички възможни симптоми.

**Galina Mratskova. COVID-19 rehabilitation. Application of physical factors in persistent rheumatic and musculoskeletal symptoms after COVID-19.**

**Summary:** The SARS-CoV-2 (severe acute respiratory syndrome-coronavirus-2) emergence in 2019 caused the subsequent Covid-19 pandemic. The pandemic situation brought new challenges for modern medicine and created new problems for global health systems. Although primarily affecting the respiratory system, COVID-19 is now recognized as a multisystem disease that is severe, often fatal, and has a wide range of clinical presentations. Evidence has been accumulated indicating that coronavirus infection proceeds not only with pulmonary, but also with cardiovascular, neurological, musculoskeletal, hepatic, renal, dermatological, psychosocial, and cognitive disorders.

According to some researchers, between 10% and 20% of patients surviving acute symptomatic COVID-19 will develop a clinical picture with persistent manifestations lasting more than a month after the acute symptomatic COVID-19 such as: fatigue, malaise after exertion, muscle and joint pain, dyspnea, headache, including neurocognitive complaints such as brain fog, difficulty performing activities of daily living. The risk of affecting the psycho-emotional sphere - development of stress, depressive states, increased irritability, sleep disorders, disorientation, frustration, etc. – is increased.

Basically, the Physical and Rehabilitation Medicine is oriented not only towards functional recovery of patients with chronic disabling conditions, but also towards reducing the treatment duration of patients in convalescent period with combined pathologies. Rehabilitation of patients who have experienced COVID-19 and those with post-COVID-19 syndrome (PCS) requires development of new models of rehabilitation behavior, clear and accurate differentiation of patients who need rehabilitation, assessment of the effectiveness and safety of rehabilitation strategies, preliminary assessment of possible problems and complications, adequate selection of physical modalities that are effective in the process for optimal functional recovery.

New opportunities are emerging in the field of Physical and Rehabilitation Medicine, such as telemedicine, and especially telerehabilitation, as an effective alternative for COVID-19 patients as well as patients with chronic conditions.

**II. Статии в научни списания в пълен текст, публикувани в реферирани и индексирани световни бази данни с научна информация (Scopus и/или Web of Science).**

**1. Mratskova G, Dimitrov N, Dimitrov A, Goycheva P, Makelov B, Petrov D.** Impact of physical modalities on pain and physical function in patients with knee osteoarthritis. J of IMAB. 2022 Journal of IMAB - 2022; 28(Supplement 12 SEEC & 32 IMAB); Section Varia (12):108-111. DOI: <https://dx.doi.org/10.5272/jimab.2022Supplement3>

**Abstract:** The aim of the study is to assess pain at rest and during movement and physical function three months after rehabilitation with Medium frequency current (Nemec's current) and therapeutic exercises in patients with osteoarthritis of the knee. Material and methods: The study included 54 patients at 65.4(9.9) mean age, with second and third X-ray degree of the knee osteoarthritis. Patients receive a ten-day course of treatment with Medium frequency current (Nemec's current) and therapeutic exercises. The results were assessed before, after treatment at 1st and 3rd months, by manual muscle testing (MMT), measuring the circumference of the knee with centimeter, range of motion test (goniometry), pain (VAS) at rest and during movement and WOMAC Osteoarthritis Index. Level of statistical significance ( $p < 0.05$ ). Results: Statistically significant decrease in swelling ( $p < 0.001$ ) one month after therapy, reduction of muscle weakness m. Quadriceps (MMT)( $p < 0.001$ ), increased knee flexion ( $p < 0.001$ ), reduced pain (VAS) at rest, going down and upstairs, walking ( $p < 0.001$ ), and decreased WOMAC Index ( $p < 0.001$ ) three months after therapy were observed. Conclusion: The applied rehabilitation program effectively reduces pain at rest and movement, WOMAC Index and muscle weakness (m. Quadriceps) and increases the knee joint flexion for at least three months after treatment, while the swelling is significantly reduced one month after rehabilitation. **Key words:** *knee osteoarthritis, WOMAC Osteoarthritis Index, Pain, , Medium frequency current (Nemec's current), therapeutic exercises, physical function, muscle weakness m. quadriceps femoris.*

**2. Mratskova G.** Potential benefits of physical modalities for improving functional activity in musculoskeletal symptoms after COVID-19. A clinical case. Trakia Journal of Sciences, 1312-1723ISSN TJS (print) 1313-3551; ISSN TJS (online). 2022; 20(1): 91-97. doi:10.15547/tjs.2022.s.01.12

**Abstract:** The purpose is to present the benefits of Physical modalities to reduce the musculoskeletal symptoms and increase the functional activity of a patient with post-COVID syndrome. Materials and methods: The rehabilitation was applied to a 78-year-old woman, admitted to the Physical and Rehabilitation Medicine Department (PRM). In April 2021 she was hospitalized for acute-severe COVID-19. During the hospitalization, a surgical treatment was performed for acute-mechanical ileus with enterocolitis. Due to the persistence (6 months), hypokinesia, weakness, back pain, difficulty in locomotion and daily activities, the general practitioner referred her to the PRM Department. The rehabilitation included breathing and active exercises for the neck, thoracic-lumbar spine and lower limbs; verticalization with a walker, training in everyday activities, magnetic field and Nemec's currents. Results: The clinical symptoms were assessed before and after the therapy. A reduction was observed in the tests of Tom Mayer from 36 to 23 cm, Schober from 0.5 to 1.0 cm, Lateral slopes r/l 57/60 cm to 52/51 cm, SFTR from /S/10°-0°-40° to 15°-0°-50° and /F/20°-0°-25° to 30°-0°-25° and Modified OSW from moderate (38) to mild (17). Conclusion: The rehabilitation including

physical modalities and therapeutic exercises effectively reduced the musculoskeletal symptoms and increased the functional activity of a patient with postCOVID-19 syndrome. Studies should continue in order to better objectify the therapeutic benefits of the physical factors. **Key words:** *Post-COVID-19 Rehabilitation, post-COVID medical care, functional capacity, therapeutic exercises, Low intensity magnetic field therapy, Interferential Nemes's currents.*

**3. Mratskova G, Elkova H.** Physical therapy and rehabilitation for late post COVID-19 consequences. A Case report. *Bulgarian Medical Journal*, 2022: 16(1):34-39.

**Резюме.** Появата на COVID-19 и бързото му разпространение в световен мащаб поставиха пред здравните специалисти задачи, свързани с адекватната и навременна диагностика на инфекцията, оказването на специализирана медицинска помощ, рехабилитация и вторична профилактика. Към настоящия момент информацията за първична, вторична профилактика и медицинска рехабилитация, е недостатъчна. Въпреки че започват да се изработват препоръки и конкретни насоки за рехабилитация, все още липсва единно становище. Целта на настоящата статия е да представи клиничен случай на пациент със симптоматична лумбална спондилоза в реконвалесцентния период след прекарана средно-тежка COVID-19 пневмония, лекувана в болнично отделение. Приложена е комплексна рехабилитационна програма в амбулаторни условия, включваща компреси с луга, съчетани с позиционна терапия, терапевтични упражнения: дихателна гимнастика, активни упражнения за тораколумбален отдел и долни крайници; магнитотерапия и интерферентни токове в трофични и обезболяващи параметри, по 10 процедури. **Ключови думи:** *симптоматична лумбална спондилоза, post-COVID-19, Modified Oswestry Low Back Pain Disability Questionnaire, луга, магнитно поле, интерферентен ток, терапевтични упражнения.*

**Abstract:** The outbreak and the rapid spread worldwide of COVID-19 has confronted the health professionals with the tasks to diagnose adequately the infection, to provide specialized medical care, rehabilitation, and secondary prevention. Currently, information on primary and secondary prevention and medical rehabilitation is insufficient. Although recommendations and specific guidelines for rehabilitation are being developed, there is still a lack of consensus. The aim of this article is to present a clinical case of a patient with symptomatic lumbar spondylosis in the convalescent period after a history of moderate-severe COVID-19 pneumonia treated in a hospital ward. A complex rehabilitation program in an outpatient setting has been applied, including compresses with lye, combined with positional therapy, therapeutic exercises: breathing exercises, active exercises for the thoracolumbar region and lower limbs; magnetotherapy and interferential currents in trophic and analgesic parameters, 10 procedures each. **Key words:** *symptomatic lumbar spondylosis, post-COVID-19, Modified Oswestry Low Back Pain Disability Questionnaire, lye, magnetic field, interferential current, therapeutic exercises.*

4. Ruska Paskaleva, **Galina Mratzkova**, Magdalena Platikanova. „Increased motor activity and proper nutrition for prevention of complications in the elderly with diabetes.“, AIP Conference Proceedings 10 December 2019; 2186 (1): 170029. <https://doi.org/10.1063/1.5138108> - [SJR - 0.19](#)

**Abstract:** One of the most significant diseases worldwide, with a rapid rate of development leading to severe economic losses is diabetes mellitus type 2 (non-insulin

dependent diabetes). Chronic metabolic disease of carbohydrate metabolism is characterized by high blood glucose levels and relative insulin deficiency. Approximately 6% of the adult population, estimated globally from 2010 to date, shows that type 2 diabetes (285 million people) accounts for about 90% of diabetes. He exercise of regular physical activity maintains muscles in good condition, prevents the onset of inactive hypertrophies or contractions, and activates various types of modulating downward control (pain suppression) to maintain the emotional tone of the patient. The purpose of the present study is the active participation of the students of specialty “Medical rehabilitation and ergotherapy” in the implementation of rehabilitation activities at the Diabetes Center - Stara Zagora, in elderly people with type 2 diabetes. **Material and methods.** *The subject* of the study is 120 diabetic patients at the Diabetes Center - Stara Zagora with different types of diabetes. Five rehabilitation groups were developed, depending on the motor skills. The exercises are for one year with consecutive group work twice a week by the students during the clinical practice.. This result is indicative of the stimulating effect of kinesitherapy and ergotherapy on the motor activity of patients. They all have increased motor skills in everyday activities. **Key words:** *motor activity, elderly people, diabetes, prevention of complications.*

5. Paskaleva, Ruska, **Mratzkova, Galina.** Increased motor activity for prevention of complications in the elderly with diabetes. International Scientific Congress Applied Sports Sciences (ICASS2019) / Balkan Scientific Congress Physical Education, Sports, Health, 2019, 594-598 <https://doi.org/10.1063/1.5138108>

**Abstract:** The purpose of the present study is the active participation of the students of specialty "Medical rehabilitation and ergotherapy" in the implementation of rehabilitation activities at the Diabetes Center - Stara Zagora, in elderly people with type 2 diabetes. **Material and methods.** The subject of the study is 120 diabetic patients at the Diabetes Center – Stara Zagora with different types of diabetes. **Methodology of the study.** Anthropometric measurements were performed, a specialized test for daily activities (DA Test, with a six-step assessment from 0 to 5) and a Quality of Life Test. The tests were applied to 120 diabetic patients before and after rehabilitation. **Results and discussion.** The correlation between influencing the physical and mental health of patients is positively significant ( $R = 0.61$ ,  $p < 0.05$ ). This is an evidence of the incomparable influence of motor activity on the quality of life of diabetic patients. These results motivate the participation of students in the practical training, which is a factor that ensures the improvement of the quality in the real working environment. **Conclusions and conclusions:** The implementation of complex rehabilitation in patients with diabetes type 2 requires prolonged activities in specialized rehabilitation centers to stimulate motor activity and social integration; to achieve good results in the rehabilitation of diabetic patients and to improve self-care, it is essential to start early, to include work and training in self-sustaining activities from everyday life, Ergotherapy and art therapy stimulate patient autonomy. **Key words:** *motor activity, elderly people, diabetes, prevention of complications.*

6. **Galina Mratzkova.** Clinical aspects of rehabilitation of a patient with ischemic Stroke after bilateral COVID-19 Pneumonia. A Case Report. Trakia Journal of Sciences. ISSN 1313-3551 (online) 2021: 19 (2): 18-25, <http://www.uni-sz.bg> doi:10.15547/tjs.2021.s.02.004

**Abstract:** The purpose is to present a clinical case of a patient undergoing hospital rehabilitation for ischemic stroke post COVID-19 pneumonia. **MATERIALS AND**



**METHODS:** The rehabilitation program was administered to a 77-year man with a severe motor deficiency (group-I) after stroke, 4 weeks post SARS-CoV-2 infection. The individual program includes positional therapy, breathing gymnastics, active and passive exercises, neuromuscular reeducation, verticalization, daily activity living-training. On the second day of rehabilitation, the patient received acute bleeding from the urinary tract, which necessitated one-day interruption of the rehabilitation until overcoming the hemorrhage. The clinical symptoms were assessed before and after the therapy. **RESULTS:** An improvement in the functional tests (Brunnstrom scale, coordination tests and locomotion, Barthel Index, Borg Scale) was observed. The patient was discharged on day 8-th with a second II-group of motor deficit, with mild paresis for upper and severe paresis for lower left limbs, verticalized in a walker. **CONCLUSION:** The rehabilitation program for patients with a post-COVID stroke requires an exact assessment of the general condition and the degree of the functional impairment of the respiratory system and motor activity. An adequate combination of physiotherapeutic methods aimed at improving the lung function and motor recovery based on the involvement of the nervous system led to a reduction of the motor deficit and improved daily activity. **Key words:** *Post-Covid stroke, Multidisciplinary rehabilitation team, Functional recovery, Activity daily living, Locomotion, Brunnstrom scale, Barthel Index, Borg CR10 Scale.*

**7. Mratskova G.** Use of Deep Dscillation- therapy in rehabilitation program for patient after distal radius fracture with a complex regional pain syndrome (Sudeck's atrophy): A case report. *Trakia Journal of Sciences*, 1312-1723 - ISSN TJS (print) 1313-3551 - ISSN TJS (online) 1313-7050 - ISSN TJS: Biomedical sciences 1313-7069 - ISSN TJS 2020; 18(1):187-193. doi:10.15547/tjs.2020.s.01.034

**Abstract:** The purpose is to present a clinical case of a patient with a fracture of the distal radius and complex regional pain syndrome I, in which complex rehabilitation was applied, including Deep Oscillation, cryotherapy and therapeutic exercises. **MATERIALS AND METHODS:** The rehabilitation program was conducted to a 62-year-old woman, four months after the injury. The intervention includes Deep Oscillation in biphasic mode (up to 7 $\mu$ A) and therapeutic exercises 10 procedures. The clinical symptoms were assessed before and after therapy and after 1-st and 3-rd months after therapy. **RESULTS:** Reduction in pain (VAS) after therapy from “very strong” (75mm) before therapy, to “mild” at 3 months (12mm) was observed. Reduction of wrist swelling and muscle weakness as assessed by manual muscle testing was observed. The range of movement in the sagittal plane from 25°-0-35° to 70°0°-85° and the frontal plane from 5°-0-15° to 20°-0°-35° was increase. Improved performance of activities of daily living was observed. No adverse events with Deep Oscillation therapy were observed. **CONCLUSION:** Deep Oscillation and therapeutic exercises effectively reduce the clinical symptoms of regional pain syndrome. To establish the therapeutic efficacy of Deep Oscillation treatment after a fracture of the distal radius with complex regional pain syndrome, randomized studies involving a larger number of patients are required. **Key words:** *Low frequency and low intensity pulsation electrostatic field, Sudeck atrophy, kinesitherapy, cryotherapy, activities of daily living.*

8. Dimitrov N, Petrov D, **Mratskova G**, Dimitrov I, “Less invasive stabilization system (LISS) in the treatment of distal femur fractures” *Trakia Journal of Sciences*. 2015; 4:56-61. doi:10.15547/tjs.2015.04.009

**Purpose:** To review the advantages of LISS for complex distal femoral fractures. **Methods.** 25 women and 19 men underwent surgical LISS plating for distal femur fractures following low- or high-energy injury between 2011 - 09.2015. The mean age of patients was  $53.34 \pm 20.1$  years. One patient had a pathologic femur fracture because of metastasis. One patient had a bilateral femoral fracture following a traffic accident. In one patient a periprosthetic femoral fracture occurred after total knee arthroplasty. According to the AO classification, predominantly occurring fracture types were A1 (38.1%) and C1 (35.7%). **Results.** The mean period of bone union was  $3.4 \pm 1$  months. Two patients (4.8%) had non-union due to implant loosening and required revision surgery and osteosynthesis RFN. One case (2.4%) with deep infection necessitating revision surgery with debridement, jet-lavage, drainage, combined antibiotic therapy and application of gentamycin beads. One patient (2.4%) with delayed bone healing. One patient (2.4%) underwent primary bone grafting in AO C2 fracture. **Conclusion.** All of the distal femur fractures A - C of the AO, incl. and all degrees of severity of these fractures can be successfully stabilized by LISS. **Key words:** femoral fractures, internal fracture fixation, mini invasive techniques

9. Petrov D, Grekova O, Petkova L, **Mratskova G**, Enchev E. Some results from a medical specialists option about E- health” *Trakia Journal of Sciences*, ISSN 1313-7050 (print), ISSN 1313-3551 (online). 2014; 12(1): 354-357.

**Abstract:** E-health includes a number of tools based on information and communication technologies (ICT). Its introduction in the practice of medical specialists helps them for more effective work. **PURPOSE** The aim is to analyze the adjustment and the efficiency of the usage in the practice of medical specialists. **METHODS:** A representative scientific survey among medical specialists working in 8 hospitals from 5 cities in Bulgaria – 3 university (2 MHAT and 1 SHAT), 4 private (MHAT) and 1 complex oncology center (COC). **RESULTS:** The present article analyzes the answers of questions relevant to using information systems (IS) of medical specialists’ practice. The success of e-health depends on the understanding of its current role and proficiency in its usage from medical specialists. **CONCLUSIONS:** Time to review the patient is not enough for large part of medical specialists. They enter corresponding data consecutively in using information system (IS) after the review. **Key words:** *survey, hospitals, information system, ICT, costs.*

10. **Mratzkova G**, Paskaleva R, Gyonkova A. Rehabilitation program in clinical case of polytrauma” *Trakia Journal of Sciences*. 2015; 13(2):198-202. Available online at: <http://www.uni-sz.bg> ISSN 1313-7050 (print) doi:10.15547/tjs.2015.s.02.043 ISSN 1313-3551 (online)

**Abstract:** Fractures in the cervical spine are among the most common injuries of locomotor apparatus and nervous system in patients with poly trauma. These are severe pathology injuries and primarily affect people of working age. In spinal reconstructive interventions the recovery period is considerably shortened, there is no need for prolonged immobilization in halo traction and extended wear of immobilization collar in the absence of spinal injury. The purpose of this paper is to present a comprehensive rehabilitation program for patients with severe trauma of cervical spine, shoulder girdle and chest. **Material and Methods.** A comprehensive rehabilitation program is composed and implemented on 41 year old patient suffered an accident. There are radiographic scan and Traffic Police evidence of fracture of the second cervical vertebra fracture, mnogo fragment fracture of right humeral head

and dislocation of the right humerus, fracture of the left collarbone in the distal third and 12th rib fracture on the left. No evidence of abdominal trauma. Results and discussion. The rehabilitation is consistent with the objective condition of the patient at each stage for optimum recovery of functional activity and training in daily life activity. Applied are kinesitherapeutical methods and preformed physical factors aimed at reducing pain syndrome, hypotrophy of the affected muscles, limited range of motion and prevention of late posttraumatic complications. Findings and conclusion. As a result of the surgery, comprehensive and timely rehabilitation the following results were achieved: maximum restore of the volume of movement of the affected joints of the right upper limb and cervical spine; improved was the muscular strength of flexor muscles and extensors in the elbow and shoulder joints; right upper limb was fully involved in daily life activity. Recommended is continuing of treatment at home or in specialized sanatorium rehabilitation centers. **Key words:** *clinical case poly trauma, recovery, complex rehabilitation.*

## **II. Резюмета на статии в научни списания в пълен текст, публикувани в нереферирани списания с научно рецензиране или публикувани в редактирани колективни толове.**

**1. Мръцкова Г.** Оценка на рехабилитационните нужди на пациентите с мускулно-скелетни симптоми, като част от стратегията за функционално възстановяване след КОВИД-19. Сборник доклади Международна научна конференция „Тенденции и стратегии за възстановяване на икономическата и обществената система след пандемията от COVID-19“, 15-17 март 2023 г. (под печат)

**Резюме:** Целта на проучването е да се изследват причините и нагласите за провеждане на рехабилитация при пациентите с мускулно-скелетни симптоми, след COVID-19 насочени за амбулаторна физиотерапия. Методология: В проучването са включени 138 пациенти, за които са събирани данни, относно демографската характеристика, образование, професия, спортна активност, продължителност на пост COVID-19 симптоми, лечение на острата инфекция (стационарно или домашно-амбулаторно), вид и продължителност на персистиращите мускулно-скелетни симптоми, коморбидни заболявания, причини за посещение при лекар специалист физикална медицина (ФРМ), активно поведение при търсенето на рехабилитация. Резултати: В наблюдаваната група, мускулно-скелетните симптоми персistirат средно 13(7-20) седмици. Най-често, пациентите са насочени за извънболнична рехабилитация по повод на: болка в гърба (68.8%(95)), умора (46.4%(64)), миалгия 38.4%(53), артралгия (23.9%(33)), затруднение при физическа активност (20.3%(28)), други причини (10.1%(14)), задух(6.5% (9)). Резултатите показват, че 84%(117) от пациентите посочват повече от една причина за посещение при ФРМ специалист, а придружаващи заболявания имат над 80%. Едва 31%, са имали активно здравно поведение и са изисквали да бъдат насочени за рехабилитация. Заключение: Рехабилитацията е важна част от намаляването на негативните последици за здравето на пациенти с мускулно-скелетни симптоми при пост COVID-19 синдром. Обучението и формирането на активно здравно поведение във фазата на възстановяване е съществен елемент от дългосрочното управление на последствията от COVID-19. **Ключови думи:** *Рехабилитация след COVID-*

19, Възстановяване на функционалната активност, Извънболнична помощ, Увреждания на мускулно-скелетната система JEL: I110; I120

**2. Mratskova G.** Evaluation of the therapeutic effects of Interferential current therapy and therapeutic exercises on musculoskeletal symptoms in patients with post COVID-19 (2023) MEDIS – International Journal of Medical Sciences and Research, 2(1), 31–38. <https://doi.org/10.35120/medisij020131m>

**Abstract:** The aim of this research was to investigate the therapeutic effectiveness of a multi-component rehabilitation program including: transcutaneous interferential current therapy and therapeutic exercises in patients with musculoskeletal symptoms in post COVID-19 syndrome. Materials and Methods: 62 patients, mean age 55.9(13.99), aged 21 to 79 years, with persistent musculoskeletal symptoms in the recovery phase after experiencing COVID-19 were included in this study. All patients underwent a ten-day treatment course in an outpatient setting, including transcutaneous application of interferential current with four electrodes. The therapeutic parameters were selected with analgesic, trophic and stimulating effects (90-100 Hz, 5min and 0-100 Hz, 15min). Immediately after electrotherapy, kinesitherapy was performed including: breathing exercises, aerobic training, active and resistance exercises for the limbs, postural control exercises and exercises to improve the mobility of the peripheral joints and the axial skeleton. Results were evaluated by: Visual Analogue Scale (VAS) for assessment of back pain, Numerical Rating Scale (NRS) for arthralgia and myalgia assessment, Brief Fatigue Inventory (BFI) – fatigue assessment, functional tests of mobility, Goniometry in the spine, Ott Sign- for measuring the range of motion (ROM) of the thoracic spine, Schober's test to determine a lumbar spine range of motion (flexion), Tom Meyer's test for total hip joint and spine flexion mobility. The results were reported before and after the rehabilitation. The statistical significance level was specified as ( $p < 0.05$ ). Results: Musculoskeletal symptoms in the observed patients persisted for an average of 12 weeks, ranging from 7 to 20 weeks, and included: myalgia in 46.8% (29), arthralgia 29.0% (18), pain in various back departments 79.0% (49), fatigue 66.1% (41). Inpatient treatment for acute COVID-19 was performed in 35.5% (22) of patients, and home and outpatient treatment in 64.5% (40). There was a statistically significant reduction (Mean (SD)) after therapy in back pain (VAS) from 4.88(1.5) to 1.93(1.1), myalgia (NRS) from 3.66(1.2) to 1.29(1.1), arthralgia (NRS) from 3.27(1.2) to 0.89 (0.8), and fatigue index (BFI) showed a reduction from 5.73(1.4) to 3.22(1.4). There was an increase in mobility in Ott's symptom from 2.24(1.2) to 2.86(0.9) cm, Schober's test 1.41(1.2) to 2.38(0.9) cm, Tom Meyer's test from - 8.23(6.5) to - 2.46(3.7) cm. Conclusion: In the recovery phase post COVID-19, some of the patients had long-time persistent musculoskeletal symptoms (fatigue, myalgia, arthralgia, back pain). These are a common reason for these patients to be referred for outpatient rehabilitation. In order to design a multi-component rehabilitation programme, it is necessary to take into account individual characteristics and comorbidities. The inclusion of physical modalities such as electrotherapy requires an accurate assessment of the rehabilitation potential and the presence of any counterindications. Therapeutic exercises have been proven to be effective in post COVID-19 patients. The results of this study show that the combination of interferential current therapy and therapeutic exercise can effectively reduce back pain, myalgia, arthralgia, and perception of fatigue. On the other hand, this multicomponent program resulted in improvement in functional tests in the studied patients. Due to the small sample size, it is advisable to continue the study in the future, covering a larger number of patients with long-standing musculoskeletal symptoms as part of post-COVID-19 syndrome, in order to design an effective strategy that can efficiently reduce negative health

consequences and improve functional activity in these patients. **Keywords:** *Post-COVID-19 Rehabilitation, Musculoskeletal symptoms, Transcutaneous electrical nerve stimulation, Interferential current therapy, Therapeutic exercises, Functional activity*

**3. Mratskova G.** Estimates of causes and attitudes of patients with post-COVID-19 syndrome and musculoskeletal symptoms referred for outpatient rehabilitation. *Knowledge - International Journal*. 2023; 56(3): 311–317. <https://ikm.mk/ojs/index.php/kij/article/view/5927>

**Abstract:** The purpose of the study is to assess the causes and attitudes of patients with post-COVID-19 syndrome (PCS) and musculoskeletal symptoms referred to outpatient rehabilitation. **Materials and methods:** The study includes 138 recovery phase patients, after COVID-19 with persistent musculoskeletal symptoms, referred to outpatient rehabilitation. Data were collected regarding demographic characteristics of the patients, educational status, occupation, practice of sports, period since COVID-19, treatment (inpatient or home-outpatient), symptoms and period during which the musculoskeletal symptoms persisted, comorbidities, reasons for visiting a physical medicine specialist, active approach towards rehabilitation. **Results:** The average duration of musculoskeletal symptoms Me(Range) in patients referred for rehabilitation was 13 (7-20) weeks, respectively for women it was 13 (7-20) weeks, for men - 12 (7-19) weeks. 35.5% (49) of the patients were hospitalized due to acute COVID-19 illness, respectively 30.8% (28) of all women and 44.7% (21) of all men. No relationship was found between gender and the severity of the disease, hospital versus home treatment, as well as between patients' BMI and hospitalization. 76.1% (105) of the patients were in active working age, 33.3% (46) of all were workers, 42.8% (59) – office employees, 14.5% (20) – retired workers and 9.4% (13) – retired employees. 4.3% (6) of all patients were actively involved in sports, 28.3% (39) were amateur sportsmen, and 67.4% (93) did not practice any sport activities. On the occasion of persistent post-COVID-19 rheumatic and musculoskeletal complaints, 40.6% (56) of the patients were referred for rehabilitation after examination by a family physician and at his/her discretion. Those actively seeking rehabilitation and referred by a GP for outpatient rehabilitation were 24.6% (34), including 33.0% (30) of all women and 8.5% (4) of all men. 28.3% (39) were referred for rehabilitation by a specialist physician. At the specialist's discretion, 28.6% (26) of women and 27.7% (13) of men were referred for treatment with physical modalities, of whom only 6.5% (9) of women actively sought rehabilitation. 31% (43) of all referred patients, actively sought rehabilitation with physical modalities. 46.4% (64) of all patients had no prior physiotherapy treatment, of whom 34.1% (31) were women and 70.2% (33) were men. Treatment with physical modalities on other occasion was performed by 53.6% (74), respectively 65.9% (60) women and 29.8% (14) men. The leading causes for visiting Physical and Rehabilitation Medicine (PRM) specialist by 68.8% (95) of the patients was back pain, followed by fatigue 46.4% (64), myalgia - 38.4% (53), limited ability to work - 29.7% (41), arthralgia - 23.9% (33), physical activity difficulties - 20.3% (28). Other causes were mentioned by 10.1% (14) of the patients and shortness of breath was experienced by 6.5% (9) of all patients referred for rehabilitation. Fatigue was more pronounced as a symptom by female patients. Myalgia was prevalent, as a symptom in both genders, no difference was found between genders in arthralgia. 15% (21) of patients during their first visit to a PRM physician pointed out one reason, 39% (54) - two reasons, and 45% (63) of all patients referred for rehabilitation indicated three or more reasons. More than 80% of the patients had a comorbidity: 50% (69) had one comorbidity, 18% (25) had two comorbidities, and 16.3% (23) had three or more comorbidities. 5.8% (8) had concomitant cardiovascular disease, 30.4% (42) had hypertensive disease, 16.7% (23) had

neurological disease, 9.4% (13) had diabetes mellitus, 59.4%(82) reported pre-existing spondylosis and 19.6% (27) had other diseases. Conclusion: Time-persistent musculoskeletal symptoms (fatigue, myalgia, arthralgia, back pain) are a common reason for rehabilitation in patients with Post-COVID-19 (PCS) syndrome. The results of the study showed that more than two-thirds of patients reported more than one reason for seeing PRM specialist, with comorbidities seen in three-quarters of patients. One-third of the patients actively wanted to be referred for rehabilitation. Patient education and the formation of active behaviors in the recovery phase after COVID-19 could reduce the negative health consequences in patients with musculoskeletal symptoms of postCOVID-19 syndrome. **Keywords:** *Rehabilitation, Post- COVID-19, Musculoskeletal symptoms, Functional activity*

**4. Mratskova G.** Deep Oscillation® therapy - can it be effective in patients with COVID-19 and post - COVID syndrome. MEDIS – International Journal of Medical Sciences and Research, 2022; 1(4):1–7. <https://doi.org/10.35120/medisij010401m>

**Abstract:** Treatment of patients with COVID-19, prevention of respiratory and other affected systems complications, prevention of multisystem damage and faster recovery possibilities and disease consequences overcoming is a particularly relevant topic today, when the number of people who have suffered from acute coronavirus infection is increasing. A tendency to shift the focus from acute manifestations to long-term morbidity and chronic involvement of various organs and systems is observed. In these subacute and chronic phases of illness, the application of physical modalities would be potentially effective. Traditionally, physical and rehabilitation medicine deals with patients with combined pathologies in order to reduce the duration of treatment and to speed up after-illness recovery. Deep Oscillation® therapy is a relatively new physical modality that is successfully applied to a number of diseases, including inflammatory pathologies of respiratory and musculoskeletal system, trauma, burns, fibrosis prevention, edema reduction, muscle relaxation etc. The purpose of this article is to make a review of the potential therapeutic effects of the Deep Oscillation® therapy application to patients suffering from COVID-19 and/or postCOVID-19 syndrome. Materials and methods: A review of the available literature was performed, including reports, articles, feedback letters regarding the application of Deep Oscillation® therapy. The search for scientific articles was conducted in the bibliographic database of Pub Med, Google Scholar, Elsevier. Results matching the following keywords were searched: Deep Oscillation® therapy, low-frequency and low-intensity electrostatic field, COVID-19, COVID-pneumonia, post-COVID-19 syndrome, long COVID, post-acute sequelae of SARS-CoV-2 infection, chronic COVID syndrome, diseases of the respiratory system, pneumonia, obstructive bronchitis, asthma, edema, lymphedema, musculoskeletal symptoms after COVID-19, chronic pain, myalgia, arthralgia, chronic back pain, fatigue. Results: The review made found evidence regarding the anti-inflammatory, anti-edematous, pain-reducing, and anti-fibrotic effects observed with the application of Deep Oscillation® in various diseases, including such of lungs. At this time, no research data were found regarding the application of Deep Oscillation® in patients with COVID-19 or after illness except for a brief communication in the form of a feedback letter regarding the therapy application in individual clinical cases of patients with COVID -19. Conclusion: The scientific studies carried out so far testify of established antiinflammatory, -swelling and pain-reducing effects, fibrosis reduction possibilities, muscle spasm reduction, local microcirculation improvement and anti-lymphedematous effects of Deep Oscillation® application in various diseases, including lung diseases. These data suggest that a possible positive effect of the low-frequency electrostatic field can also be assumed in



patients with COVID-19. Now, however, there are no clinical studies conducted about the Deep Oscillation® application effect in patients with COVID-19 and post COVID-19. Low-frequency electrostatic field therapy is probably an appropriate adjuvant therapy but cannot be recommended as a therapeutic modality in daily clinical practice in patients with COVID-19 due to the lack of reported therapeutic benefits in scientific reports. In the presence of convincing scientific evidence, this opinion is subject to correction. At the same time, it would be appropriate to determine the benefit of this therapy in post-COVID-19 recovery and persistent arthralgia and musculoskeletal symptoms. **Keywords:** *Deep Oscillation® therapy, low-frequency and low-intensity electrostatic field, COVID-19, post-COVID-19 syndrome, post-COVID rehabilitation*

**5. Mratskova G.** Influence of prevention and physiotherapeutic interventions to reduce functional limitations in patients with knee osteoarthritis. Knowledge - International Journal. 2022; 50(4): 515–522. Retrieved from <https://ikm.mk/ojs/index.php/kij/article/view/4960>

**Abstract:** Knee osteoarthritis (KOA) is a degenerative chronic disease that leads to prolonged pain and permanent damage. Changes in the surrounding muscles of the knee joint may progress together or develop prior to damage in the subchondral bone and articular cartilage. The aim of this review is to review physiotherapeutic interventions that may have a positive effect on muscle function and can improve functional activity in patients with osteoarthritis of the knee. Materials and methods: For the purposes of this publication, an overview of available scientific articles which deal with the application of various physiotherapeutic interventions that may be potentially effective in preventing weakness and affecting muscle function and functional activity in patients with knee osteoarthritis has been reviewed. Results were sought in Pub Med, defining: knee osteoarthritis, functional activity, muscle weakness, prevention, therapeutic exercises, aerobic exercises, resistance ground-based exercises, aquatic exercises, neuromuscular exercises, balance training proprioceptive training, exercises to reduce body weight, tai chi and other traditional exercises. Results: The overview of the available literature found evidence of a positive effect of exercise and therapeutic exercise in patients with knee osteoarthritis, both to prevent the onset and the progression of the disease and to reduce the intensity of the clinical symptoms. Depending on the type of intervention, various mechanisms have been identified that can reduce pain, reduce muscle weakness, improve proprioception, postural balance, and increase functional activity. Conclusion: The use of therapeutic exercises in treatment and rehabilitation of patients with knee osteoarthritis is highly recommended therapy. Therapeutic exercises, depending on their variety, can lead to improved therapeutic outcomes and reduced functional impairment. The application of different type strategies for prevention is an important part of the therapeutic process. When developing strategies for the management of the knee osteoarthritis it is necessary to consider the individual characteristics of the patient and the accompanying comorbidity. There is a need to continue research on the use of therapeutic exercises in order to better understand the mechanism by which they can lead to optimization of functional activity and reduction of adverse effects in patients with knee osteoarthritis. **Keywords:** *Knee osteoarthritis, Muscle weakness, Prevention, Therapeutic exercises, Knee rehabilitation*

**6. Mratskova G.** Musculoskeletal symptoms in patients with post COVID-19 syndrome and opportunities for increased functional activity. MEDIS – International Journal of Medical Sciences and Research. 2022; 1(1): 1–7. DOI:<https://doi.org/10.35120/medisij010101m>.

**Abstract:** There is an increasing number of patients surviving SARS-CoV-2 infection who have no evidence of acute infection but who continue to have symptoms that persist and shape the post COVID-19 symptoms (PCS). Musculoskeletal symptoms (MSK), as part of the PCS, lead to reduced functional activity and cause prolonged suffering. **The purpose** of this review is to identify the main MSK symptoms in PCS and to review physical interventions that may have a beneficial effect in reducing MSK complaints and increasing functional activity in PCS. **Materials and methods:** A review of the literature was performed, including articles about MSK symptoms in patients with PCS and the possible physical interventions used in rehabilitation of these patients, with impact on symptoms, functional capacity, and functional activity. The scientific articles research took place in the bibliographic database of PubMed. The search results were found for: post-COVID-19 (PCS) syndrome, long COVID, post-acute sequelae of SARS-CoV-2 infection (PASC), chronic COVID syndrome (CCS), Musculoskeletal symptom, Pain post COVID, physical function, Rehabilitation post-COVID, exercise, physical activity, functional capacity, traditional Chinese medicine. **Results:** The review found evidence of prolonged persistence of MSK symptoms as part of PCS syndrome. Fatigue, myalgia, back, waist and neck pain and arthralgia (pain in the peripheral joints) are the most reported symptoms. Data showing the need for rehabilitation and the positive effect of physical therapy and therapeutic exercises in patients with PCS to reduce pain and increase functional activity was found. **Conclusion:** Increasing physical activity in patients with PCS is likely to have a beneficial effect on general conditioning, physical function, and functional recovery, helping to overcome the effects of infection, reducing pain, and reducing emotional stress. Individually targeted physical interventions are recommended, including multimodal programs, exercises for overall muscle strengthening, increasing joint stability, cycling training, Individually targeted physical interventions are recommended, including multimodal programs, exercises for overall muscle strengthening, increasing joint stability, cycling training, electrical modalities -Transcutaneous electrical nerve stimulation (TENS) for pain symptoms. Rehabilitation should be applied after detailed functional assessment and shaped be carried out with the participation of a multidisciplinary rehabilitation team. The development of appropriate rehabilitation strategies will allow the achievement of optimal functional recovery and increased functional activity, satisfactory to the patient and will reduce the economic burden of prolonged reduced work capacity. **Keywords:** *Post-COVID-19 (PCS) syndrome, Musculoskeletal symptom, Pain post-COVID, Physical function, Rehabilitation post-COVID, Therapeutic exercise, TENS.*

**7. Mratskova G, Dimitrov N, Goycheva P, Petrov D.** Assesment of the rehabilitation program for patients with knee osteoarthritis and diabetes mellitus type 2. KNOWLEDGE - International Journal. 2021 45(4), 853–859. <https://ikm.mk/ojs/index.php/kij/article/view/215>

**Abstract:** The ame of the study isto evaluate the therapeuticeffects of the complex rehabilitation program, including electrotherapy and therapeutic exercises on the functional activity in patients with knee joint(KJ)osteoarthritis(OA)and concomitant diabetes mellitus type 2(DMT2).Materials and methods:A pilotstudy includet 20 patients with OA of KJand DMT2 ,responsible the criteria of the American College of Rheumatology (ACR) in the second and third radiological stages,according to Kellgren and Lawrence system.Patients underwent ten sessions of electrotherapy (medium-frequency Nemeck currents or low-frequency and low intensity electrostatic field) andtherapeutic exercises includes: analytical exercises with an emphasis on Vstus medialis et lateralis of m. Quadriceps femoris, resistance exercises, range of motion exercises, gait training. The resultswere objectified by evaluating the WOMAC



Osteoarthritis Index before and after therapy, 1st and 3rd month. There was a statistically significant decrease in total WOMAC Osteoarthritis Index ( $p < 0.001$ ), subscale Pain ( $p < 0.001$ ), Stiffness ( $p < 0.001$ ) and Function ( $p < 0.001$ ), which persisted for at least 12 weeks after the complex rehabilitation program. Conclusion: The results of the applied complex rehabilitation in the observed group of patients with osteoarthritis of the knee joint and diabetes mellitus type 2, which includes electrotherapy (with Nemeck currents or low-frequency and low intensity electrostatic field) therapeutic exercises leads to at least a 12-week increase in functional activity and reduction of the WOMAC Osteoarthritis Index and the three subscales Pain, Stiffness and Function. For better objectification of the therapeutic effects of the applied rehabilitation it is necessary to continue the study. **Keywords:** *Knee Osteoarthritis, Diabetes mellitus, Low-frequency and low-intensity electrostatic field, Nemeck currents, Therapeutic exercises, WOMAC Osteoarthritis Index*

**8. Elkova H, Mratskova G.** Assessment of the rehabilitation program for patients with stroke - a preliminary study. KNOWLEDGE - International Journal. 2021; 47(4), 675–680. Retrieved from <https://ikm.mk/ojs/index.php/kij/article/view/4838>

**Abstract:** Cerebrovascular diseases are the leading cause of morbidity and mortality around the world, and Bulgaria is on one of the first places, which determines the great social significance of the problem. Stroke is a leading cause of functional impairment and reduced daily activity. There is an increase observed in the frequency and severity of these diseases, accompanied by severe functional deficits, disorders of independence in everyday activities and quality of life. It is essential for the functional recovery of stroke patients to conduct timely, gradual, and comprehensive rehabilitation in all phases of the recovery process. Rehabilitation measures should consider the degree of damage of the central nervous system, the motor deficit and the concomitant diseases. Objective: To study the influence of the applied rehabilitation program on the motor recovery, the daily functional activity, and the quality of life in patients who have survived a stroke. Materials and methods: The pilot study included 39 stroke patients with a mean age of  $69.90 \pm (10.75)$ . The patients were divided into three groups and inpatient rehabilitation was applied. The first group had a severe degree of motor deficit, the second group was with a moderate motor deficit and/or discoordination syndrome and the third group - with a mild deficit and/or coordination disorders. The rehabilitation program included positional treatment, breathing exercises, active and passive exercises including balance and coordination, massage, specialized techniques for neuromuscular rehabilitation, verticalization and walking training, training in daily life activities. Low-frequency current stimulations are used to reduce spasticity. For the pain syndrome - magnetic field, interference currents, therapeutic ultrasound, and thermotherapy. The achieved results were evaluated in two stages - before and after rehabilitation by: testing of motor function; Brunnstrom scale, coordination testing, locomotion, diadochokinesia, Barthel scale. SPSS v.25 was used for statistical processing. The statistical significance of the changes is  $p < 0.05$ . Results: In the beginning of the rehabilitation, 18% of the patients were in first motor deficiency group, 28% - in second group, and in third group - 54% of them. After the completion of the rehabilitation program in the first group were 15%, in the second - 5%, and in the third - 80%. Significant improvement in motor function for the upper and lower limbs after rehabilitation  $p < 0.001$  and the Brunnstrom scale for upper and lower limb  $p < 0.001$  were observed. Reduction in spasticity from 28% to 18% of patients was observed, as well as reduced coordination dysmetria. The proportion of non-vertical patients decreased from 26% to 8%. The Bartel index  $p < 0.001$  was significantly increased.

Conclusion: The application of a complex rehabilitation program leads to a reduction in the motor deficit and discoordination syndrome and improvement of the daily functional activity in the examined group of stroke patients. In order to better objectify the obtained results, it is necessary to continue the study, covering a larger number of patients.

**Keywords:** stroke, rehabilitation, quality of life, Brunnstrom scale Bartel index.

**9. Galina Mratskova, Nedko Dimitrov, Alexander Dimitrov, Petya Goycheva, Damyan Petrov.** Short-term effects of the complex rehabilitation program including Nemeč's currents and therapeutic exercises in patients with Knee Osteoarthritis. Journal Science & Research (S&R), 2021; 5(1): 28-36.

**Abstract:** The purpose of this study is to evaluate the short-term therapeutic effects of treatment with Nemeč's medium-frequency currents and therapeutic exercises in patients with knee osteoarthritis. **Material and methods:** The study included 54 patients with symptomatic osteoarthritis of the knee joints, II and III radiological degrees on the Kellgren-Lawrence scale with a mean age of  $65.4 \pm 9.9$  (40-85), who conducted rehabilitation with Nemeč's currents and therapeutic exercises. All patients underwent a ten-day rehabilitation course. The results were evaluated by manual muscle testing test (MMT), measuring the circumference of the knee joint (KJ) with centimeter, test range of motion (Goniometry), pain (VAS), WOMAC Index, before and immediately after therapy. The statistical significance of the changes is  $p < 0.05$ . **Results:** A statistically significant decrease in the circumference of KJ after therapy ( $p < 0.05$ ), reduction of muscle weakness m. Quadriceps by MMT test ( $p < 0.05$ ), reduction of pain (VAS) at rest and activity ( $p < 0.05$ ) and WOMAC Index ( $p < 0.05$ ) and increase in the range of flexion in the knee joint ( $p < 0.05$ ) was observed. **Conclusion:** The results of the study showed significant improvement in the functional activity of patients (WOMAC Index). Nemeč's medium frequency currents therapy and therapeutic exercises can effectively reduce pain (VAS), swelling, muscle weakness (MMT), and range of motion in patients (ROM) with gonarthrosis. The obtained therapeutic effects are probably based on the complex application of Nemeč's current in trophic and analgesic parameters and therapeutic exercises. **Key words:** Knee osteoarthritis, Interferential current therapy, Pain, Muscle weakness m. Quadriceps femoris, Functional activity.

**10. Mratskova G.** Therapeutic effects of transcutaneous electrical neuromuscular stimulation (TENS) and therapeutic exercises in patients with cervical spondylosis. A preliminary study. Journal Science & Research (S&R). 2020; 4(1); 46-52.

**Abstract Aim:** To evaluate the therapeutic effects of complex rehabilitation, including TENS - Transcutaneous electrical nerve stimulation and therapeutic exercises on pain and mobility in the cervical spine in patients with cervical spondylosis. **Materials and Methods:** The preliminary study included 29 patients with cervical spondylosis, of mean age (Mean(SD))  $59.9(11.6)$  years (20 women  $62.0(10.0)$  and 9 men  $55.3(14.2)$ ). The duration of the current pain episode is 5(2-16) weeks, and the average duration (Me(Range)) of the disease is 8(1-19) years. Patients conducted 10 sessions with TENS and therapeutic exercises. The results were scored before therapy and after rehabilitation, by assessing pain (VAS) and range of motion in the cervical spine by goniometry. **Results:** We observed a decrease in pain (Mean(SD)) from  $4.86(0.95)$  to  $2.14(0.95)$ ;  $p < 0.05$  and an increase in the range of motion in the cervical spine after the rehabilitation program. In the sagittal plane: Extension from  $41.03(12.20)$  to  $56.21(10.32)$ ;  $p < 0.05$ , Flexion from  $39.83(9.68)$ ,  $53.10(8.70)$ ;  $p < 0.05$ . Rotation in left from  $41.55(13.30)$  to  $53.28(12.91)$ ;  $p < 0.05$ , Rotation in right from  $38.97(14.04)$  to  $50.0(14.08)$ ;  $p < 0.05$ . Lateroflexion on the left from  $27.41(7.28)$  to  $35.0(6.94)$ ;  $p < 0.05$ , Lateroflexion on the right from

23.62 (6.67) to 33.45 (6.96);  $p < 0.05$ . **Conclusion:** The results of the conducted preliminary study showed a reduction in pain and an increase in the range of motion in the cervical spine. Therapy with TENS and therapeutic exercise could be an effective non-pharmacological therapeutic option in the treatment of patients with cervical spondylosis. For better objectification of the obtained results it is necessary to continue the research. **Key words:** *Cervical spondylosis, Pain, Range of motion, TENS (Transcutaneous electrical nerve stimulation), Therapeutic exercises.*

**11. Ruska Paskaleva, Galina Mratzkova.** Analysis of the results of a study of motor activity and activities of daily living in adults with diabetes“, KNOWLEDGE – International Journal, 2019; 34(4): 889-894. <https://ikm.mk/ojs/index.php/kij/article/view/2014>

**Abstract:** The purpose of the present study in analysis of the results of a study of motor activity and activities of daily living in adults with diabetes at the Diabetes Center -Stara Zagora, in elderly people with type 2 diabetes. The subject of the study is 120 diabetic patients at the Diabetes Center -Stara Zagora with type 2 diabetes. The exercises are for one year with consecutive group work twice a week by the students during the clinical practice. Methodology of the study. Anthropometric measurements were performed, a specialized test for daily activities (DA Test, with a six-step assessment from 0 to 5) and a Quality of Life Test. The correlation between influencing the physical and mental health of patients is positively significant ( $R = 0.61$ ,  $p < 0.05$ ). This is an evidence of the incomparable influence of motor activity on the quality of life of diabetic patients. These results motivate the participation of students in the practical training, which is a factor that ensures the improvement of the quality in the real working environment, guarantees the consolidation of the acquired professional competences and the successful professional realization of the students. **Keywords:** *daily living, elderly people, diabetes.*

Целта на настоящата разработка е анализ на резултатите от изследване на двигателната активност и дейностите от ежедневието при възрастни хора с диабет в обществено-социален център „Диабет“ –Стара Загора, при възрастни хора с диабет тип 2. Материал и методи. Обект на проучването са 120 диабетноболни пациенти в обществено-социален център „Диабет“ –Стара Загора с диабет тип 2. Провежданите занимания са в продължение на една година с последователна работа по групи, два пъти седмично от студентите по време на клиничната практика. Методика на изследването. Извършени са антропометрични измервания, специализиран тест за ежедневиите дейности (Тест за ДЕЖ, като оценяването е шестстепенно от 0 до 5) и Тест за качеството на живот. Корелационната зависимост между повлияването на физическото и психическото здраве на пациентите е положително значима ( $R=0,61$ ;  $p < 0,05$ ). Това е доказателство за несравнимото влияние на двигателната активност върху качеството на живот на диабетноболните пациенти. **Ключови думи:** *двигателна активност, ежедневни дейности, възрастни хора, диабет.*

**12. Galina Mratzkova, Damyan Petrov, Nedko Dimitrov.** Short term effects of low-frequency and low intensity electrostatic field in patients with knee joint osteoarthritis. KNOWLEDGE – International Journal. 2018; 28 (2): 547-551. <https://doi.org/10.35120/kij2802547M>

**Abstract:** Introduction: Osteoarthritis (OA) is a widespread disease among adult population and is one of the major public health problems. OA is leading cause of disability the joints of lower limbs: knee and hip. As global life expectancy increases, it

predicted that OA will be the leading cause of damage resulting in permanent disability. In cases of OA a reduction in cartilage tissue is observed, which is radiographically demonstrated by narrowing of the joint space and bone changes, osteophytes and subchondral bone sclerosis. However, a significant proportion of patients with radiological evidence of gonarthrosis do not report joint pain. It is important to evaluate the changes occurring in the surrounding tissues. Muscle weakness of m. quadriceps femoris may occur before pain and impaired joint function. The development and application of new non-pharmacological methods in the rehabilitation of degenerative joint diseases is particularly important. Purpose: To establish the short-term therapeutic effects of treatment with Low-frequency and Low-intensive electrostatic field, applied through Deep Oscillation® method and complex of therapeutic exercises in rehabilitation of patients with osteoarthritis of the knee. Materials and methods: We conducted a one-year observational study involving 23 patients with clinical symptoms and radiologically proven II and III stage according Kellgren-Lawrence gonarthrosis, aged between 42 and 78 years, were observed. 15 of them were women average age  $61.73 \pm 12.9$  years vs 8 -males average age  $61.75 \pm 9.6$  years ( $p=0.997$ ). The duration of the current pain-episode was  $1.7 \pm 0.7$  months. The treatment was conducted in 10 sessions and included: Low-frequency and Low-intensity electrostatic field and complex therapeutic exercises. Results: The results were evaluated before and after completion of therapeutic course by assessing pain (VAS) at rest, when walking, climbing and descending on stairs, Manual Muscle Testing, Measurement of the knee joint circumference, Test Range of Motion and WOMAC Osteoarthritis Index, V.LK3.1. were tracked. For processing statistical data SPSS v.13 was used. There was a statistically significant reduction of pain syndrome at rest ( $p<0.001$ ), walking ( $p<0.001$ ), descending stairs ( $p<0.001$ ), climbing ( $p<0.001$ ). Reduction of knee joint circumference ( $p<0.001$ ). Increasing the range of flexion before Me (Range) from  $105^\circ$  ( $90^\circ$ - $120^\circ$ ) versus  $120^\circ$  ( $100^\circ$ - $125^\circ$ ) after therapy. Reduced deficiency at an extension from  $3.48 \pm 4.38$  before therapy to recovery of the extension. Improved total WOMAC Index ( $p<0.001$ ), Stiffness ( $p<0.001$ ) and Function ( $p<0.001$ ). Conclusion: The short-term effects of the application of Low-frequency and Low-intensive electrostatic field in complex with therapeutic exercises show reduction of clinical symptoms and improvement of daily functional activity in patients with knee joint osteoarthritis. Reduction of pain of rest and physical activity (walking, descending and climbing stairs) is observed, oedema is reduced, joint range of motion increases, immediately after completion of the therapeutic course. Because of the small number of patients included in the study for better objectifying of the effects of the low-frequency and low-intensity electrostatic field, the studies should continue. **Keywords:** *Knee osteoarthritis, Low-frequency and Low-intensive electrostatic field, Deep Oscillation® therapy, Pain, therapeutic exercises*

**13. Mratskova Galina, Dimitrov Nedko, Petrov Damyan.** Effectiveness of complex rehabilitation with deep oscillation and kinesitherapy for pain relief in patients with gonarthrosis. KNOWLEDGE - International Journal. 2018; 26(4): 1071-1078. Retrieved from <http://ikm.mk/ojs/index.php/kij/article/view/3086>

**Abstract:** Osteoarthritis (OA) is the most common rheumatic disease. It is a long-term chronic disease, which is characterized by destructive changes in the cartilage of joints. Clinically, OA is manifested with pain, stiffness and a reduced range of movement of the joints. There is established increase of symptomatic knee OA worldwide is observed. OA is the most common cause of disability in the elderly people which affects the knee. This leads to reduced daily functional activity and reduced quality of life. Pain is often the first and major symptom

of knee joint OA (KJ) and is often associated with functional deficiency of the affected joint. Pathogenesis of OA pain is multifactorial. It may be due to the engagement of the intra- and / or the structures around the joint. Pain reduction is an important factor in improving quality of life and in avoiding a number of side effects such as decreased muscle activity, muscular atrophy, reduction in overall muscle activity, osteopenia, sleep disturbance and psychosocial stress. **Purpose:** To evaluate the therapeutic effects of a complex rehabilitation involving Deep Oscillation (DO) and Kinesitherapy on pain in patients with symptomatic knee osteoarthritis. **Materials and methods:** The study included 57 patients (42 women and 15 men, average age  $65.6 \pm 11.3$  years) with clinical expression of symptomatic knee OA and radiographic data of II and III-grade of Kellgren and Lawrence system for classification of knee osteoarthritis. Patients underwent a ten-day complex rehabilitation including Deep Oscillation treatment using a hand applicator. The knee joint, the surrounding tissues and the m. Quadriceps femoris area were treated. The therapeutic course for all patients included 10 kinesitherapy procedures (KT) including different types of exercises, carried out immediately after electrotherapy. **Results:** The results were scored by assessing the pain at rest, walking, descent stairs and ascending stairs in four time periods: before and after treatment, at I-st and III-rd month, through VAS (a Visual-Analogue Scale for pain). We recognize statistically significant pain reduction after treatment, I and III month at rest ( $p < 0.001$ ), walking ( $p < 0.001$ ), descent ( $p < 0.001$ ) and ascending ( $p < 0.001$ ). The post-treatment effect was observed at 3-months after complex rehabilitation. **Conclusion:** The results of the conducted observational study show prolonged (at least III months) pain reduction effect in patients with gonarthrosis, who underwent complex rehabilitation with Deep Oscillation and Kinesitherapy. Complex rehabilitation, including Deep Oscillation and kinesitherapy, could be an effective pain relief option in patients with symptomatic osteoarthritis of the knee joint. In our opinion, more objective results can be achieved through by conducting randomized trials evaluating the therapeutic effects of complex rehabilitation involving Deep Oscillation therapy in larger number of patients. **Keywords:** *Gonarthrosis, Deep Oscillation therapy, Pain, VAS, Kinesitherapy*

**14. Mratskova G, Dimitrov N, Dimitrov A, Goycheva P, Petrov D.** Assessment of pain and physical activity 12 weeks after rehabilitation in knee osteoarthritis. *J Int Soc Phys Rehabil Med* 2022;5(S2):119-411 DOI: 10.4103/2349-7904.351394 Available from: <https://www.jisprm.org/text.asp?2022/5/6/119/351394>

**Background and Aims:** Osteoarthritis of the knee joint is a common disease in the elderly. It is most often characterized by pain, stiffness and swelling of the knee, which progress over time and lead to disability,<sup>[1]</sup> which reduces functional and social activity.<sup>[2]</sup> The aim was to assess pain at rest and during movement and functional activity 12 weeks after rehabilitation with Interferential currents and therapeutic exercises in patients with osteoarthritis of the knee. **Methods:** The study included 54 patients (17 men, 34 women) with mean age of 65.4(9.9) with osteoarthritis grade II and III radiology of the knee joint. Rehabilitation includes ten-day treatment with Interferential currents and therapeutic exercises. Results were assessed by manual muscle testing (MMT), KJ circumference measurement, goniometry, pain (VAS) at rest, descent, ascent of stairs, walking and WOMAC Index, before, 4 and 12 weeks after therapy. **Results:** Statistically significant decrease in swelling( $p < 0.001$ ) up to 4 weeks after therapy, reduction of muscle weakness m. quadriceps (MMT)( $p < 0.001$ ), increased flexion( $p < 0.001$ ), reduced pain(VAS) at rest, going down and upstairs, walking ( $p < 0.001$ ), and decreased WOMAC Index( $p < 0.001$ ) 12 weeks after therapy were observed. **Conclusion:** The applied rehabilitation program effectively reduces pain at rest and movement, muscle weakness and total WOMAC and increases flexion in the knee joint for at least 12 weeks after treatment,

while the swelling is significantly reduced within 4 weeks after rehabilitation.

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**III. Резюмета на статии, публикувани в сборници от конгреси и конференции в пълен текст, публикувани в нереферирани Български списания с научно рецензиране или публикувани в редактирани колективни томовете.**

1. **Галина Мръцкова**, Румен Делиев. Приложение на физикалните фактори при лечението и рекреацията на хроничен тазов болков синдром. Физикална медицина, Рехабилитация и Здраве, ISSN – 1312-9417. 2020; 16 (3-4):26-31.

**Резюме:** Хроничният тазов болков синдром (ХТБС) е хетерогенно понятие, което описва състояния, свързани с болка в областта на таза, придружени от затруднена микция и сексуална дисфункция, включително и такива, при които не се изолира бактериален причинител. ХТБС често се асоциира с хроничен простатит IIIA при мъже, но невинаги се касае за възпаление на простатната жлеза. Заболяването поставя значителни психологични и социални проблеми. Препоръчва се разработването на индивидуални терапевтични планове, които използват мултимодална терапия. Лечението е комплексно и цели повлияване на инфекциозния причинител и възпалителните процеси, подобряване качеството на живот, намаляване на симптомите и усложненията. Немедикаментозната терапия включва промяна в стила на живот, когнитивно-поведенческа терапия, приложение на факторите на физикалната медицина, преформирани и естествени (балнеотерапия, пелоидотерапия и др.), включително активна и пасивна кинезитерапия. Преформираните физикални фактори са достъпни и безопасни и не оказват обичайните странични ефекти от фармакотерапията. Към тях се отнасят: ниско-, средно- и високочестотни токове, магнитно поле, терапевтичен ултразвук, екстракорпорална ударновълнова терапия, Deep Oscillation, светлолечение и лазертерапия. **Ключови думи:** Хроничен тазов болков синдром/хроничен простатит (ХТБС/ХП), фармакологично лечение, електротерапия, екстракорпорална ударновълнова терапия, Deep Oscillation, светлолечение, лазертерапия.

**Abstract:** Chronic pelvic pain syndrome (CPPS) is a heterogeneous term that describes pelvic pain conditions accompanied by difficulties in urinating and sexual dysfunction, including those in which no bacterial cause is isolated. CPPS is often associated with chronic prostatitis IIIA in men, but it is not always associated with an inflammation of the prostate gland. The disease poses significant psychological and social problems. It is recommended to develop individual treatment plans which include multimodal therapy. The treatment is complex and aims to influence the infectious agent and inflammatory processes, to improve the quality of life, to reduce symptoms and complications. Non-pharmacological therapy includes lifestyle changes, cognitive-behavioral therapy, application of Physical Medicine factors, both preformed and natural (balneotherapy, peloidotherapy, etc.), including active and passive kinesitherapy. Preformed physical factors are accessible and safe and do not have the usual adverse events of pharmacotherapy. These include: low, medium and high frequency currents, magnetic field, ultrasound, extracorporeal shock wave therapy, Deep Oscillation, light therapy and laser therapy. **Keywords:** Chronic pelvic pain syndrome/Chronic prostatitis (CPPS/CP), pharmacological therapy, electrotherapy, extracorporeal shock wave therapy, Deep Oscillation, light and laser therapy.



**2. Мръцкова ГП,** Хидает ЛХ, Паскалева РВ. Рехабилитационната програма при пациент с Паркинсонова болест. Клиничен случай. Сборник- Доклади от Национална научно-практическа (on-line) конференция с Международно участие „Медицинските сестри и акушерките – ключов ресурс в съвременното здравеопазване“, 29 - 30 октомври 2020. (ISBN: 978-954-305-570-8). 2020: 398-404.

**Въведение:** Болестта на Паркинсон (БП) е невродегенеративно заболяване, характеризиращо се с тремор, ригидност, брадикинезия и постурална нестабилност. БП предизвиква дефицит във всички области на живота. Комплексната рехабилитация може да бъде ефективна част от терапията. **Целта е,** да се представи комплексна рехабилитационна програма при клиничен случай с Паркинсон. **Материали и методи:** Рехабилитационната програма включва: електрофореза с луга, масаж и терапевтични упражнения, приложени в болнични условия при жена на 70г. с болест на Паркинсон. Клиничните симптоми са оценени преди и след терапия чрез прилагането на Unified Rating Scale Of Parkinson (UPDRS). **Резултати:** Наблюдава се подобрене в двигателната активност и редуция на UPDRS от 34 на 28 точки. Подобрена е функционалната активност, дейностите от ежедневиия живот и локомоторната функция. **Заключение:** Комплексната рехабилитация, може да редуцира ефективно моторния дефицит при БП. **Ключови думи:** Болест на Паркинсон, ежедневна активност, Unified Rating Scale of Parkinson, електрофореза, терапевтични упражнения.

**Introduction:** Parkinson's disease (PD) is a neurodegenerative disease characterized by tremor, rigidity, bradykinesia, and postural instability. The disease can cause deficits in all areas of life. Conducting comprehensive rehabilitation can be potentially effective part of the therapy of these patients. The purpose is to present a complex rehabilitation program in a clinical case with Parkinson's. **Materials and methods:** The rehabilitation program was applied to a 70-year-old woman hospitalized with Parkinson's disease. The intervention includes iontophoresis with Black sea lye, massage and therapeutic. Clinical symptoms were assessed before and after therapy by applying a Unified Rating Scale Of Parkinson. **Results:** We observed an improvement in motor activity and a reduction in UPDRS from 34 to 28 points. Improved functional activity, daily living activities and locomotor activity were observed. **Conclusion:** Complex rehabilitation, probably can effectively reduce motor deficiency in patients with PD. **Key words:** Parkinson's disease, activities of daily living (ADL), Unified Rating Scale Of Parkinson (UPDRS), iontophoresis, therapeutic exercises.

**3. Галина П. Мръцкова,** Руска В. Паскалева. Функционално възстановяване след комплексна рехабилитация при пациенти с остеоартроза на колянната става“, Здравна политика и мениджмънт. (ISSN 1313-4981). 2019; 19(2):81-86.

**Резюме:** В настоящето проучване си поставихме за цел да изследваме ефектите от прилагането на комплексна рехабилитация за повлияване на субективната оценка за функционална активност и болка при остеоартроза на колянната става. Включени са 32 пациенти (24 жени и 8 мъже,  $67.1 \pm 8.1$  години) със симптоматична гонартроза II и III степен по Kellgren-Lavrence. Пациентите провеждат десет сеанса с интерферентен ток и кинезитерапия. Установи се, статистически значимо намаляване на болката след лечение в покой ( $p < 0.001$ ), ходене ( $p < 0.001$ ), слизане ( $p < 0.001$ ) и качване по стълби ( $p < 0.001$ ). Наблюдава се редуция в стойностите на WOMAC Index ( $p < 0.001$ ), подскаки болка, скованост и функция ( $p < 0.001$ ). Приложената програма може да бъде ефективна възможност за намаляване на болката в покой и при движение, и води до подобряване на

ежедневната функционалната активност. **Ключови думи:** Гонартроза, Функционална активност, WOMAC Index, Интерферентен ток, Кинезитерапия

In the present study, we set ourselves the goal to evaluate the effects of complex rehabilitation to influence the subjective assessment of pain and functional activity in knee osteoarthritis. The study included 32 patients (24 women and 8 males, 67.1±8.1 years) with Kellgren-Lavrence symptomatic gonarthrosis II and III. Patients hold ten sessions with Interferential currents and kinesitherapy. We found a statistically significant reduction in pain after treatment in rest ( $p<0.001$ ), walking ( $p<0.001$ ), descent ( $p<0.001$ ) and stair climbing ( $p<0.001$ ). We observed a reduction in WOMAC Index ( $p<0.001$ ) and subscales pain, stiffness and function ( $p<0.001$ ). The applied program may be an effective option for reducing pain at rest and on movement and leads to improvement of daily functional activity. **Key words:** Knee osteoarthritis, Functional activity, WOMAC Index, Interferential current, Kinesiotherapy

**4. Г. Мръцкова, Е. Илиева, А. Димитров, Н. Димитров, Д. Петров.** Ефективност на комплексната рехабилитация, включваща метода на DEEP OSCILLATION при пациенти с гонартроза. Физикална медицина, Рехабилитация и Здраве. (ISSN – 1312-9417). 2017; 16 (3-4):19-28.

**Резюме:** Цел: Да се оценят терапевтичните ефекти върху болката и функционалната активност при гонартроза, след комплексна рехабилитация, включваща Deep Oscillation (DO) и Кинезитерапия. **Материали и методи:** Обхванати са 90 пациенти с гонартроза II и III-степен по Kellgren-Lawrence. При работна група (РГ;  $n=57$ ) общият WOMAC Index (Me(range)) е 62 (40.0-78.0), а при плацебо група (ПГ;  $n=33$ ) е 59.0 (46.0-77.0). Пациентите проведоха десетдневна комплексна рехабилитация. Резултатите са отчетени чрез оценка на болката по VAS и общ WOMAC Index в четири момента. **Резултати:** В РГ се отчита статистическо значимо редуциране на болката след терапия, I и III месец в покой ( $p<0.001$ ), при движение ( $p<0.001$ ), слизане ( $p<0.001$ ) и качване ( $p<0.001$ ) по стълби, спрямо изходните стойности и задържане на постигнатите резултати след лечението и на III месец. За ПГ се установява намаляване на болката-покой ( $p<0.001$ ) за трите времеви периода (ТВП), спрямо изходните стойности, увеличаване на III месец, спрямо след лечение ( $p=0.002$ ), при движение редуция след терапия и повишаване на III месец, спрямо след терапия ( $p=0.001$ ), слизане по стълби-редукция за ТВП, спрямо началото ( $p<0.001$ ), увеличаване на III месец, спрямо след терапия ( $p=0.016$ ), качване по стълби-намаление в ТВП ( $p<0.001$ ), но задържане на постигнатия ефект до I месец след ФРМ ( $p=1.00$ ). При общия WOMAC Index за работната група се установи, статистическо значимо намаляване на показателя за ТВП ( $p<0.001$ ) и задържане на ефекта на III месец след терапията ( $p=1.00$ ), спрямо след лечение. При ПГ се установява, значимо намаляване след терапия ( $p<0.001$ ), на I месец ( $p<0.001$ ) и не се установява статистически значима разлика на III месец, спрямо изходните стойности ( $p=0.170$ ). **Заключение:** Резултатите от проведеното проучване показват значима, дълготрайна (до III месец) редуция на болката и WOMAC Index при пациентите с гонартроза, провеждащи комплексна рехабилитация включваща DO. **Ключови думи:** Гонартроза, болка, Deep Oscillation, WOMAC Index

**Objective:** To evaluate the therapeutic effects on pain and functional activity in gonarthrosis after complex rehabilitation including Deep Oscillation (DO) and Kinesiotherapy. **Materials and Methods:** 90 patients with Kellgren-Lawrence II and III grade gonarthroses were enrolled. In the work group (WG;  $n = 57$ ), the WOMAC Index (Me(range)) was 62(40.0-



78.0) and 59.0(46.0-77.0) in the placebo group (PG; n = 33). Patients underwent a ten-day complex rehabilitation. Results were scored by assessing the pain by VAS and a general WOMAC Index in four moments. **Results:** A statistically significant reduction in pain after treatment in WG, I and III months at rest ( $p < 0.001$ ), motion ( $p < 0.001$ ), descent ( $p < 0.001$ ) and ascending ( $p < 0.001$ ) were reported compared to baseline values and retention of post-treatment outcomes and at month III. The PG showed a reduction in pain at rest ( $p < 0.001$ ) for the three time periods(TTP), compared to baseline values, increase in the III month compared to posttreatment ( $p = 0.002$ ), pain-motion reduction after treatment and increase in the III month compared to posttreatment ( $p = 0.001$ ), pain-down stairs reduction for TTP, compared to baseline ( $p < 0.001$ ), increase in III month versus post-therapy( $p = 0.016$ ), pain-up stairs decrease in TTP( $p < 0.001$ ), and retention of the effect achieved up to 1 month after treatment ( $p = 1.00$ ). The total WOMAC Index for work group a statistically significant reduction in the TTP score ( $p < 0.001$ ) and retention of the effect on III month post-therapy( $p = 1.00$ ) versus post treatment were observed. In PG, a significant reduction after treatment ( $p < 0.001$ ), on I month ( $p < 0.001$ ) was observed and no statistically significant difference on III month compared to baseline was found ( $p = 0.170$ ). **Conclusion:** The results of the study show significant, long-term (up to III months) pain reduction and the WOMAC Index of patients with *gonarthritis* who undergo complex rehabilitation with DO. **Key words:** *Gonarthritis, Pain, Deep Ossillation, WOMAC Index*

5. Паскалева Р, Г. Мръцкова, В. Иванова, В. Павлова. Използване на проблемно-базираното обучение за изграждане на професионалните умения на студентите. Using problem-based learning to build a professional skills of students. Управление и образование, Том XIII (5) 2017, 197-204 ISSN 1312-6121.

**Abstract:** The training of students majoring in Medical rehabilitation and ergotherapy is directed at acquiring professional skills compliant with modern requirements of health care system and specialised rehabilitation centres. The practical training of students is performed in specialised classrooms under the supervision of a teacher and in practical training bases under the supervision of mentors. The aim of the present work was to investigate the opinion of students about the role of problem-based learning (PBL) in clinical training and its effect on professional skills and competence formation. The results of studies confirmed that 58% of students had a positive attitude to the implementation of PBL in clinical training evaluating it as interesting and motivating, while 75% were satisfied with practical training sessions. PBL was associated with solving multiple and various problems encountered in the professional activities of medical specialists. It improves the quality of training, stimulated professional thinking and decision-making, facilitated coping with complex and unexpected emergencies, which require adequate and professional reaction. **Key words:** *Problem-based learning, practical training, practical training bases, professional skills.*

6. Мръцкова Г, Маринов В, Гьонкова А, Руев П, Петров Д. Ефективност на нервномускулната електрофонаторна стимулация /NMEPS/ в комплексната рехабилитация при пациенти с ларингеална дисфункция (Наблюдателно проучване). Физикална медицина, Рехабилитация и Здраве. (ISSN – 1312-9417). 2017; 16(2): 26-31.

**Абстракт:** Целта на статията е да представи терапевтичните възможности на нервномускулната електрофонаторна стимулация /NMEPS/ при пациенти с ларингеална дисфункция. В наблюдателното проучване са обхванати 21 пациенти с едностранна пареза на възвратния ларингеален нерв. Процедурите се предхождат от електродиагностика за установяване степента на нервна увреда. Лечението се провежда

курсово за 10 дни, по 20 процедури на курс. След статистическа обработка на получените резултати се установи, че има статистическа зависимост по отношение на дисфонията преди и след терапия с NMEPS ( $p=0.0001$ ), която се изразява в подобрието от средна към лека форма на дисфония. При дисфагията се наблюдава подобрието от средно-тежка към лека форма на дисфагия и липса на такава, но има пациенти при които няма промяна (44.4%) и статистическа зависимост ( $p=0.005$ ). Пациентите с дисфункция по отношение на ефективността при кашляне преди началото на лечението бяха: 16.7%, с тежка дисфункция, 50.0% със средно тежка и 33.3% с лека. След NMEPS се установи подобрието от средно-тежка до лека форма. При направения непараметричен анализ се наблюдава статистическа зависимост ( $p=0.0001$ ). Всички пациенти бяха помолени да дадат оценка на качеството на гласа си по петобалната система на Likert. В началото на терапията 44.4% самооцениха качеството на гласа си като лошо, 50.0% като средно и 5.6% като добро. След терапията се установи подобрието в самооценката на качеството на гласа от средно до много добро и статистическа зависимост ( $p=0.0001$ ). Резултатите от проведеното изследване показват, че терапията по метода на NMEPS би могла да бъде ефективна възможност за функционално възстановяване при комплексното лечение на ларингеалните парези. **Ключови думи:** ларингеална дисфункция, невромускулна електрофонаторна стимулация, едностранна увреда на възвратния ларингеален нерв, наблюдателно проучване

**Abstract** The purpose of this study is to objectify the therapeutic options of neuromuscular elektro phonatoric stimulation /NMEPS/ in patients with laryngeal dysfunction. The study covers 21 patients with unilateral dysfunction of n. laryngeus recurens after surgery of the thyroid gland. Procedures are preceded by elektro diagnostic to establish the extent of damage of the nerve. Treatment is organized in courses for 10 days, 20 procedures per course. After statistical processing of the obtained results a statistical dependence in relation to dysphonia before and after NMEPS therapy was established ( $p=0.0001$ ), which is expressed in improvement of medium to mild dysphonia. In relation to dysphagia we found improvement from average-heavy to light form of dysphagia and absence of any symptoms of it after treatment, but there are patients with no change observed (44.4%) and statistical dependence ( $p=0.005$ ) Patients with dysfunction regarding the effectiveness when coughing, before treatment they were: 16.7%, with severe dysfunction, 50.0% with moderate to severe and 33.3% with light. After NMEPS therapy improvement in the condition of patients with moderate-heavy to light form was observed. The non-parametric analysis proved statistical dependence ( $Z=3.58$ ;  $p=0.0001<0.05$ ). All patients were asked to assess the quality of their voice according to the Linkert five-point rating scale. In the beginning of the therapy 44.4% of the patients ranked their voice quality as poor, 50.0% as moderate and 5.6% as good. After treatment improvement in self-assessment of voice quality from moderate to very good and statistical dependence ( $p=0.0001$ ) was observed. The results of the survey prove that NMEPS therapy is effective for functional recovery in complex treatment of laryngeal dysphonia. **Keywords:** laryngeal dysfunction, neuromuscular elektro phonatoric stimulation, unilateral damage of n. laryngeus recurens, observational study

**7. Мръцкова Г.** Терапевтични възможности на невромускулната електрофонаторна стимулация /NMEPS/ и невромускулната електроартикулаторна стимулация /NMEPS / при лечението и рехабилитацията на пациенти с ларингеална парализа. Физикална медицина, Рехабилитация и Здраве. (ISSN 1312-9417). 2017; 16(1): 14-20.

**Резюме:** През последните десетилетия много автори отбелязват, увеличаване броя на болните, страдащи от заболявания, свързани с хипотония на ларинкса. Възстановяването на гласовите функции при тези пациенти е бавен и продължителен процес, който е свързан с промяна в социалните и икономическите условия на живот.

Целта на настоящата статия е да представи терапевтичните възможности на нервно-мускулната електрофонаторна стимулация (NMEPS) и нервно-мускулната електроартикулаторна стимулация (NMEAS), проведени с апарат Voca Stim и предимствата, които тя притежава пред класическите методи, съчетавайки едновременно контролирани от пациента електростимулиращи импулси с фониаторни и вербални функционални упражнения. Терапевтичните процедури се предхождат от електродиагностика за първоначално определяне степента на увреда и последващо проследяване процеса на възстановяване, чрез определяне коефициента на приспособимост (ACC) и променливите параметри за стимулиращите токове, при директна ларингоскопия за NMEPS методика. Терапевтичният сеанс се реализира в два етапа: т.нар. „подгряване“ с галваничен ток и реална NMEPS и NMEAS стимулация. Селективната стимулация на увредения мускул се осъществява без да се засягат антагонистите или съседните здрави мускули. Предизвиква се чрез бутон за ръчно управление. Лечението се провежда курсово: 15–20 процедури на курс. Терапията с NMEPS и NMEAS е нова и ефективна възможност за рехабилитация и функционално възстановяване при пареза на ларинкса, дисфагия, дисфазия, дизартрия и други периферни и централни парези в областта на ларинкса и лицето. **Ключови думи:** ларингеална дисфункция, нервно-мускулна електрофонаторна стимулация (NMEPS), нервно-мускулна електроартикулаторна стимулация (NMEAS)

**Abstract:** In recent decades, many authors have indicated an increasing number of patients suffering from diseases associated with hypotension of the larynx. The functional recovery of voice features in these patients is a slow and continuous process associated with changes in social and economic living conditions. The purpose of this article is to present the therapeutic efficacy of the neuromuscular electrophonatory stimulation (NMEPS) and electroarticulatory and neuromuscular stimulation (NMEAS) conducted with Voca Stim and the advantages it offers, compared to traditional methods of electrostimulation, by simultaneously combining electrical stimulation pulses controlled by patient with vocal and verbal functional exercises. The therapeutic procedures are preceded by electro diagnosis for initial damage degree determination and follow-up tracking of the recovery process through determination of the coefficient of accommodation (ACC) and variable parameters of the stimulating current in direct laryngoscopy for NMEPS methodology. The therapeutic session is conducted in two stages: the so called preheating with galvanic current and real NMEPS and NMEAS stimulation. The selective stimulation of the damaged muscle is made without affecting the antagonists or adjacent healthy muscle. The stimulation is manually controlled by button. The treatment is conducted in courses of 15–20 procedures per course. The therapy with NMEPS and NMEAS is a new and effective opportunity for rehabilitation and functional recovery in laryngeal paralysis, dysphagia, dysphasia, dysarthria etc. peripheral and central paresis in the larynx and face area. **Keywords:** Laryngeal disorders, neuromuscular electrophonatory stimulation (NMEPS), electroarticulatory and neuromuscular stimulation (NMEAS)

8. **Мръцкова Г.** Съвременни виждания върху физиологичните и патофизиологичните процеси в хиалинния хрущял- основа за развитието на артрозна болест. Физикална медицина, Рехабилитация и Здраве. ISSN – 1312-0417; 2016; 15(1): 17-26.

**Резюме:** Структурните отличителни белези при остеоартроза /OA/ са: загуба на хрущял, която рентгенологично се демонстрира със стесняване на ставната междина и костни промени, представящи се с появата на остеофити и субхондрална костна

склероза. Въпреки това, тези структурни промени са слабо свързани с усещането за болка в ставите. Съвременните виждания за патогенетичните механизми при ОА са свързани с нарушение в хрущялната хомеостаза, която при нормално състояние е добре синхронизиран баланс между анаболните и катаболните процеси. При ОА настъпват промени в морфологията и синтетичната функция на хондроцитите и биохимични и структурни промени в екстрацелуларния матрикс. Тя е мултифакторно заболяване на цялата става, протичащо с участието на възпалителния процес и не може да се възприема, като чисто дегенеративно заболяване, което е следствие на механичното износване на ставите. В патогенезата се включват сложни взаимодействия на клетъчно ниво, цитокини, растежни фактори, неоангиогенеза. Патоморфологичните промени в хрущялната тъкан и синовиалната мембрана, варират в широк диапазон от лек възпалителен процес до дифузно възпаление. ОА се развива поради нарушен баланс между разградни и синтезни хондроцитни процеси – това води до хрущялна и субхондрална костна дегенерация. Доброто познаване на физиологичните и патофизиологични процеси, причина за появата и прогресирането на ОА е предпоставка за целенасочено нефармакологично лечение, включително, приложение на физикалните фактори, съобразено със стадия на заболяването. **Ключови думи:** *остеоартроза, патогенеза, възпаление, м. квадрицепс феморис*

**Abstract:** The structural hallmarks of OA are cartilage loss (seen as joint space narrowing on radiography) and bone changes (manifesting as osteophytes and subchondral sclerosis). However, these structural changes are poorly related to the perceived joint pain. The contemporary views on pathogenetic mechanisms of OA are linked to an infringement in cartilage homeostasis, which in a normal state is a well synchronized balance between anabolic and catabolic processes. In OA changes in the morphology and the function of chondrocytes synthetic and biochemical and structural changes in the extracellular matrix occur. It is a multifactorial disease of the whole joint, involving ongoing inflammatory process and cannot be regarded as purely degenerative disease, which is a consequence of mechanical deterioration of the joints. In the pathogenesis complex interactions at a cellular level, cytokines, growth factors and neoangiogenesis are included. Pathomorphological changes in the cartilage and synovial membrane vary widely from mild inflammation to diffuse inflammation. OA develops due to imbalance between degradation and synthesis chondrocyte processes – which leads to cartilage and subchondral bone degeneration. The good knowledge of physiological and pathophysiological processes, the cause of emergence and progression of OA, is the precondition for targeted non-pharmacological treatment, including application of physical factors, appropriate to the stage of the disease. **Key words:** *Osteoarthritis, pathogenesis, inflammation, m. quadriceps femoris*

9. Делиев Р, Петков Е, Мръцкова Г. Терапевтични възможности на консервативното лечение при пациенти с инконтиненция на урината. *Medikal Magazine*. (ISSN – 1314-9709). 2016; 26:50-55.

**Въведение:** Инконтиненцията на урина (UI) е значим медицински и социален проблем, засягащ двата пола. Съществена причина за понижаване качеството на живот, особено сред жените. С увеличаване на възрастта се повишава и честотата на инконтиненция. Тя има голямо социално и финансово отражение. Лечението при уринна инконтиненция е строго индивидуално и зависи от вида инконтиненция, нейната тежест, и причините за възникването ѝ. То може да бъде консервативно и оперативно.

Неоперативното лечение (Медикаментозна терапия, поведенческа терапия, обучение на пикочния мехур, промяна в начина на живот, кинезитерапия за мускулатурата на тазовото дъно, електростимулации) е средство на първи избор и се предпочита от повечето пациенти, понася се добре и е ефективно. **Ключови думи:** *Инконтиненция на урината (UI), Стрес инконтиненция (SUI), Императивна инконтиненция (UII), Неоперативното лечение*

10. Делиев Р, Петков Е, **Мръцкова Г.** Терапевтично поведение при пациенти с хроничен простатит/ Хроничен тазов болков синдром. *Medikal Magzaine.* (ISSN – 1314-9709). 2016; 29: 98-105.

**Въведение:** Хроничния простатит е разпространено заболяване при младите мъже, влошаващо качеството на живот на засегнатите. Заболяването поставя значителни психологични и социални проблеми при мъжете в сексуално-активната и трудоспособна възраст. Лечението е комплексно, прилага се медикаментозна терапия включваща антибиотични средства, алфа- блокери, НСПВ и др. медикаменти, промяна в стила на живот, психотерапия, физиотерапия и балнеолечение. **Ключови думи:** *Хроничен тазов болков синдром, флуорохинолони, физиотерапия, балнеолечение.*

11. Делиев Р, Петков Е, **Мръцкова Г.** Надежден диагностичен критерий ли е PSA? *Medikal Magzaine.* ISSN – 1314-9709; 2016; 33:60-65.

**Въведение:** PSA (простатен специфичен антиген) е биомаркер, специфичен за простатната тъкан. Първоначално е разработен като тест имащ за цел да подобри диагностиката на простатния карцином. В следствие от направените проучвания се установява, че серумните му нива се повишават не само при онкологични заболявания, но и при доброкачествени и възпалителни заболявания на простатната жлеза и се повлиява от различни фактори. PSA е не само диагностичен, но и важен прогностичен критерий при лечението на карцинома на простатата. Познаването на спецификата в динамиката на серумните му нива в съчетание с прилагането на други диагностични методи е от съществено значение за диагностиката и адекватното лечение на карцинома на простата. **Ключови думи:** *PSA, Gleason grading system, карцином на простата.*

12. Делиев Р, Петков Е, **Мръцкова Г.** Урофлоуметрия при доброкачествена простатана хиперплазия /ДПХ/. *Medikal Magzaine.* (ISSN – 1314-9709). 2015; 15: 66-71.

**Въведение:** Доброкачествената простатна хиперплазия /ДПХ/ е състояние тясно свързано с процесите на стареене. Въпреки, че не е животозастрашаващо състояние, клиничните прояви на ДПХ, като Симптоми на Долни Пикочни Пътища /СДПП/, влошават значително качеството на живот на пациента. Урофлоуметрията е неинвазивен, и лесно осъществим метод на уродинамично изследване, позволяващ скрининг и диагностика на нарушенията в микцията при ДПХ със и без симптоми на СДПП. Надежден по отношение на ранната диагностика при нарушения в акта на микция и е задължително изследване преди оперативна интервенция. **Ключови думи:** *урофлоуметрия, доброкачествена простатна хиперплазия, симптоми на долни пикочни пътища, максимално флоу*

**13. Мръцкова Г.** Синилкова М. Петров Д. Димитров С. Проследяване развитието на физическото качество Сила при отделни мускулни групи в заниманията по боди билдинг. *Science & Technologies*. 2014; 4 (8): 20-25.

**Abstract:** Physical activities of different intensities are important measures against the adverse effects of hypokinesia. Accordingly, this brings into relevance the problem related to measuring and assessing level of physical fitness. **The aim** of the present study is to trace the impact of bodybuilding exercise on some basic indicators of physical development. **Materials:** The study included 83 students from the Faculty of Medicine, Trakia University, Stara Zagora, Bulgaria, who were usually non-participants in any forms of physical activity. The participants performed a workout once weekly. Changes in seven indicators during the first and second terms were monitored and these included the following: strength of left arm, strength of right arm, back muscles strength, long jump from standing position, crunches to refusal, sustaining dead hang hold, squats for a defined time 30 sec. **Results:** The Test group showed significant changes in four of the observed indicators during the first term and during the second term: crunches ( $t(81)=3.69$ ,  $p=0.0001$ ,  $p=0.0001<0.05$ , first term  $\bar{x}=34.34$ ,  $SD=13.95$ , second term  $\bar{x}=39.15$ ,  $SD=13.91$ ); squats ( $t(81)=5.39$ ,  $p=0.0001<0.05$ , first term  $\bar{x}=25.11$ ,  $SD=4.95$ , second term  $\bar{x}=27.96$ ,  $SD=4.66$ ); sustaining dead hang hold (seconds) in the first term and second term ( $t(81)=3.44$ ,  $p=0.001<0.05$ , first term  $\bar{x}=50.51$ ,  $SD=25.84$ , second term  $\bar{x}=59.21$ ,  $SD=25.92$ ) and crunches in the first term and second term ( $t(81)=3.69$ ,  $p=0.0001<0.05$ , first term  $\bar{x}=34.34$ ,  $SD=13.95$ , second term  $\bar{x}=39.15$ ,  $SD=13.91$ ). **Conclusion:** The bodybuilding classes produced positive impacts on the development of muscle strength. It was found that once-weekly sporting activities were insufficient in bringing about any changes in muscle strength in all muscle groups. Therefore we propose a programme that could improve locomotor activity. **Keywords:** *Pedagogical study, muscle strength, physical activity.*

**14. Мръцкова Г,** Илиева Е. Приложение на вибрационната терапия във Физикалната и рехабилитационна медицина. *Физикална медицина, рехабилитация и здраве*. (ISSN – 1312-9417). 2012;11(1):18-23.

**Резюме:** Настоящият обзор има за цел да представи терапевтичните възможности на общата вибрационна терапия като нов физикален фактор в областта на Физикалната и Рехабилитационна медицина, за подобряване на нервномускулната дейност, повишаване на костната маса и плътност и благоприятно повлияване на симптомите при някои заболявания. Първоначално методът е разработен с цел да се предотврати загубата на мускулна сила и костна маса в условията на безтегловност. В последствие терапията с вибрации на цялото тяло /WBV/ става обект на проучвания, относно терапевтичното повлияване на редица заболявания, протичащи с промяна във функционирането на нервната и мускулна системи и костния метаболизъм. Хипотезата на повечето автори е, че вибрациите стимулират мускулните вретена и алфа-мотоневроните и инициират мускулни контракции. Чрез включването на WBV в рехабилитационната програма се преследват най-често три терапевтични цели: увеличаване на мускулна сила, подобряване на баланса, увеличаване на костната маса. Установяват се промени в кръвната концентрация на някои хормони: повишават се нивата на тестостерона и растежния хормон и намалява кръвната концентрация на кортизола. **Ключови думи:** *вибрация на цяло тяло, мускулна сила, неспецифична болка в гърба, постурален баланс, костна минерална плътност, остеопороза, физикална и рехабилитационна медицина.*

**Abstract:** Current article aims at presenting therapeutic modality of the whole body vibration therapy applied to human body through vibrating plate /WBV/ in order to improve neuromuscular performance, to increase bone mass or density, as a new therapeutic factor in

the field of Physical and Rehabilitation Medicine. Initially the method was designed to reduce loss of muscular strength and bone mass in conditions of weightlessness. Further on the whole body vibration therapy becomes a subject of treatment studies aiming to reveal the therapeutic influence upon different health problems leading to change in muscular and neurological systems functionality and bone metabolism. Most authors hypothesize that vibrations stimulate muscle spindles and alpha-motoneurons, which initiate a muscle contraction. Introducing WBV in rehabilitation process aims at three therapeutic goals: increasing of muscle strength, improving balance and increasing of bone mass. Changes in blood concentration of some hormones are observed. Increased blood concentrations of testosterone and growth hormone and decreased blood concentration of cortisol are observed. Mechanical vibrations are transmitted to the human body through vibrating plate. The frequency of the vibrations applied with the WBV varies in the range of the low frequencies and it can differ in interval from 5 to 60 Hz. **Keywords:** *whole-body vibration, muscle strength, non-specific back pain, postural balance, bone mineral density, osteoporosis, physical and rehabilitation medicine.*