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**Physiotherapy – movement for
health**



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Fizioterapija objavlja le izvirna, še neobjavljena dela v obliki raziskovalnih prispevkov, kliničnih primerov, preglednih prispevkov ter komentarjev in strokovnih razprav. Izhaja dvakrat na leto, občasno izidejo suplementi.

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Odziv na placebo: fiziološki temelji in vloga v zdravljenju

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Po priljubljeni razlagi naj bi bil placebo snov ali poseg brez specifičnega učinka na posameznikovo stanje ali bolezen, ki ga terapevt uporabi, da pri prejemniku izzove izboljšanje bolezenskega stanja, okvarjene funkcije in počutja. Ta razlaga je skladna z večinoma inertno naravo sredstev, ki se najpogosteje uporabljajo kot placebo, na primer škrob, injekcija fiziološke raztopine itn. Toda iz tovrstne opredelitve izhajata dve neprijetni posledici: prvič, učinek inertnega ukrepa je protisloven in skrivnosten koncept, ki ustvarja razlagalno vrzel glede mehanizmov odziva na placebo, in drugič, namerna uporaba neučinkovitega ukrepa je etično vprašljiva in je vir nezaupanja v terapevtski odnos.

Placebo lahko opredelimo tudi tako, da izpostavimo, da njegovo bistvo ni v inertni snovi ali navideznem posegu. Tovrstna sredstva delujejo le kot simbolni nosilci vplivov konteksta in značilnosti vsakega terapevtskega odnosa (1). Okoliščine zdravljenja in terapevtov odnos niso inertni, temveč hote ali nehote vplivajo na izid zdravljenja. Kadar so vplivi okoliščin zdravljenja in značilnosti terapevtskega odnosa v sozvočju z učinki specifičnih ukrepov zdravljenja, lahko dopolnjujejo in izboljšujejo njegov izid. Tedaj se odziv na placebo polno uresniči.

V predavanju bomo pogledali, kaj sodobni raziskovalni izsledki povedo o psiholoških (2) in fizioloških mehanizmih delovanja placeba, torej o vzvodih za uporabo odziva na placebo v prid zdravljenju (3, 4).

Response to placebo: physiological basis and role in treatment

A popular definition posits that *placebo* is an inert substance or intervention, used by a therapist with intent to induce an improvement in the recipient's state or function. Such definition stems from the predominantly (but not exclusively) inert means of eliciting a placebo-response (e.g. starch, saline injection), but it has its shortcomings: first, an efficacious inert substance or procedure is a *contradictio in terminis*, which fuels a mysterious explanatory gap on the mechanisms underlying the response to placebo, and second, the therapist's deception in applying a placebo makes it ethically questionable and brews distrust in a therapeutic relation.

However, placebo can also be defined differently, by shifting the focus away from the inert nature of the fake intervention. The intervention and the substance employed can then be seen merely as symbolic vehicles of the therapeutic relation, which is not inert because its nature and context impact the treatment process (1), both intentionally and unintentionally. When the nature and context of the therapeutic relation are in harmony with the specific treatment procedures, they can facilitate and enhance the treatment outcome – thus realizing the full therapeutic potential of placebo.

The lecture will present an overview of recent scientific evidence on the psychological (2) and physiological mechanisms underlying response to placebo, focusing on physiological basis for exploitation of placebo response in maximising therapeutic benefit (3, 4).

Literatura/References:

1. Benedetti F, Mayberg HS, Wager TD, Stohler CS, Zubieta J-K (2005) Neurobiological Mechanisms of the Placebo Effect. *J Neurosci* 25 (45): 10390–402.
2. Geers AL, Miller FG (2014) Understanding and Translating the Knowledge About Placebo Effects: The Contribution of Psychology. *Curr Opin Psychiatry* 27 (5): 326–31.
3. Bresjanac M. (2012) Mehanizmi učinka placeba. [Placebo effect mechanisms.] *Zdrav Vestn [Slo Med J]* 81: 876–93.
4. Hall KT, Loscalzo J, Kaptchuk TJ (2015). Genetics and the placebo effect: the placebome. *Trends Mol Med* 21 (5): 285–94.

Fizioterapija in prehrana, nov izziv za stroko

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Fizioterapevtski postopki se neposredno vpletajo v presnovne procese v organizmu, zato je za njihov optimalni učinek pomemben ustrezen vnos energetskih in drugih presnovnih substratov. Prehransko podporo med fizioterapijo je treba prilagoditi presnovnemu stanju posameznika, vrsti in namenu fizioterapije ter presnovnim dogajanjem ob posameznih fizioterapevtskih postopkih.

Kadar izvajamo fizioterapijo pri bolniku, je treba poznati tudi osnovne značilnosti njegovega bolezenskega stanja, ki lahko neposredno vplivajo na presnovna dogajanja.

Pri načrtovanju prehranske strategije upoštevamo prehranska priporočila za specifično populacijo. Še posebej smo pozorni pri populacijskih skupinah, ki so prehransko bolj ogrožene:

- otroci,
- nosečnice,
- starostniki,
- bolniki,
- športniki (tudi rekreativni),
- posamezniki s posebnimi načini prehranjevanja.

Začetna stopnja prehranske obravnave je prehransko presejanje, ki ga izvajamo z ustreznim orodjem. Pri bolnikih lahko uporabljamo vprašalnik NRS 2002, za starostnike MNA (mini prehranska obravnava) in v splošni populaciji MUST (univerzalno orodje za odkrivanje prehranske ogroženosti v splošni populaciji). Še posebej je odkrivanje prehranske ogroženosti pomembno za bolnike in starostnike, pri katerih je ustrezna prehranska podpora bistvena za uspeh številnih fizioterapevtskih postopkov. Pri prehransko ogroženih posameznikih je treba pripraviti tako prehransko strategijo, da je uspeh fizioterapije optimalen.

Podlaga za izdelavo ustrezne prehranske strategije so presnovno stanje posameznika oziroma bolnika in presnovne zahteve, ki so povezane s fizioterapevtskim procesom. Kadar je namen fizioterapije okrepiti mišično funkcijo pri starostniku, je na primer treba razumeti in poznati osnovna prehranska priporočila za izvajanje vadbe moči ter strokovno utemeljene možnosti uporabe prehranskih dodatkov, kot so aminokislina, omega-3 maščobne kisline in vitamin D.

Prehranska podpora in fizioterapija sta pomembni terapevtski orodji za izboljšanje funkcionalnega stanja in zdravja, zato je v luči novih spoznanj na področju presnove pomembno, da združimo znanje z obeh področij: prehrane in fizioterapije.

Ključne besede: fizioterapija, prehranska obravnava, prehranska strategija.

Physiotherapy and diet, a new challenge for the profession

Physiotherapeutic methods are in tight connection with metabolic processes in the body, therefore their optimal effect demands adequate intake of energy and other metabolic substrates. Nutritional support during physiotherapy must be adapted to the metabolic status of the individual, the nature and purpose of physiotherapy and metabolic processes in individual physiotherapy procedures.

When physiotherapy is performed in patients, the physiotherapist must be familiar with the basic features of his medical condition, which may have a direct effect on metabolic processes. For nutritional strategies during physiotherapy, the dietary recommendations for specific population with high nutrition risk must be considered:

- children,
- pregnant women,
- the elderly,
- patients,
- sportsmen (including recreational),
- individuals with special diets.

The initial level of nutritional treatment is a nutritional screening, which is carried out with a suitable tool. For assessing the nutritional risk in patients we can use the questionnaire NRS 2002, for elderly MNA (mini nutritional assessment) and in the general population MUST (a malnutrition universal tool). It is particularly important to detect nutritional risk in patients and the elderly, where appropriate nutritional support is crucial to the success of many physiotherapy procedures. Individuals with nutritional risk need specific nutritional strategy to optimize the outcome of physiotherapy.

The basis for an adequate nutritional strategy is the metabolic state of an individual or patient and metabolic requirements associated with the physiotherapy process. For example, when the purpose of the physiotherapy is to improve muscle function in the elderly, it is necessary to understand and know the basic dietary recommendations for power and strength sports. It is also necessary to know what are the possibilities for the use of nutritional supplements such as amino acids, omega-3 fatty acids, and vitamin D.

Nutritional support and physiotherapy are important therapeutic tools to improve functional status and health. Therefore, in light of the new lessons learned in the field of metabolism, it is important to combine knowledge of the two areas: nutrition and physiotherapy.

Key words: physiotherapy, nutritional assessment, nutritional strategy.

Literatura/References:

1. Sobotka L et al. Basics of Clinical Nutrition 2014; Galen.
2. Rotovnik Kozjek N, Milošević M, ured. Priporočila za prehransko obravnavo bolnikov v bolnišnicah in domovih za starejše občane. 2008 Dosegljivo na: http://www.mz.gov.si/fileadmin/mz.gov.si/pageuploads/javno_zdravje_09/Priporocila_za_prehransko_obravnavo_bolnikov.pdf.
3. The 'MUST' report. Nutritional screening for adults: a multidisciplinary responsibility. Elia M, editor. 2003.
4. Biolo G, Ciocchi B, Stulle M et al. Calorie restriction accelerates the catabolism of lean body mass during 2 wk of bed rest. *Am J Clin Nutr.* 2007; 86: 366–72.
5. Kreider RB, Wilborn Cd, Taylor L, et al. ISSN exercise and sport nutrition review: research and recommendations. *Int J Soc Sports Nutr* 2010; 7: 7 [homepage on the Internet]. Available from: <http://www.biomedcentral.com/content/pdf/1550-2783-7-7.pdf>.

Visokokakovostna fizioterapija – kaj je to?

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Uvod: Revidirani Temeljni standardi za fizioterapevtsko prakso Evropske regije WCPT (1) so bili prevedeni v slovenski jezik (2). Namenjeni so vsem fizioterapevtom in študentom fizioterapije, ki so v posrednem ali neposrednem stiku s pacienti. Vključujejo jasna stališča o pričakovani kakovosti medsebojnega delovanja, potrebna pri upoštevanju etičnih načel. Izražajo vrednote, pogoje in cilje, nujne za nadaljnji razvoj stroke. So orodje, ki ga za vrednotenje kakovosti sedanjega izvajanja fizioterapevtske dejavnosti in načrtovanje izboljšanja lahko uporabljajo vsi, ki želijo ponujati ali prejemati visokokakovostno fizioterapijo. Vsak standard ima več meril, ki ga vrednotijo oziroma opisujejo, kako naj bi ga dosegli. Dvaindvajset standardov je razdeljenih v pet medsebojno odvisnih sklopov. **1) Sodelovanje s pacientom:** Najpomembnejše je upoštevanje pacienta kot posameznika in se kaže pri vseh vidikih fizioterapevtskega odnosa in v vseh časovnih obdobjih. Pacient mora dobiti informacije o predlaganih postopkih fizioterapije. Pri tem je treba upoštevati njegovo starost in čustveno ter mentalno sposobnost za soglasje ob polni obveščenosti. Fizioterapevt obravnava podatke, ki jih dobi od pacienta, kot strogo zaupne. **2) Cikel ocenjevanja in terapije:** Da bi lahko zagotovili učinkovito fizioterapijo, je treba pridobiti vse dosegljive podatke, ki bi lahko bili uporabni v povezavi z obravnavo pacienta. Fizioterapevtski pregled mora poleg opazovanja, ogledovanja in tipanja ter specifičnih ocenjevalnih tehnik vsebovati uporabo objavljenih standardiziranih veljavnih, zanesljivih in občutljivih merilnih orodij. Izberemo jih glede na pacientovo težavo, da ocenimo spremembo njegovega zdravstvenega stanja. Zbiranju podatkov in ocenjevanju sledi analiza, katere cilj je pripraviti načrt fizioterapije. Načrt fizioterapije se oblikuje v sodelovanju s pacientom in izvede tako, da ima pacient od tega korist. Uspešnost načrta se ocenjuje sproti, glede na pacientove spreminjajoče se okoliščine in zdravstveno stanje ter ga, če je treba, lahko spreminjamo. Ob koncu načrta fizioterapije je treba poskrbeti za nadaljevanje fizioterapije drugje – premestitev ali zaključek obravnave. Odpustno poročilo o pacientovi obravnavi, ki ga napiše fizioterapevt samostojno ali je večdisciplinarno, mora biti poslano osebi, ki je pacienta nanjo napotila. Pri premestitvi se rezultati in interpretacija uporabljenih merilnih orodij posredujejo fizioterapevtu, ki bo pacienta prevzel. **3) Sporazumevanje:** Fizioterapevt se učinkovito sporazumeva s pacienti in/ali njihovimi skrbniki. Da bi pacientu zagotovil učinkovito in zadostno fizioterapevtsko storitev, sodeluje z zdravstvenimi delavci in drugimi ustreznimi strokovnjaki. Vsak pacient mora imeti svojo dokumentacijo, ki je shranjena skladno z veljavno zakonodajo. **4) Promocija varnega okolja za delo in fizioterapevtsko obravnavo:** Obravnava pacientov poteka v okolju, ki je varno tako zanje kot za njihove skrbnike in fizioterapevte. Fizioterapevt mora zagotoviti, da bo tveganje, če dela sam, kolikor se da znižano. Vsa oprema je varna, služi namenu in zagotavlja varnost pacientu, njegovemu skrbniku in fizioterapevtu. **5) Nепrekinjen strokovni razvoj oziroma vseživljenjsko učenje:** Fizioterapevt ocenjuje svoje potrebe po izobraževanju oziroma izpopolnjevanju ter načrtuje svoj neprekinjeni strokovni razvoj oziroma vseživljenjsko učenje. V zbirni mapi evidentira izvedbo načrta in vrednoti koristi glede na postavljene učne cilje. **Zaključek:** Temeljni standardi za fizioterapevtsko prakso so dosegljivi standardi in dobra podlaga za samoregulativo stroke. Ujemajo se s slovensko zakonodajo, vključno s kompetencami poklica fizioterapevt (3), ter jo dopolnjujejo (za primerjavo in razlago glej 4). Za njihovo udejanjanje v Sloveniji smo v prvi vrsti odgovorni fizioterapevti, za doseganje nekaterih standardov pa so verjetno

potrebne širše sistemske prilagoditve. Poleg kakovostnega dodiplomskega izobraževanja je treba organizirati tudi podiplomska izpopolnjevanja, ki bodo spodbujala z dokazi podprto prakso v fizioterapiji in uporabo standardiziranih merilnih orodij na vseh ravneh fizioterapevske dejavnosti.

Ključne besede: standardi, fizioterapija, kakovost, ocenjevanje, razvoj.

High quality physiotherapy – what is this?

Background: European core standards of physiotherapy practice (1) were translated in Slovenian language (2). These standards apply to all physiotherapists in direct or indirect contact with patients. The tool provides clear statements about the expected quality of interaction required to apply the ethical principles. They are considered to be achievable. The core standards are a tool that can be used to evaluate the current physiotherapy service and to plan its improvement by everybody who has an interest in providing or receiving high quality physiotherapy service. In this paper, foundations for the core standards are explained, and the standards are summarized in five sections: **1. Patient partnership:** recognition of the patient as an individual is central to all aspects of the physiotherapeutic relationship and is demonstrated at all times. Patients are given information about the proposed physiotherapy procedure, taking into account their age, emotional state and cognitive ability to allow informed consent to be given. Information which the patient gives to the physiotherapist is treated in the strictest confidence. **2. Assessment and treatment cycle:** in order to deliver effective physiotherapy intervention, information relating to treatment options is identified, based on the best available evidence, included observation, palpation/handling and use of specific assessment techniques. Taking account of the patient's problems, a published, standardised, valid, reliable and responsive outcome measure is used to evaluate the change in the patient's health status. Following information gathering and assessment, analysis should be undertaken in order to formulate a treatment plan. A treatment plan is formulated in partnership with the patient and is delivered in a way that benefits the patient. The treatment plan is constantly evaluated to ensure that it is effective and relevant to the patient's changing circumstances and health status. On completion of the treatment plan, arrangements are made for the transfer of care/discharge. A discharge report about the patient's treatment may be uni-professional or multi-professional and should be sent to the referrer. The report should include the results of any outcome measures used, with a clear explanation of the scoring used and interpretation to the physiotherapist. **3. Communication and the patient's documentation:** Physiotherapists communicate effectively with patients and/or their carers/relatives. Physiotherapists communicate effectively with health professionals and other relevant professionals to provide an effective and efficient service to the patient. To facilitate patient management and satisfy legal requirements, every patient who receives physiotherapy must have a record, and must be retained in accordance with existing policies. **4. Promotion of a safe working treatment environment:** patients are treated in an environment that is safe for patients, physiotherapists and carers. Physiotherapists take measures to ensure that the risks of working alone are minimised. All equipment is safe, fit for purpose and ensures patient, carer and physiotherapists' safety. **5. Continuing professional development/lifelong learning:** the physiotherapist assesses his/her learning needs and plans his/her continuing professional development/lifelong learning. In a continuing professional development portfolio the plan is implemented and the benefits of the learning needs evaluated. **Conclusion:** the core standards of physiotherapy practice are considered to be achievable and a good base for physiotherapy self-regulation. The core standards are in accordance with competencies of physiotherapy profession (3) and are supplementing the Slovenian legislation (4). Physiotherapists are responsible primarily for their realisation. To achieve some standards a few bigger systematic adaptations are needed in Slovenia. There is a need of qualitative graduate education and organisation of postgraduate education, which should facilitate the evidence based physiotherapy practice and application of standard outcome measures to all levels of physiotherapy.

Key words: standards, physical therapy, quality, assessment, development.

Literatura/References:

1. European Region World Confederation for Physical Therapy. European core standards of physiotherapy practice. general meeting, 22–24 May 2008, Athens, Greece: European Region, World Confederation for Physical Therapy; 2008. Dostopno na:

- <http://www.physio-europe.org/download.php?document=71&downloadarea=6>.
2. Društvo fizioterapevtov Slovenije – strokovno združenje. Temeljni standardi za fizioterapevtsko prakso. Ljubljana: Društvo fizioterapevtov Slovenije – strokovno združenje; 2015.
 3. Seznam poklicev v zdravstveni dejavnosti. Uradni list RS, št. 82/2004.
 4. Puh U, Zupanc A, Hlebš S (2015). Temeljni standardi za fizioterapevtsko prakso – merila pričakovane kakovosti. Rehabilitacija 14 (supl. 1): 25–32. Dostopno na: http://ibmi.mf.uni-lj.si/rehabilitacija/vsebina/Rehabilitacija_2015_S1_p025-032.pdf.

Krepitev zdravja s promocijo zdravja in preventivo v fizioterapiji

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Uvod: Fizioterapija se ukvarja z opredeljevanjem in izboljševanjem kakovosti posameznikovega življenja in njegove zmožnosti za gibanje na področjih promocije zdravja (PZ), preventive (P), zdravljenja, rehabilitacije in rehabilitacije (1). Zaradi staranja prebivalstva in pandemije kroničnih nenalezljivih boleznih (KNB) v svetu narašča potreba po fizioterapevtih. Mnenja o delovanju fizioterapevtov na področju promocije zdravja in preventive pa so med fizioterapevti še vedno deljena. V praksi se promocija zdravja pogosto zmotno enači z zdravstveno vzgojo (ZV) (2). Promocija zdravja zahteva interdisciplinaren in medsektorski pristop, pri katerem ima javnozdravstveni sektor pomembno in povezovalno vlogo (2). Vključenost fizioterapevtov pri vsem tem je nujna. **Metode dela:** Ključni strateški pristopi v promociji zdravja so zdravstveno sporočanje, vzgoja za zdravje, samopomoč oziroma vzajemna pomoč, spreminjanje organiziranosti, razvoj in mobilizacija skupnosti, zagovorništvo in razvoj politik (2). Svetovna zveza za fizioterapijo (angl. WCPT) je zato sprejela novo politično izjavo o kroničnih nenalezljivih boleznih, ki navaja pomembno vlogo fizioterapevtov pri njihovem preprečevanju in obvladovanju z zagotavljanjem z dokazi podprtih preventivnih programov na primarni in sekundarni ravni; promocije zdravja in kakovosti življenja; zmanjšanja sedečega vedenja; in izboljšanja ter vzdrževanja ravni telesne dejavnosti (TD) in funkcijske odvisnosti (3). Sistem javnega zdravstva v Sloveniji dopušča fizioterapevtom delovanje na področju promocije zdravja in preventive skozi nacionalna preventivna programa Z gibanjem do zdravja (ZGDZ) (od leta 1999) in Nacionalni program primarne preventive srčno-žilnih boleznih (NPPPSŽB) (od leta 2002) (4). Nov obračunski model v fizioterapiji na primarni ravni (od leta 2014) opredeljuje štiri fizioterapevtske obravnave in nalaga fizioterapevtom večjo odgovornost za učinkovito izvajanje in merjenje teh učinkov (5). Hkrati omogoča izvajanje (tudi preventivnih) fizioterapevtskih postopkov. Pri nacionalnem projektu Skupaj za zdravje (SZZ) so izbrani fizioterapevti prenovili sedanjí sistem zdravstvenovzgojnih obravnav za vse populacijske skupine, prilagodili vsebine, povezane s telesno dejavnostjo, jih razširili na večino kroničnih nenalezljivih boleznih in izbrana zdravstvena stanja ter predlagali sistem presejanja za funkcijsko manjšo zmožnost (FM) pri starejših (6). Od marca 2015 se novosti preizkušajo v treh pilotskih okoljih (6). **Rezultati:** V fizioterapevtskih raziskavah je v ospredje postavljena telesna dejavnost v povezavi s promocijo zdravja in preventivo, saj se tu fizioterapevti najbolj zavedajo svoje vloge in število tovrstnih raziskav raste (7). V okviru programa Z gibanjem do zdravja fizioterapevti delujejo v širšem lokalnem okolju skozi izvedbo testov hoje in svetovanje za telesno dejavnost (4). Pri Nacionalnem programu primarne preventive srčno-žilnih boleznih v okviru zdravstvene vzgoje centrov 69 fizioterapevtov izvaja zdravstvenovzgojne delavnice (4). Zdravstvenovzgojne centre obišče 6000 odraslih na leto. Uporaba fizioterapevtskih postopkov v preventivne namene v okviru novega obračunskega modela še ni raziskana. V dveh pilotnih okoljih SZZ (Celje in Sevnica) so štiri fizioterapevtke od marca do julija 2015 skupaj izvedle 37 presejanj za funkcijsko manjšo zmožnost, 56 udeležencev so testirale s skupino testov za starejše v modularni obliki, izvedle temeljne delavnice *Ali sem fit?* za 69 udeležencev in poglobljene delavnice *Gibam se* za 29 udeležencev. **Zaključki:** Vsak fizioterapevt mora biti promotor zdravja, saj življenjski slog pacienta oziroma klienta vpliva na izid fizioterapije. Fizioterapevti so med vsemi zdravstvenimi strokovnjaki najbolj kompetentni za predpisovanje in vodenje programov telesne vadbe, zato je treba prihodnost stroke

usmeriti v sistematično ozaveščanje in usposabljanje fizioterapevtov na področju promocije zdravja in preventive s formalnimi in neformalnimi izobraževanji.

Ključne besede: promocija zdravja, preventivni programi, fizioterapija, telesna dejavnost, funkcijska manjša zmožnost.

Enhancing health through health promotion and prevention in physiotherapy

Introduction: Physical therapy is concerned with identifying and maximising quality of life and movement potential within the spheres of health promotion (HP), prevention (P), treatment, habilitation and rehabilitation (1). In consequence of population aging and the global pandemic of non-communicable chronic diseases (NCDs), the need for physiotherapists is increasing. Opinions of physiotherapists about their performance in the area of HP and P are, however, divided. In practice, HP is often mistakenly equated with health education (HE) (2). HP requires a multidisciplinary and intersectoral approach, where the public health sector has an important and integrating role (2). Involvement of physiotherapists is urgent in all of the above areas. **Methods:** The key strategic approaches in HP are health communication, health education, self-help or mutual aid, organizational change, community development and mobilization, advocacy and policy development (2). The World Confederation for Physical Therapy (WCPT) therefore adopted a new Political Statement on NCDs which indicates that physiotherapists play a vital role in preventing and managing NCDs by providing evidence-based primary and secondary prevention programmes, promoting health and quality of life, reducing sedentary behaviour, and improving and maintaining physical activity level (PA) and functional independence (3). Public health system in Slovenia allows physiotherapists to act in the fields of HP and P throughout national prevention programs, like the Move for Health (MFH), implemented since 1999, and the National Program for Primary Prevention of Cardiovascular Diseases (NPPPCVD), implemented since 2011 (4). The new financial model in physiotherapy at the primary care level (2014) defines four physiotherapy treatments and gives physiotherapists a greater responsibility for efficient performance and measurement of outcomes (5). Concurrently, it enables the performance of preventive physiotherapy procedures. Within the national project Towards Better Health (TBH), a number of chosen physiotherapists renewed the existing system of HE for all population groups. They modified its contents in relation to PA and expanded them to most of NCDs and specific health conditions. They also proposed a screening system for functional disability (FD) among the elderly population (6). Since March 2015, the innovations have been tested in three pilot environments (6). **Results:** The expanding physiotherapy research related to HP and P highlights the importance of PA as physiotherapists working in this area are becoming increasingly aware of their role in health care (7). Within the MFH physiotherapists work in a wider local community through the execution of walk tests and PA counselling (4). In HE centres, 69 physiotherapists carry out HE workshops within the NPPPCVD (4), attended by 6000 adults every year. The use of physiotherapy procedures for preventive purposes under the new financial model has not as yet been studied. Within the project TBH four physiotherapists carried out joint 37 screenings for FD in two pilot environments (Celje and Sevnica) from March to July 2015. A total of 56 participants were tested with senior fitness test battery in modular form, 69 individuals attended the basic workshops 'Am I fit?' and 29 individuals participated in the advanced workshop 'I am moving'. **Conclusions:** Every physiotherapist must be a health promoter as a lifestyle of patients/clients has a significant influence on *physiotherapy treatment outcomes*. Physiotherapists are the most competent health professionals to prescribe and conduct exercise programs. Therefore, the future of the profession in the area of HP and P should be directed towards systematic education and training of physiotherapists through formal and informal learning.

Key words: health promotion, prevention programmes, physiotherapy, physical activity, functional disability.

Literatura/References:

1. RSK za fizioterapijo (2012). Opis poklica fizioterapevt. Ljubljana: DFS-SZ. www.dfs.si/mojprostor/novica/Opis%20poklica%20fizioterapevt%20RSK%202012.pdf. <8. 7. 2015>.

2. Zaletel-Kragelj L, Eržen I in Premik M (2007). Uvod v javno zdravje. Ljubljana: Medicinska fakulteta Univerze v Ljubljani, 291–314.
3. WCPT (2015). Policy Statement: Non-communicable diseases. London, UK: WCPT. www.wcpt.org/policy/ps-ncd < 30. 9. 2015>.
4. Backović Juričan A (2011). Involvement of primary health care physiotherapist in health enhancing physical activity promotion and chronic diseases prevention interventions. V: 16th International WCPT Congress, Amsterdam, 20-23 June 2011. (Physiotherapy Journal 2011; Vol. 97, Suppl 1). Amsterdam: WCPT: Elsevier: Physiotherapy Journal.
5. ZZZS. Občasnik - akti & navodila št. 2/12. 9. 2013, str. 53.
6. Norveški finančni mehanizem in Nacionalni inštituta za javno zdravje (2015). Skupaj za zdravje. Ljubljana: NFM & NIJZ. www.skupajzazdravje.si/projekt/ < 10. 7. 2015>.
7. Solar M. (2014). Promocija zdravja in preventiva v fizioterapiji (pregled literature). Diplomsko delo. Ljubljana: Zdravstvena fakulteta Univerze v Ljubljani.

Manipulacija fascij in celostna obravnava limfedema pri bolnici z vztrajnim limfedemom – poročilo o primeru

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Limfedem je kronično stanje in je posledica zastajanja limfne tekočine v tkivu zaradi poškodbe ali degeneracije limfnega sistema. Najpogostejši je sekundarni limfedem, ki je posledica zdravljenja karcinoma. Za zdravljenje limfedema se uporablja protokol celostne obravnave limfedema (1, 2). Manipulacija fascij se izvaja tudi za odpravljanje motenj delovanja notranjih organov. Organe obravnava glede na sistem, ki mu pripadajo (3, 4). V primeru te bolnice je bil to limfni in imunski sistem, ki sta povezana v eno enoto (3). Mišično-kostni sistem prek napetosti fascij vzdržuje ustrezen volumen telesnih votlin, v katerih so notranji organi – v opisanem primeru bolnice sta bila to ščitnica in premer žilnih vodov. Zastajanje limfe poleg brazgotin povzročijo spremembe na globokih fascijah mišic udov (3), motnje delovanja limfnega sistema pa spremembe na površinskih fascijah in fascijah notranjih organov. Poleg brazgotin sta na poslabšanje limfedema vplivali pojavljanje šenov in nepravilno delovanje ščitnice. Namen poročila o primeru je bil ugotoviti, ali je manipulacija fascij pripomogla k izboljšanju izida pri obravnavi bolnice z vztrajnim limfedemom. Metode: Pacientko, staro 48 let, s sekundarnim limfedemom v predelu spodnje medenice in levega spodnjega uda, ki se je pojavil pred 13 leti po kirurški odstranitvi rodil in regionalnih bezgavk zaradi karcinoma, sva obravnavali pet mesecev. Tkiva bolnice so dodatno prizadeli terapija z obsevanjem, šen in okvara delovanja ščitnice. Prejela je 13 celostnih obravnav limfedema, vsaka je trajala eno uro. Zadnje tri mesece sva dodali še šest obravnav manipulacij fascij, vsak drugi teden. Trikrat sva merili obseg levega spodnjega uda, in sicer prvič pred prvo obravnavo, drugič pred osmo obravnavo in tretjič po opravljeni dvanajsti celostni obravnavi limfedema in po šestkratni manipulaciji fascij. Obseg uda sva merili od zunanega maleola do vrha noge, na vsake štiri centimetre dolžine noge. Pred vsako obravnavo z manipulacijo fascij sva opravili specifične palpacijske teste za oceno limfnega sistema in specifične teste gibanja za oceno napetosti fascij mišično-kostnega sistema (4). Na podlagi izidov testov sva se odločili za protokol posamezne obravnave manipulacije fascij. Testiranje sva po obravnavi z manipulacijo fascij ponovili. Rezultati: V času celostne obravnave limfedema so se do uvedbe manipulacije fascij obsegi spodnjega uda zmanjšali v povprečju za 1,8 cm glede na prvi obisk. Po treh terapijah celostne obravnave limfedema je stanje ostalo enako. Po uvedbi manipulacije fascij se je obseg levega spodnjega uda še dodatno zmanjšal za približno 1,5 cm. Po končanem sklopu terapij je bil obseg za 3,3 cm manjši glede na prvi obisk. Po uvedbi manipulacije fascij je bolnica navajala subjektivno izboljšanje splošnega počutja in zmanjšanje težav, ki spremljajo limfedem. Po pregledu specialista flebologa z diagnostičnim ultrazvokom ni bilo več zaznati limfnega zastoja v prizadetem tkivu. Obseg levega spodnjega uda je še ostal večji v primerjavi z desnim zaradi več podkožnega maščevja. Želeni rezultat terapije je bil dosežen, težko pa je oceniti, koliko je k spremembi prispevala posamezna intervencija. V ta namen bi bilo potrebno izvesti obsežnejšo primerjalno študijo. Pomanjkljivost te študije je standardizacija postopka manipulacije fascij, saj je ta nemogoča.

Ključne besede: limfedem, celostna obravnava limfedema, manipulacija fascij, disfunkcija notranjih organov.

Fascial manipulation and combined decongestive therapy in a patient with persistent lymphedema – a case report

Introduction: Lymphedema is a chronic condition of lymph stasis caused by damage or degeneration of lymphatic system. The most common is secondary lymphedema which is the result of cancer treatment. The combined decongestive therapy is a lymphedema treatment protocol (1, 2). Fascial manipulation is used for treatment of musculoskeletal system as well as treatment for visceral dysfunction. Viscera are treated according to the system to which they belong (3, 4). In this case lymphatic immune system, that represents one unit (3). Musculoskeletal system sustains appropriate volume of body cavities, which contain the viscera – in this case the thyroid gland and lymph vessels. Beside the scar tissue, lymphedema can also be caused by the changes of the deep fascia of limbs (3). Lymphatic immune system dysfunction can cause changes in superficial and visceral fascia. Beside scars and the thyroid dysfunction, lymphatic system was additionally affected by repetitive erysipelas. The aim of the study was to find out if fascial manipulation contributed to the treatment outcome in case of the patient with persistent lymphedema.

Methods: A 48 year-old female patient was treated for secondary lymphedema of pelvis and the left lower limb for 5 months. Lymphedema emerged 13 years ago after excision of reproductive organs and local lymph nodes due to carcinoma. The patient's tissues were additionally damaged by radiotherapy, erysipelas and thyroid dysfunction. In five-month period the patient received 13 sessions of 1 hour of combined decongestive therapy. In the last 3 months, fascial manipulation was introduced for six times every other week. Circumference of the lower limb was measured three times. Firstly, before the combined decongestive therapy, secondly, before the eighth session and thirdly, after twelve sessions of the combined decongestive therapy and six treatments with fascial manipulation. The limb circumference was measured from lateral malleolus up to the top of the limb every four centimeters. Before every session of fascial manipulation treatment, specific palpation tests to assess the lymphatic system were conducted as well as movement verification to assess musculoskeletal system (4). Based on the test outcome the treatment protocol for fascial manipulation was established. Testing was repeated after each session of fascial manipulation.

Results: Before fascial manipulation was introduced the circumferences of the lower limb reduced for 1.8 cm in average according to the first treatment. After three treatments of the combined decongestive therapy, the condition of the patient remained the same. After fascial manipulation was introduced, the circumference reduced for another 1.5 cm in average. After the last treatment, it reduced for 3.3 cm regarding the first visit. After the introduction of FM, the patient reported improvement of general well-being and reduction of the side effects of the lymphedema. Absence of lymph collections in the lower limb was confirmed by the diagnostic ultrasound. Difference in circumferences of the lower limbs was attributed to the fat tissue.

Conclusion: The desired result of the treatment was obtained. However, it is hard to say to which extent the single intervention contributed to the result. For this purpose, a larger comparative study should be conducted. The objection of this study is standardization of the FM protocol, which is impossible to do.

Key words: lymphedema, combined decongestive therapy, internal organ dysfunction, fascial manipulation.

Literatura/References:

1. Földi M, Földi E (2012). Földi's textbook of lymphology for physicians and lymphedema therapists. 3rd ed. Munich: Elsevier GmbH, 175–249.
2. Weissleder H, Schuchhardt C (2001). Lymphedema - Diagnosis and Therapy 3rd. ed. Köln: Viavital-Verl. 118–31, 214–21, 336–74.
3. Stecco L, Stecco C (2014), Fascial manipulation for internal dysfunction. Padova: Piccin nuova libreria S.p.A., 3–8, 33–43, 229–38, 251–72.
4. Stecco L, Stecco A (2014), Manipolazione fasciale per le disfunzioni intene Parte pratica. Padova: Piccin nuova libreria S.p.A., 37–40, 67–71, 95–7, 105–14, 151–4, 201–8.

Fizioterapevtski postopki pri obravnavi bolnikov po operaciji Dupuytrenove kontrakture po klasični in novi metodi z lipofilingom

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Uvod: Dupuytrenova kontraktura je progresivno fibroproliferativno obolenje, ki vodi do fleksijske kontrakture prstov roke. Novejše obravnave vključujejo aponevrotomijo »multi-needle«, ekstenzivno perkutno aponevrotomijo z lipografitomom, vbizganje kolagenaze clostridium histolyticum, INF-gama in terapijo »shockwave« ter radioterapijo (1). Predavanje je namenjeno predstavitvi fizioterapevtskih postopkov in tehnik, uporabljenih pri bolnikih po opravljeni operaciji Dupuytrenove kontrakture s klasično obliko operativnega posega (selektivna fasciektomija/selektivna aponevrotomija) in novejšim postopkom z lipofilingom (ekstenzivna perkutna aponevrotomija z lipografitomom) (2). Cilj pooperativne rehabilitacije je čim bolj izboljšati normalno funkcijo operirane roke. **Metode:** Po operaciji uporabimo pasivne in aktivne oblike fizioterapevtskih postopkov, ki jih začnemo izvajati kmalu po posegu. Namen fizioterapevtskih postopkov je tudi zmanjšati možnost ponovitve kontrakture, medtem ko se rana celi, zmanjšati oteklino in povrniti gibljivost prstov. Uporabimo lahko različne fizioterapevtske metode, kot so kinezioterapija, magnetoterapija, elektroterapija, ultrazvok, galvanske kopeli, »tape« in laser. Uporabljene so tudi tehnike sklepne mobilizacije, PNF-metoda »zadrži-spusti« in prečna trikijska masaža. Pri operacijski metodi z lipofilingom pa je potrebna le dobro izvedena zdravstvena vzgoja. Bolnika je treba naučiti pravilnega razgibavanja, ki ga nato izvaja doma. Enkrat na teden bolnik pride na kontrolo, da fizioterapevt preveri pravilnost izvajanja vaj. **Rezultati:** Novi operativni postopek pri zdravljenju Dupuytrenove kontrakture z lipofilingom bistveno skrajša celotni postopek obravnave bolnika (2). Rehabilitacija, ki temelji na kombinaciji fizioterapevtskih metod in tehnik, vodi do izboljšanja gibljivosti roke in hitrejše vrnitve bolnika v normalno življenje. **Zaključki:** Izid zdravljenja je odvisen od stopnje prizadetosti, načina zdravljenja in pravilne rehabilitacije (3). Najboljše rezultate dosežemo pri uspešnem sodelovanju operaterjev, fizioterapevtov, specializiranih za rehabilitacijo roke, in sodelovanju bolnikov. Da lahko dosežemo te rezultate, se je treba nenehno izobraževati in pridobivati novo znanje o novejših metodah in tehnikah, ki se uporabljajo pri rehabilitaciji bolnikov.

Ključne besede: roka, Dupuytrenova kontraktura, lipofiling, rehabilitacija.

Physiotherapeutic methods and treatments of patients after the classical surgery of Dupuytren contracture and the new approach with lipofilling

Background: Dupuytren disease is a progressive fibroproliferative disorder, which leads to flexion contractures of the digits. The most recent treatments used are multi-needle aponeurotomy, extensive percutaneous aponeurotomy and lipografting, injecting collagenase *Clostridium histolyticum*, INF-gamma and shockwave therapy as well as radiotherapy [1]. The physiotherapeutic methods and techniques after the surgery of Dupuytren contracture with standard operation procedure (selective fasciectomy/aponeurotomy) and the new approach using lipofilling (extensive percutaneous aponeurotomy and lipografting) will be presented [2]. The aim of postoperative rehabilitation is to achieve the normal function of the hand and fingers. **Methods:** After the surgery the passive and active physiotherapeutic techniques are used as soon as possible. The purpose of physiotherapeutic treatment is to prevent recurrence of the contracture while the wound is healing, to reduce swelling and to restore movement of the fingers and hand with exercises. A hand therapist can use various physiotherapeutic methods such as chinesiotherapy, magnetic therapy, electrotherapy, ultrasound, galvanic bath therapy, taping, and laser. Joint mobilization technique, PNF hold-relax method and traction therapy can be used as well. When the surgical method with lipofilling is used, a hand therapist has to inform the patient about the correct way to do exercises at home. Weekly visits to the hand therapist are necessary to check if the patient is performing the exercises in the correct way. **Results:** The new surgical procedure to correct Dupuytren contracture based on lipofilling shortens the entire medical intervention for the patient [2]. Rehabilitation that is based on combination of physiotherapeutic methods and techniques leads to improvement in hand and finger mobility in faster return of patient to normal life. **Conclusions:** The outcome of medical treatment depends on the stage of disease, the surgical approach used and correct rehabilitation [3]. The best results are obtained with successful cooperation between surgeons, therapists specialized in hand rehabilitation and patients. To achieve good results, permanent education and training are very important for successful implementation of new techniques to improve rehabilitation and benefit patients.

Key words: hand, Dupuytren contracture, lipofilling, rehabilitation.

Literatura/References:

1. Mafi R, Hindocha S, Khan W (2012). *The Open Orthopaedics Journal*, 6, (Suppl 1: M9): 77–82.
2. Hovius SE, Kan HJ, Smit X, Selles RW, Cardoso E, Khouri RK (2011). *Plast Reconstr Surg*. 128 (1): 221–8.
3. Hovius SE, Kan HJ, Verhoekx JS, Khouri RK (2015). *Clin Plast Surg*. 42 (3): 375–81.

Uporaba elastičnega lepilnega traku pri brazgotini – poročilo o primeru

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Uvod: Brazgotina, sestavljena iz kolagena, nastane po vsaki prekinitvi kože (1). Nenormalno brazgotinjenje, ki ima značilnosti povečanega širjenja tkiva v višino in širino, povečane vaskularizacije, zmanjšane prožnosti in mehkoobe ter spremenjene pigmentacije, pa povzroči nastanek hipertrofične brazgotine (2). Povečano brazgotinjenje je za bolnika neprijetno v fizičnem, estetskem in psihološkem pomenu (3). Namen raziskave je bil ugotoviti, ali lahko zmanjšamo hipertrofično brazgotino z nameščanjem elastičnega lepilnega traku. **Metoda:** Bolnik je bil star 53 let, po resekciji distalne tretjine leve stegenice s pripadajočim manjšim delom mehkih tkiv v okolici. Vstavljena je bila tumorska endoproteza levega kolena. Po operaciji je bila po štirih tednih brazgotina dolga 300 mm, široka 15 mm in visoka 5 mm. Elastični lepilni trak je bil nameščen pravokotno na brazgotino in zamenjan vsake tri dni. Terapija je trajala 17 dni. Brazgotino smo ocenili pred postopkom nameščanja traku in po njem. Za oceno brazgotine smo uporabili ogledovanje in otipavanje, merilni trak, lestvico Stony Brook za ocenjevanje brazgotine in vizualno analogno lestvico za bolnikovo subjektivno oceno brazgotine. **Rezultati:** Brazgotina je bila po 17 dneh nameščanja elastičnega lepilnega traku ploska, na površini kože, po višini se je zmanjšala za 5 mm, njena prožnost je bila normalna, trdota brazgotine pa se je zmanjšala. Lestvica za oceno brazgotine Stony Brook je bila pred obravnavo 1/5, po obravnavi pa 4/5. Bolnikova subjektivna ocena glede na videz brazgotine po vizualni analogni lestvici je bila pred obravnavo 10/10, po obravnavi pa 1/10. **Zaključek:** Nameščanje elastičnega lepilnega traku se je v našem primeru pokazalo kot učinkovit postopek za zmanjšanje hipertrofične brazgotine. Za bolnika je imelo zmanjšanje brazgotine velik fizičen, estetski in psihološki pomen.

Ključne besede: brazgotina, celjenje ran, elastični lepilni trak, zdravljenje.

Application of kinesiotope by scar – a case report

Background: A scar, made of collagen, occurs after each injury of skin (1). Abnormal scarring with features of increased extending of tissue in height and width, increased vascularisation, decreased elasticity and softness and changed pigmentation, causes a hypertrophic scar (2). Hypertrophic scarring is for the patient uncomfortable in a physical, visual and psychological sense (3). Therefore, the aim of the research was to determine if we could decrease hypertrophic scar with application of the kinesiotope on it.

Methods: The patient was 53 years old, after operation of distal part of the left femur with a little part of soft tissue in this area. He had a tumor endoprosthesis in the left knee. After four weeks after operation, the scar was 300 mm long, 15 mm wide and 5 mm high. The kinesiotope application was placed perpendicularly to the scar and changed every three days. The treatment lasted 17 days. The scar was assessed before and after the kinesiotope application. We used auscultation and palpation, the measuring tape, the Stony Brook scale and the visual analogue scale for the patient's subjective assessment of the scar. **Results:** After 17 days of the treatment with a tape, the scar was plane and on the surface of the skin. It decreased in height for 5 mm, the scar elasticity was normal and the hardness of the scar reduced. Before the treatment, the Stony Brook scale was 1/5, after the treatment it was 4/5. Before the treatment, the visual analogue scale of the patient's subjective assessment was 10/10, after the treatment it was 1/10.

Conclusions: In our case the application of kinesiotope showed an effect on reducing hypertrophic scar. Reduction of the hypertrophic scar has for the patient great physical, visual and psychological meaning.

Key words: scar, wound healing, kinesiotope, treatment.

Literatura/References:

1. Guo S, DiPietro LA (2010). Factors affecting wound healing. *J Dent Res* 89 (3): 219–29.
2. Sharp P (2014). Best evidence statement use of pressure therapy for management of hypertrophic scarring. *BEST* 176: 1 - 10. <http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/best.htm> <7. 2. 2015>.
3. Esselman PC (2007). Burn rehabilitation: an overview. *Arch Phys Med Rehabil* 88 (12 Suppl 2): 3–6.

Učinki ponavljajočega se pasivnega posteroanteriornega obremenjevanja kolena na anteriorno laksnost kolenskega sklepa

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Uvod: Ob poškodbi sprednje križne vezi se poveča anteriorna laksnost kolenskega sklepa. Povečana anteriorna laksnost kolena lahko povzroči kolensko disfunkcijo. Trenutno strokovno prepričanje je, da se lahko povečana laksnost kolenskega sklepa popravi le s kirurškim posegom. Zadnje raziskave (Barcellona et al., 2014; Morrissey et al., 2009) kažejo, da se povečana laksnost kolena lahko zmanjša z ustreznim obremenjevanjem kolena, zato je namen raziskave ugotoviti, ali ponavljajoče se pasivno posteroanteriorno obremenjevanje nepoškodovanega kolena lahko zmanjša njegovo laksnost. **Metode:** V randomizirani raziskavi je sodelovalo 22 mladih, nepoškodovanih preiskovank. Preiskovanke so bile razvrščene v dve skupini: skupina z visoko in skupina z nizko obremenitvijo. Vadba je potekala 12 tednov in se je izvajala le na enem kolenu, ki je bilo izbrano naključno, medtem ko je drugo koleno služilo kot kontrolno. Fizioterapevtke so manualno izvajale obremenitev v smeri anteriorne translacije golenice, pri fleksiji kolena 20°. Obremenitev je bila aplicirana s pomočjo ročnega dinamometra (NexGen Ergonomics Inc, Pointe Claire, Quebec, Canada), pripetega na usnjeno pasjo ovratnico okoli proksimalnega dela golenice. Obe skupini sta prejeli 4 sete po 10 ponovitev anteriorne translacije golenice, pri čemer je bila za skupino z nizko obremenitvijo uporabljena sila 10 kg, za skupino z visoko obremenitvijo pa 17 kg. Pred trimesečnim pasivnim obremenjevanjem kolena, med in po njem so bile izvedene meritve anteriorne laksnosti kolena z GeNouRoB (GNRB®) kolenskim artrometrom (GENOUROB SAS, Monenay, Francija). **Rezultati:** Pasivno obremenjevanje kolena ni pomembno vplivalo na anteriorno laksnost kolenskega sklepa ($p = 0.48$ pri sili 134N in 0.78 pri sili 250N). 95% interval zaupanja je bil $[-1.09, 0.51]$ pri sili 134N in $[-1.13, 0.85]$ pri sili 250N. Med skupinama ni bilo statistično pomembnih razlik pri začetnem testiranju ($p = 0.50$ in 0.76), a se je anteriorna laksnost kolena statistično značilno povečala pri obeh silah ($p = 0.001$ pri sili 134N in $p = 0.006$ pri sili 250N). V povprečju se je anteriorna laksnost povečala za približno 1 mm pri obeh silah (95% IZ $[0.40, 1.54]$ pri sili 134N in $[0.32, 1.73]$ pri sili 250N). Razlika ni klinično pomembna (Vauhnik et al., 20013). **Zaključki:** Pasivno obremenjevanje kolena ni pomembno vplivalo na anteriorno laksnost kolenskega sklepa. Potrebne so dodatne raziskave, da bi ugotovili, ali ima pasivno obremenjevanje kolena vpliv na anteriorno laksnost kolenskega sklepa, ob upoštevanju intenzivnosti in trajanja obremenjevanja.

Ključne besede: sprednja križna vez, sila, artrometer, manualna terapija.

Effect of repeated knee posteroanterior passive loading on knee anterior laxity

Background: Increased knee anterior laxity results when the anterior cruciate ligament is injured. This increased laxity can cause knee dysfunction. Until recently this laxity was believed to be only diminished through surgery, but recent findings (Barcellona et al., 2014; Morrissey et al., 2009) indicate that knee anterior laxity may be decreased with proper, repeated loading of the knee. The purpose of this study was to test the hypothesis that regular passive loading of the uninjured knee would enhance its stiffness. **Study design:** Randomized controlled trial. **Methods:** Twenty two subjects were recruited for this study and attended the pre-training test. Only females with no prior history of knee injury were included. Subjects were randomly assigned to one of two groups: high or low load groups. Only one knee was treated with the other acting as a control and the leg chosen for treatment was randomly determined. Physiotherapists manually applied anterior directed loads to the proximal tibia while using the other hand to stabilize the femur in a fashion similar to the Lachman test with the knee flexed to approximately 20°. These loads were applied via a hand-held dynamometer (NexGen Ergonomics Inc, Pointe Claire, Quebec, Canada) attached to a leather dog collar secured around the proximal tibia. Both groups received 4 sets of 10 repetitions of loading in each treatment session with the loads used either 10 kg (low load group) or 17 kg (high load group). Knee anterior laxity was tested using a GeNouRoB (GNRB®) knee arthrometer (GENOUROB SAS, Monenay, Francija) before, during and after a 3-month of training period. **Results:** The passive anterior loading of the knee does not seem to have any effect on knee anterior laxity ($p = 0.48$ and 0.78 for forces 134N and 250N, respectively). The 95% confidence interval for the effect of passive anterior loading is $[-1.09, 0.51]$ and $[-1.13, 0.85]$ for forces 134N and 250N, respectively. There was no difference between the randomized groups at baseline ($p = 0.50$ and 0.76), but the knee anterior laxity did significantly increase in time in all cases ($p = 0.001$ and $p = 0.006$, for forces 134N and 250N, respectively). On average the knee anterior laxity increased for approximately 1 mm in both analyses considered (95% CI $[0.40, 1.54]$ and $[0.32, 1.73]$ for forces 134N and 250N, respectively). However, the increase is not clinically important (Vauhnik et al., 2013). **Conclusions:** Knee anterior laxity was not affected by the load training. Additional research is required to evaluate this treatment further with future work modified in terms of training intensity and duration.

Key words: anterior cruciate ligament, force, arthrometry, manual therapy.

Literatura/References:

1. Barcellona MG, Morrissey MC, Milligan P, Johnson M, Amis AA (2014). The effect of knee extensor open kinetic chain resistance training in the ACL-injured knee. *Knee Surg Sports Traum Arthrosc*; Jun 17 (Epub ahead of print).
2. Morrissey MC, Perry MC, King JB (2009). Is knee laxity change after anterior cruciate ligament injury and surgery related to knee extensor training load? *Am J Phys Med Rehabil* 88: 369–75.
3. Vauhnik R, Pohar Perme M, Barcellona MG, Rugelj D, Morrissey MC, Sevšek F (2013). Robotic knee laxity testing: Reliability and normative data. *Knee*; 20: 250–5.

Učinki standardne cilindrične manšete in prototipa manšete z asimetrično razporeditvijo tlaka na oksigenacijo in aktivacijo mišice kvadriceps femoris

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Uvod: Vadba z zmanjšanim pretokom krvi z aplikacijo napihljivih manšet skozi aktivne mišice (ishemična vadba) se uporablja kot alternativa standardni vadbi s težkim bremenom. Za povzročitev žilne okluzije se uporabljajo različne napihljive manšete in sistemi za regulacijo tlaka. Tehnične podrobnosti so slabo opisane in tudi optimalni parametri za ishemično vadbo niso znani. Namen te študije je primerjati delovanje dvoprekatne manšete z asimetričnim tlakom (DMAT) in enoprekatne manšete s simetričnim tlakom (EMST) na spodnjih udih v mirovanju in med vadbo. **Metode:** Novo oblikovana DMAT (širina 14 cm) in EMST (širina 10 cm) sta bili preverjeni na 17 zdravih prostovoljcih (starost $27,3 \pm 5,2$ leta). Učinkovitost manšet v mirovanju smo primerjali na obeh stegnih pri štirih različnih tlakih (120, 160, 200 in 240 mm Hg). Izmerili smo obseg stegna in kožno gubo, navor maksimalne hotene izometrične kontrakcije (MIVC) mišice kvadriceps, čas izometrične kontrakcije do hotene odpovedi pri 40-odstotni sili MIVC v ishemičnih in kontrolnih pogojih, kardiovaskularne odzive (EKG in arterijski krvni tlak), intenzivnost bolečine in spremembe kinetike hemoglobina v mišici vastus lateralis z infrardečim laserskim spektrometrom (NIRS). **Rezultati:** Obseg stegna ($L = 57,3 \pm 3,7$ cm, $D = 57,1 \pm 3,8$ cm) in navor MIVC ($L = 230 \pm 77$ Nm, $D = 233 \pm 77$ Nm) se med nogama nista razlikovala. V mirovanju je intenzivnost bolečine pomembno ($p = 0,03$) naraščala z manšetnim tlakom, vendar se med manšetama ni pomembno razlikovala. Opazna je bila pomembna ($p = 0,009$) razlika v hitrosti spremembe koncentracije skupnega hemoglobina med manšetama ($v\Delta$ [tHb] = $0,028\mu\text{M/s}$ z DMAT, $v\Delta$ [tHb] = $0,056\mu\text{M/s}$ z EMST) pri tlaku 160 mm Hg. Čas do hotene odpovedi med izometrično kontrakcijo je bil -11% krajši ($p = 0,033$) v ishemičnem pogoj, vendar brez razlike med manšetama. Aktivacija in oksigenacija mišice se nista pomembno razlikovali med pogojema in manšetama. **Zaključki:** Iz razlike v v^- [tHb] sklepamo, da je bila z DMAT arterijska okluzija povzročena že pri manšetnem tlaku ~ 160 mmHg, medtem ko je bila z EMST dosežena šele pri ~ 200 mmHg. To kaže, da lahko z novo DMAT povzročimo ishemijo mišice v mirovanju z nižjim tlakom pri enaki intenzivnosti bolečine kot z EMST. Učinek obeh manšet na oksigenacijo in aktivacijo mišice je bil razmeroma majhen, kar pripisujemo konstantno povečanemu medmišičnemu tlaku med izometrično kontrakcijo. V prihodnje bi bilo smiselno preučiti vpliv ishemije med dinamičnimi kontrakcijami.

Ključne besede: ishemija, mišična aktivacija, manšetni tlak, dvoprekatna manšeta.

Effects of standard cylindrical tourniquet and asymmetrical countoured tourniquet on oxygenation and activation of quadriceps femoris muscle

Introduction: Blood flow restricted resistance exercise (BFRRE) is commonly used to gain muscle mass and strength. The most efficient technique of blood-flow restriction for muscle conditioning has not been identified yet. During rest, width of the tourniquet and limb circumference has been shown to substantially influence pressure distribution to the tissues. Thus the aim of this study was to further optimize tourniquet characteristics for restriction of limb muscles blood flow. **Methods:** Newly designed double-compartment tourniquet cuff with asymmetric pressure distribution (DCAP, 14 cm wide) and standard single-compartment tourniquet cuff with symmetric pressure distribution (SCSP, 10 cm wide) were tested on 17 healthy volunteers (27.3±5.2 years) during rest. Thigh circumference and skinfold were determined for each leg. Efficiency of tourniquets was compared bilaterally on proximal thighs at four occlusion pressures (OP = 120, 160, 200 and 240 mmHg). Changes in haemoglobin kinetics in v. lateralis muscle (near-infrared spectroscopy), cardiovascular responses (ECG and ABP), isometric endurance, maximal voluntary isometric contraction (MIVC) torque and pain intensity (visual analogue scale, VAS) were analyzed. **Results:** Lean thigh circumference did not differ between legs (L= 57.3±3.7 cm, R=57.1±3.8 cm). VAS scores did not differ between tested tourniquets, but did significantly increase (p=0.03) at OP 200 mmHg and higher. Difference (p = 0.009) in slope of total haemoglobin concentration change ([tHbs]) was found between the tourniquets at OP 160 mmHg (DCAP=0.028µM/s, SCSP=0.056µM/s). Mean ABP was significantly increased (p=0.02) at OP 120 mmHg compared to baseline values, whereas change in heart rate was detected. MIVC did not differ between legs (L=230 ± 77 Nm, R=233 ± 77 Nm). Shorter time to exhaustion (-11%; p=0.003) was found in ischemic condition compared to control condition, while no difference was found between tested tourniquets. **Discussion:** Based on differences in [tHbs], arterial occlusion was induced at OP ≥ 160 mmHg with DCAP, whereas OP ≥ 200 mmHg was required with SCSP. Given that higher pressure may cause damage to underlying tissues and increases discomfort, it is concluded that novel tourniquet design allows safer and more efficient blood flow restriction at a given tourniquet pressure and discomfort during rest. Whether the same is achieved during BFRRE, needs further investigation.

Key words: ischemia, isometric, muscle activation, tourniquet characteristics.

Učinki predoperativne priprave z ishemično vadbo na atrofijo mišice kvadriceps femoris po rekonstrukciji sprednje križne vezi

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Namen randomizirane kontrolirane študije je bil ugotoviti, ali je z predoperativno ishemično pripravo mogoče preprečiti oziroma omiliti izgubo volumna, moči in funkcije mišice kvadriceps femoris po rekonstrukciji sprednje križne vezi. **Metode dela:** Dvajset pacientov, izbranih za selektivno artroskopsko rekonstrukcijo sprednje križne vezi z avtolognim hamstring graftom, je v zadnjih desetih dneh pred operativnim posegom izvedlo pet vadbenih enot. Pacienti so bili naključno razdeljeni v dve skupini: ishemično, ki je izvajala izteg kolena z nizkim bremenom in oviranim krvnim pretokom (tlak v manšeti – 150 mm Hg), in v standardno, ki je izvajala enako vadbo brez oviranega pretoka krvi skozi mišico (tlak v manšeti – 20 mm Hg). Volumen mišice kvadriceps femoris (izmerjen z MRI), maksimalna hotena izometrična kontrakcija in razdalja, dosežena v enonožnem počepu z dosegom naprej, so bili ocenjeni pred operacijo ter štiri in dvanajst tednov po posegu. **Rezultati:** Med vadbenima skupinama ni bilo statistično pomembnih razlik v nobenem izmed spremljanih parametrov tako pred operativnim posegom kot tudi v obeh časovnih točkah po njem. Deficit volumna mišice kvadriceps femoris operirane noge glede na neoperirano se je pri združenih vastusih štiri tedne po operaciji povečal na 20 ± 5 % v ishemični skupini in na 23 ± 10 % v standardni skupini in je tudi po dvanajstih tednih vztrajal pri 16 ± 4 % v ishemični in 20 ± 11 % v standardni skupini. Rectus femoris se statistično značilno ni spreminjal. Tudi deficiiti navorov, doseženih z maksimalno hoteno izometrično kontrakcijo, so po dvanajstih tednih še vedno znašali 15 ± 15 % v ishemični in 22 ± 16 % v standardni skupini. V razdaljah, doseženih z globokim počepom, ni bilo statistično značilnih razlik med skupinama. **Zaključki:** Kratkotrajna predoperativna priprava z ishemično vadbo se ni pokazala kot uspešen preventivni ukrep za preprečitev izgube mišične mase in moči mišice kvadriceps femoris ter upada funkcijskih sposobnosti kolenskega sklepa pri pacientih po rekonstrukciji sprednje križne vezi. Izkazalo se je celo, da so vsi pacienti dosegli podobno raven atrofije in izgube moči kvadricepsa, ne glede na njihov predoperativni mišični status.

Ključne besede: mišična atrofija, mišična jakost, rekonstrukcija ACL, ishemična vadba, ishemična predpriprava.

The effects of preconditioning with ischemic exercise on quadriceps femoris muscle atrophy following anterior cruciate ligament reconstruction

Purpose: This randomized controlled study assessed whether muscle preconditioning with ischemic exercise can prevent loss of quadriceps femoris volume, strength, and function after anterior cruciate ligament (ACL) reconstruction. **Methods:** Twenty subjects scheduled for ACL reconstruction with autologous hamstring grafts performed 5 exercise sessions during the last 10 days before surgery. They were randomly assigned into two groups: ISCHEMIC – performing low-load ischemic knee-extension exercise with pneumatic tourniquet inflated to 150 mmHg, or SHAM – knee-extension exercise with tourniquet inflated to 20 mmHg. Quadriceps femoris (QF) volume (measured by MRI), maximal voluntary isometric contraction torque, and single-leg anterior reach distance were assessed prior to preconditioning and repeated at 4 and 12 weeks post-surgery. **Results:** There were no significant differences between the groups in any of the measured variables prior to or after surgery. The deficit in QF vastii volume increased to 20±5 % in ISCHEMIC and 23±10 % in SHAM group at 4 weeks and persisted at 16±4 % in ISCHEMIC and 20±11 % in SHAM group at 12 weeks post-surgery. There were no statistically significant differences in rectus femoris volumes. Likewise, the deficit in QF maximal isometric torque persisted at 15±15 % in ISCHEMIC and 22±16 % in SHAM at 12 weeks post-surgery. There were no significant differences between groups in single-leg reach distance deficit. **Conclusions:** Muscle preconditioning with short ischemic exercise showed no protective effect on QF muscle mass, isometric strength, or knee functional loss in patients undergoing ACL reconstruction. Moreover, all patients reached similar level of QF muscle atrophy and strength deficit regardless of their pre-operative muscular status.

Key words: muscle atrophy, muscle strength, ACL reconstruction, blood flow restricted exercise, ischemic preconditioning.

Poškodbe košarkaric prve slovenske lige

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Uvod: Košarka primarno ne velja za kontaktni šport, kljub temu pa gre za zelo hitro in agresivno igro, pri kateri je stiku in poškodbam težko ubežati. Košarka je eden izmed športov z največ poškodbami, ki so med najbolj različnimi in resnimi (Zelisko et al., 1982). Prav stik je glavni krivec za številne poškodbe. **Metode:** Izvedli smo anketno raziskavo, v katero je bilo vključenih 108 igralk, ki so bile v sezoni 2011/2012 članice slovenskih košarkarskih klubov. Anketa, s katero smo naredili pregled poškodb košarkaric, je vsebovala 114 vprašanj. **Rezultati:** Od 64 igralk, ki so vrnile anketo, je bilo vsaj enkrat poškodovanih kar 75 % igralk. Največ poškodb so predstavljale poškodbe spodnjih udov, od tega 44,7 % poškodbe gležnja, 14,5 % pa poškodbe kolena. Najpogostejša tipa poškodbe sta zvin (42,7 %) in nateg (30,7 %). Največ poškodb se je pripetilo na treningu košarke (61,3 %). Dve tretjini poškodovanih igralk je poiskalo strokovno pomoč, največkrat fizioterapevta ali splošnega zdravnika. V skoraj polovici vseh poškodb (45,9 %) poškodba ni bila diagnosticirana z nobeno diagnostično metodo. Pri poškodbah, ki so bile diagnosticirane, sta bili najpogostejši metodi rentgensko slikanje (52 %) in magnetna resonanca (30 %). Po poškodbi je približno dve tretjini igralk uporabljalo preventivno opremo, od tega so največkrat uporabile lepilni trak (46,6 %) ter opornico in elastični lepilni trak (23,3 %). Najpogostejši vzrok poškodb je zunanji dejavnik (žoga, soigralka, nasprotna igralka). Za poškodbo gležnja je najpogostejši vzrok zunanji dejavnik, za poškodbo kolena pa utrujenost. V približno tretjini primerov se je poškodba ponovila, ne glede na uporabo preventivne opreme po poškodbi. Bolečine, povezane s treniranjem košarke, je imelo 79,7 % vseh igralk. **Zaključek:** Z raziskavo smo ugotovili, da je v ženski košarki veliko poškodb. Vse informacije, ki smo jih pridobili, so lahko v pomoč zdravstvenim delavcem, košarkarskim in kondicijskim trenerjem ter drugim funkcionarjem, ki delujejo v ženski košarki, prav tako pa vsem preostalim zdravstvenim strokovnjakom, ki se srečajo s košarkaricami v fazi rehabilitacije. Nepravilna rehabilitacija za športnika pomeni daljšo odsotnost z igrišč, slabšo pripravljenost in večjo možnost ponovitve poškodb, česar pa si ne želi ne igralec in ne drugi, ki se z njim ukvarjajo. V Sloveniji je premalo raziskav o ženski košarki, saj je podatkov o poškodbah, načinu rehabilitacije in drugih stvareh zelo malo oziroma jih skoraj ni. Z empiričnimi podatki bi lahko še bolj utemeljeno ozaveščali delavce v košarki, da bi preventivi pred poškodbami namenjali več pozornosti in tako zmanjšali število poškodb.

Ključne besede: športne poškodbe, košarka, poškodbe košarkaric.

Injuries of female basketball players in slovenian premier league

Introduction: Basketball is not primarily considered to be a contact sport, however, it involves very fast and aggressive play, where it is difficult to avoid contact and injuries. Basketball is one of the sports with the highest incidence of injuries of various types and also most serious ones (Zelisko et al., 1982), with contact being the main culprit. **Methods:** A survey about injuries with 114 questions was conducted among 108 female players who were members of Slovenian basketball clubs in 2011/12. **Results:** Of 64 players who responded, 75 % were injured at least once. Most of the injuries were lower-extremity injuries, namely 44.7 % were ankle, and 14.5 % were knee injuries. The most common types of injury are distortions/sprains (42.7 %) and distensions (30.7 %). Most of the injuries occurred at the basketball training (61.3 %). Two thirds of the injured players sought professional help, mainly a physiotherapist or a general practitioner. In nearly one half of the cases (45.9 %), the injury was not diagnosed with any of the diagnostic methods. In the remaining cases the methods most commonly used were x-ray (52 %) and magnetic resonance imaging – MRI (30 %). After the injury, nearly two thirds of players used preventive equipment, mostly adhesive bandage (46,6 %), braces, and kinesio tape – adhesive elastic bandage (23,3 %). Injuries are most commonly caused by external factors (ball, team players, counterparts). Ankle injuries are mainly caused by external factors, while knee injuries are caused by fatigue. In approximately one third of cases, there was a recurrence of injury regardless of the usage of preventive equipment in the period following the first injury. 79.7 % of players suffered pains connected with basketball training. **Conclusion:** The results of the research indicate that there is a high incidence of injuries in female basketball. Information gathered with survey can help healthcare professionals, basketball and fitness coaches, and other officials involved in female basketball, as well as all the healthcare professionals who come in contact with players in the process of their rehabilitation. Inadequate rehabilitation implies longer absence of a player from the court, worse preparation, and bigger chances for a recurrence of an injury, which is something that neither a player nor her support team wants. There is a lack of research on female basketball in Slovenia, and the consequent lack of data on injuries, types of rehabilitation and other related aspects of female basketball. Empirical data would enable us to raise the awareness among actors involved in basketball, focus on prevention, and thereby reduce the number of injuries.

Key words: sport injuries, basketball, injuries of female basketball.

Literatura/References:

1. Caine DJ, Caine CG, Lindner KJ (1996). *Epidemiology of Sports Injuries*. 1st ed. Illinois: Human Kinetics Publisher, 1–13.
2. Zvijac J, Thompson W (1996). Basketball. In: *Epidemiology of Sports Injuries*. 1st ed. Illinois: Human Kinetics Publisher, 86–97.
3. Trojian TH, Bagle RB (2008). Women's basketball injuries. In: 23rd Annual Sports Medicine Symposium, New Britain, March 4, 2008. Connecticut: Connecticut SportsMed, 1,7.

Vpliv redne vadbe hatha joge na gibljivost – pilotna študija

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Uvod: Telesna nedejavnost in pretežno sedeč življenjski slog sta dva izmed vodilnih vzrokov za zmanjšano gibljivost našega telesa (1). Posledice tega se kažejo v slabši prožnosti mehkih tkiv, ki obdajajo sklepe, kar onemogoča funkcionalno gibljivost posameznih sklepov (2). Z enostavnimi tehnikami joge, kot so jogijski telesni položaji in tehnike dihanja, lahko ponovno dosežemo optimalno gibljivost telesa (3, 4). Namen raziskave je bil raziskati kvantitativne učinke redne vadbe hatha joge na gibljivost pri zdravih mladih ženskah. **Metode:** V raziskavi je sodelovalo 9 zdravih mladih žensk, starih 23,8 (2,9) leta, ki so se prostovoljno prijavile na objavljeni oglas. Vadbeni program je potekal v obliki 75-minutnih vadb, dvakrat na teden, v obdobju petih mesecev. Vključeval je jogijske vaje, usmerjene v povečanje gibljivosti obravnavanih sklepov ter sproščanje in raztezanje skrajšanih skeletnih mišic. Za merjenje pasivne sklepne gibljivosti ramenskega, kolčnega ter zgornjega in spodnjega skočnega sklepa so bili uporabljeni standardizirani postopki goniometrije, za merjenje aktivne gibljivosti prsno-ledvenega dela hrbtenice so bile uporabljene linearne meritve, za ocenjevanje skrajšav skeletnih mišic pa so bili uporabljeni specifični testi skrajšav posameznih mišic oziroma mišičnih skupin (5) in dva testa splošne gibljivosti telesa. Meritve gibljivosti so bile v času raziskave izvedene trikrat; en teden pred začetkom vadbenega programa, po dveh mesecih vadbe in ob koncu petmesečnega vadbenega programa. **Rezultati:** Pri meritvah sklepne gibljivosti je prišlo do klinično ($> 5^\circ$) in statistično ($p < 0,05$) pomembnega povečanja obsega giba elevacije skozi abdukcijo in retrofleksije ramenskega sklepa, fleksije, notranje in zunanje rotacije kolčnega sklepa, dorzalne fleksije in inverzije skočnega sklepa. Gibljivost prsno-ledvenega dela hrbtenice se je izboljšala v vseh merjenih smereh gibanja ($p < 0,05$). Izboljšala se je prožnost *m. Soleus*, *m. Gastrocnemius*, *m. Rectus femoris*, skupine mišic fleksorjev kolena in *m. Pectoralis major* ($> 5^\circ$; $p < 0,01$). Pomembno izboljšanje gibljivosti sta prav tako pokazala oba uporabljena testa, »Dotik dlani na hrbtu« in »Doseg sede« ($p < 0,01$). **Zaključki:** Rezultati pilotne raziskave potrjujejo, da redna vadba hatha joge pri zdravih mladih ženskah pomembno vpliva na gibljivost, predvsem izboljšuje prožnost skrajšanih skeletnih mišic. V prihodnje bi bile vsekakor potrebne dodatne raziskave na večjem vzorcu preiskovancev s kontrolno skupino. Za večjo integracijo tehnik joge v fizioterapiji bi bile potrebne nadaljnje raziskave učinkov različnih tehnik joge pri različnih patologijah in poškodbah.

Ključne besede: gibljivost, joga, terapevtski učinki, goniometrija, raztezne vaje.

The impact of regular hatha yoga practice on flexibility – a pilot study

Background: Physical inactivity and predominantly sedentary lifestyle are two of the leading reasons for the diminishment of our body flexibility (1). The consequence of this is decreased flexibility of soft tissues surrounding joints (2). Simple yoga techniques including body postures and breathing techniques can restore optimal body flexibility (3, 4). The main purpose of this study was to examine the quantitative impact of regular hatha yoga practice on body flexibility in young healthy females. **Methods:** Nine young healthy females (mean age 23.8 (2.9) years), who have voluntarily applied for a public tender, participated in the study. The training program was held twice a week (in 75-minute sessions) over a period of five months. The program included therapeutic yoga exercises, with the aim of increasing joint mobility as well as stretching shortened skeletal muscles. We used goniometric measurement procedures for measuring passive joint mobility (for shoulder, hip and ankle joints), linear measurement procedures for measuring the active mobility of the thoracolumbar part of the spine and specific muscle length tests for evaluating skeletal muscle shortness of individual muscles/muscle groups (5) and overall body flexibility. Measurements of body flexibility were taken three times over the five months' period; at the beginning of the training program, after two months of training and at the end of the five months' training program. **Results:** The results obtained by measuring joint mobility showed significant increase ($> 5^\circ$; $p < 0.05$) of mobility in elevation through abduction, shoulder retroflexion, hip flexion, internal and external hip rotation, dorsal flexion and inversion of the ankle. The mobility of the thoracolumbar part of the spine was increased in all the measured movements ($p < 0.05$). There was also a significant improvement in the flexibility of *m. Soleus*, *m. Gastrocnemius*, *m. Rectus femoris*, knee flexors and *m. Pectoralis major* ($> 5^\circ$; $p < 0.01$). A significant improvement in body flexibility was also confirmed by the Back Scratch Test and the Sit and Reach Test ($p < 0.01$). **Conclusions:** The results of this pilot study confirm that regular practice of hatha yoga has a significant effect on body flexibility in young healthy women, especially with increasing of the flexibility of shortened skeletal muscles. Future research in this area using a larger sample of subjects and control group is needed. In addition, further research into the effects of yoga techniques in various pathologies and injuries is required in order to enhance the usefulness of yoga techniques in physiotherapy.

Key words: flexibility, yoga, therapeutic effects, goniometry, muscle stretching exercise.

Literatura/References:

1. Kisner C, Colby LA (2007). Therapeutic exercise: foundations and techniques. 5th ed. Philadelphia: F.A. Davis Company, 65–105.
2. Schneider W, Spring H, Tritschler T (1992). Mobility: theory and practice. New York: Thieme Medical Publishers.
3. Woodyard C (2011). Exploring the therapeutic effects of yoga and its ability to increase quality of life. *Int J Yoga* 4 (2): 49–54.
4. Posadzki P, Parekh S (2009). Yoga and physiotherapy: a speculative review and conceptual synthesis. *Chin J Integr Med* 15 (1): 66–72.
5. Berryman Reese N, Bandy WD (2002). Joint range of motion and muscle length testing. Philadelphia, Pa: W.B. Saunders Company.

Vpliv utrujenosti hrbtnih mišic na gibanje središča pritiska pri skupini mlajših in starejših preiskovancev

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Uvod: Namen raziskave je bil ugotoviti vpliv utrujenosti hrbtnih mišic pri skupini mlajših in starejših preiskovancev na gibanje središča pritiska (SP) in ugotoviti, ali je med starostnima skupinama kakšna razlika v odzivu na utrujenost. **Metode:** 14 starejših ($72 \pm 7,2$ leta) in 16 mlajših ($27,5 \pm 4,1$ leta) preiskovancev je stalo na pritiskovni plošči, in sicer z odprtimi in zaprtimi očmi pred utrujanjem hrbtnih mišic, po njem in 10 minut po izvedbi. Merili smo silo reakcije podlage (SRP) na pritiskovni plošči, na podlagi katere smo izračunali šest parametrov gibanja središča pritiska. **Rezultati:** Med starostnima skupinama so se pokazale statistično značilne razlike v gibanju središča pritiska pri stoji z odprtimi in z zaprtimi očmi. Utrujenost hrbtnih mišic pa ni imela statistično značilnega vpliva na gibanje središča pritiska, in sicer ne pri skupini mlajših ne pri skupini starejših preiskovancih. Prav tako ni bilo videti statistično značilnih razlik v odzivu na utrujenost hrbtnih mišic med starostnima skupinama. **Zaključki:** Na podlagi rezultatov naše raziskave lahko sklepamo, da utrujenost hrbtnih mišic ni povzročila različnega odziva med mlajšimi in starejšimi preiskovalci. Kaže se tendenca o uporabi različnih strategij ohranjanja mirne stoje med mlajšimi in starejšimi preiskovanci, o čemer lahko sklepamo zaradi povečanega gibanja središča pritiska po utrujanju pri mlajših in zmanjšanega gibanja središča pritiska pri starejših preiskovancih ter zaradi razlik v smeri gibanja središča pritiska, in sicer pri mlajših v medio-lateralni smeri in pri starejših preiskovancih v antero-posteriorni smeri.

Ključne besede: mišična utrujenost, gibanje središča pritiska, starejši, ravnotežje.

The effect of back muscle fatigue on postural sway in a group of young and elderly subjects

Background: The purpose of this study was first to determine the effect of lumbar extensor muscle fatigue on the movement of the centre of pressure (CoP) in young and elderly subjects. The second purpose was to determine if there is any difference between age groups in the response to such fatigue. **Methods:** Fourteen elderly (72 ± 7.2 years) and 16 young (27.5 ± 4.1 years) male subjects stood on a force platform with their eyes open and closed before, immediately after and 10 minutes following a fatiguing exercise protocol for back muscles. The force platform was used to measure the CoP movements and six variables of postural sway were chosen for the analysis. **Results:** The results showed a difference in the movement of the CoP between the age groups standing with their eyes open and standing with their eyes closed. However, the lumbar extensor muscle fatigue did not affect the movement of the CoP in the young and elderly subjects. There was also no difference in the response to the back muscle fatigue between the age groups. **Conclusions:** The results suggest that fatigue of the lumbar extensor muscles does not lead to a different response among younger and elderly individuals. However, there was a tendency to adopt different strategies to maintain quiet standing between the young and elderly subjects, with increased movement of the CoP in the young compared to the elderly. Further, there were differences in the direction of the CoP movement, with the young subjects moving more in a medio-lateral direction and the elderly subjects in an antero-posterior direction.

Key words: muscle fatigue, postural sway, elderly, balance.

Literatura/References:

1. Davidson, B. S., Madingen, M. L., & Nussbaum, M. A. (2004). Effects of lumbar extensor fatigue and fatigue rate on postural sway. *European Journal of Applied Physiology*, 93, 183–9.
2. Delgado, G., Coghlin, C., Earle, K., Holek, A., & O'Hare, K. (2010). Trunk extensor muscle fatigue does not affect postural control during upright static stance in young-adults and middle-aged adults. *Health and Natural Sciences*, 2, 1–7.
3. Lin, D., Nussbaum, M. A., Seol, H., Singh, N. B., Madigan, M. L., & Wojcik, L. A. (2009). Acute effects of localized muscle fatigue on postural control and patterns of recovery during upright stance: Influence of fatigue location and age. *European Journal of Applied Physiology*, 106, 425–34.
4. Madingan, M. L., Davidson, B. S., & Nussbaum, M. A. (2006). Postural sway and joint kinematics during quiet standing are affected by lumbar extensor fatigue. *Human Movement Science*, 25, 788–99.
5. Wilson, E. L., Madigan, M. L., Davidson, B. S., & Nussbaum, M. A. (2006). Postural strategy changes with fatigue of the lumbar extensor muscles. *Gait & Posture*, 23, 348–54.

Vpliv vadbe v napravi e-go na izboljšanje ravnotežja in hoje pri pacientu po možganski kapi – poročilo o primeru

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Uvod: Funkcija hoje je eden najpomembnejših dejavnikov kakovosti življenja in glavni cilj pacientov po možganski kapi v času rehabilitacije. Moteno dinamično ravnotežje pri pacientih po možganski kapi je povezano z večjo pogostostjo padcev, kar negativno vpliva na samostojno izvajanje dejavnosti vsakodnevnega življenja (1). Razvit je bil prototip naprave za urjenje dinamičnega ravnotežja med hojo, imenovane E-go (2). Namen prispevka je bil ugotoviti vpliv vadbe z napravo E-go kot dodatek običajni fizioterapiji na ravnotežje in funkcijo hoje pri pacientu po možganski kapi. **Metode:** 44-letni pacient je petkrat na teden vadil hojo v napravi E-go, poleg tega je bil deležen fizioterapevtske obravnave po uveljavljenih nevrotapevtskih metodah. Pred začetkom in ob koncu tritedenske vadbe v napravi E-go je bil pacient testiran z Bergovo lestvico za oceno ravnotežja, z lestvico za oceno ravnotežja po možganski kapi (angl. Postural Assessment Scale for Stroke – PASS), z lestvico kategorij funkcionalnega premikanja (angl. Functional ambulation category – FAC), testom hoje na 10 metrov in s šestminutnim testom hoje. **Rezultati:** Po obravnavi so se izboljšali vsi rezultati prej navedenih testov. Izboljšala sta se ravnotežje po Bergovi lestvici (pred vadbo: 6 točk; po vadbi: 10 točk) in lestvici PASS (pred vadbo: 14 točk; po vadbi: 25 točk) ter sposobnost hoje po FAC-u (pred vadbo: stopnja 0; po vadbi: stopnja 2). Pacient je bil ob koncu obravnave sposoben hoje z eno berglo in plastično peronealno ortozo za gleženj in stopalo, potreboval je zmerno asistenco ene osebe. **Zaključek:** Prednosti vadbe v napravi E-go so, da ta omogoča delno razbremenitev telesne teže glede na trenutno funkcijsko stanje pacienta in nadzor hitrosti hoje, ki jo določa fizioterapevt prek krmilnega modula ter jo lahko sproti prilagaja. Naprava pri vadbi z manjšo stopnjo opore omogoča tudi kardio-respiratorno vadbo in tako izboljšuje pacientovo telesno vzdržljivost. Možna je vadba hoje na daljše razdalje tudi pri pacientih z večjimi omejitvami gibanja, ki bi drugače s terapevtovo izdatno pomočjo prehodili le nekaj metrov, tako pa naprava precej razbremeni fizioterapevta.

Ključne besede: motorizirana naprava E-go, hoja, ravnotežje, možganska kap.

Effect of the e-go device on the recovery of balance and gait in a hemiparetic stroke patient – case report

Background: For stroke patients gait function is one of the most important factors influencing their quality of life and it is their main goal in rehabilitation. Impaired dynamic balance after stroke is related to higher frequency of falls, and has a negative impact on the activities of daily living (1). Therefore a prototype of a device for dynamic balance training during walking (E-go) was developed (2). The aim of the study was to establish an effect of training with this device on a stroke patient. **Methods:** A 44-year-old male patient trained walking with the E-go device 5 times per week and was also included into regular neurotherapeutic treatment. Prior and after the 3 weeks of training with the E-go device, the patient was tested with the following: Berg Balance Scale, Functional ambulation category (FAC), Postural Assessment Scale for Stroke (PASS), 10-meter walk test and 6-minute walk test. **Results:** The results of all of the above-mentioned tests improved. In the end, the balance improved according to the Berg Balance Scale (before: 6 point; after: 10 point), as well as the scale PASS (before: 14 point; after: 25 point). The ability of walking also improved (FAC – before: 0, after: 2). At the end of the treatment, the patient was able to walk with one crutch and a plastic peroneal ankle-foot orthosis. He needed moderate assistance of one person. **Conclusion:** Training with the E-go device enables different levels of supporting force on the pelvis according to the patient's current functional state, and enables to control the walking speed that is supervised by a physiotherapist. With the lower level of supporting force the device offers cardiovascular training and thus improves the patient's physical endurance. The device enables gait training on longer distances also for patients with larger movement disabilities and therefore significantly facilitates the physical therapists' work.

Key words: mechanical device E-go, gait, balance, stroke.

Literatura/References:

1. Cho K, Lee G (2013). Impaired dynamic balance is associated with falling in post-stroke patients. *Tohoku J Exp Med*; 230: 233-9. 2. (2012). Adaptive dynamic balance training during overground walking with assistive device. V: 2012 4th IEEE RAS&EMBS International Conference on Biomedical Robotics and Biomechatronics, June 24-27, 2012, Roma, Italy. BioRob Roma-2012. IEEE, cop. 1066–70.

Vpliv vadbe hoje na lokomatu na srčni utrip in porabo kisika pri pacientih z nepopolno okvaro hrbtenjače

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Uvod: Za paciente z nepopolno okvaro hrbtenjače je aerobna vadba zaradi pareze velikih mišičnih skupin velik izziv. Za izboljšanje srčno-žilne in dihalne zmogljivosti se odraslim priporoča redna aerobna vadba vsaj zmerne intenzivnosti, ki vključuje velike mišične skupine in ne zahteva veliko spretnosti za izvedbo (1). Vadba hoje na robotski napravi lokomat ustreza tem merilom. Pacientom z okvaro hrbtenjače raziskovalci (2) priporočajo vadbo od tri- do petkrat na teden za 20 do 60 minut pri intenzivnosti od 50 do 80 odstotkov najvišjega srčnega utripa ali največje porabe kisika. Zaradi možnih pridruženih motenj avtonomnega živčevja in nizke telesne zmogljivosti sta pri tej skupini pacientov oba parametra bistveno nižja od predvidenih maksimalnih vrednosti pri zdravih osebah enake starosti (3). Zaradi pareze smo z možnimi fizioterapevtskimi postopki, ki bi zagotavljali tako intenzivnost vadbe, omejeni. Vadba na lokomatu lahko učinkovito vpliva na odzive srčno-žilnega in dihalnega sistema (3). Namen raziskave je bil ugotoviti intenzivnost vadbe pri hoji na lokomatu. Želeli smo opredeliti, kakšen odstotek najvišjega srčnega utripa in največje porabe kisika dosežejo pacienti med hojo v primerjavi z doseženimi vrednostmi pri obremenitvenem testiranju. **Metode:** V raziskavo smo vključili priložnostni vzorec osmih preiskovancev z nepopolno okvaro hrbtenjače (3 ženske, 5 moških), starih povprečno 53,5 leta (SO 13 let), povprečno 11 tednov po začetku okvare (SO 5 tednov). Pri štirih je bila vzrok okvare poškodba, pri drugih bolezen. Pri dveh je bila posledica okvare parapareza, pri drugih tetrapareza. Najvišji srčni utrip in največjo porabo kisika smo določili z obremenitvenim testiranjem na ročnem kolesu z neposrednim merjenjem porabe kisika in telemetričnim zapisom elektrokardiograma (Oxicon Mobile - Viasys). Meritve na sistemu lokomat (Hocoma) smo opravili po 10 minutah hoje, pri hitrosti 1,5 km/h, s povprečnim 48-odstotnim (SO 8,2 %) odvzemom telesne teže. Preiskovance smo z razlago pomena in delovanja povratne informacije o aktivni udeležbi spodbudili k čim dejavnejši hoji. Za merjenje srčnega utripa in porabe kisika smo uporabili enak sistem kot pri obremenitvenem testiranju. Raziskavo je odobrila Komisija za medicinsko etiko Univerzitetnega rehabilitacijskega inštituta - Soča. **Rezultati:** Preiskovanci so v povprečju dosegli 69,1 % (SO 13,5 %, razpon 52–89 %) najvišjega srčnega utripa, doseženega na obremenitvenem testiranju. Sedem preiskovancev je v povprečju doseglo 78,4 % (SO 14,6 %, razpon 59,2–96,8 %) največje porabe kisika. En preiskovanec je med vadbo na lokomatu dosegel 1,4 % večjo porabo kisika kot pri obremenitvenem testiranju. Povprečna vrednost porabe kisika na lokomatu je bila 10,1 mL/kg/min (SO 2 mL/kg/min, razpon 7,3–12,6 mL/kg/min). **Zaključki:** V povprečju so preiskovanci dosegli vrednosti srčnega utripa in porabe kisika, ki bi ob primernem trajanju in pogostosti vadbe lahko vplivale na izboljšanje srčno-žilne in dihalne zmogljivosti. Povprečna vrednost porabe kisika naših preiskovancev med hojo na lokomatu je bila primerljiva z vrednostmi drugih raziskovalcev (4, 5). Tako srčni utrip kot poraba kisika se ob spodbujanju preiskovancev k dejavnejši hoji povečata (5), k čemur je verjetno pripomogla povratna informacija o aktivni udeležbi med hojo. Omejitve naše raziskave so bile majhen in priložnostni vzorec ter heterogenost preiskovancev.

Ključne besede: poškodbe hrbtenjače, robotika, intenziteta vadbe, rehabilitacija.

Influence of gait training using lokomat on heart rate and oxygen uptake in patients with incomplete spinal cord injury

Background: Aerobic exercise presents great challenge to patients with incomplete spinal cord injury due to paresis of large muscle groups. For improving cardiovascular and respiratory capacity recommendations for adults include regular aerobic exercise of at least moderate intensity, which includes large muscle groups and does not require great skills for execution (1). Gait training using lokomat meets these criteria. For patients with spinal cord injury, exercising three to five times a week for 20 to 60 minutes with intensity of 50 to 80 % of peak heart rate or peak oxygen uptake is recommended (2). Due to possible disorders of autonomic nervous system and low physical capacity both are significantly lower in this group of patients than in healthy persons regarding the age (3). Physiotherapeutic procedures of appropriate intensity are difficult to apply due to paresis. Gait training using lokomat may effectively influence cardiovascular and respiratory system (3). The purpose of the study was to determine intensity of gait training using lokomat. We wanted to define the percentage of peak heart rate and peak oxygen uptake during walking compared to values attained with exercise stress testing. **Methods:** We included convenience sample of eight subjects with incomplete spinal cord injury (3 females, 5 males), aged 53.5 years (SD 13 years), on average 11 weeks after injury onset (SD 5 weeks). Impairment was caused by injury in four subjects, in others the cause was a disease. In two the result of impairment was paraparesis, in others tetraparesis. Peak heart rate and peak oxygen uptake were determined with exercise stress testing using arm ergometer with direct measurement of oxygen uptake and telemetric electrocardiogram record (Oxycon Mobile – Viasys). Measurements on the lokomat (Hocoma) were conducted after 10 minutes of walking, with speed set at 1.5 km/h and average body weight support of 48 % (SD 8.2 %). With the explanation and usage of feedback information about active participation subjects were encouraged to actively participate in gait. For heart rate and oxygen uptake measurements the same system was used as with the exercise stress testing. Study had been approved by the Ethics committee of University rehabilitation institute. **Results:** Subjects achieved on average 69.1 % (SD 13.5 %, range 52–89 %) of peak heart rate. Seven subjects achieved on average 78.4 % (SD 14.6 %, range 59.2–96.8 %) of peak oxygen uptake. One subject achieved 1.4 % higher value of oxygen uptake than with exercise stress testing. Average oxygen uptake on the lokomat was 10.1 mL/kg/min (SD 2 mL/kg/min, range 7.3–12.6 mL/kg/min). **Conclusions:** On average subjects achieved values of heart rate and oxygen uptake that might, in case of adequate duration and frequency, improve cardiovascular and respiratory system capacity. Average oxygen uptake during gait training using lokomat was comparable with values in other studies (4, 5). Heart rate and oxygen uptake increase with encouragement towards active gait (5), to which feedback information about active participation during gait training probably contributed. Limitations of the study were small sized and convenience sample and heterogeneity of subjects.

Key words: spinal cord injuries, robotics, training intensity, rehabilitation.

Literatura/References:

1. ACSM's guidelines for exercise testing and prescription (2014). 9th ed. Philadelphia: Lippincott Williams & Wilkins: 178.
2. Jacobs PL, Nash MS (2004). Exercise recommendations for individuals with spinal cord injury. *Sports Med* 34 (11): 727–51.
3. Jack LP, Purcell M, Allan DB, Hunt KJ (2010). Comparison of peak cardiopulmonary performance parameters during robotics-assisted treadmill exercise and arm crank ergometry in incomplete spinal cord injury. *Technol Health Care* 18 (4–5): 285–96.
4. Hoekstra F, van Nunen MPM, Gerrits KHL, Stolwijk-Swüste JM, Crins MHP, Janssen TWJ (2013). Effect of robotic gait training on cardiorespiratory system in incomplete spinal cord injury. *J Rehabil Res Dev* 50 (10): 1411–22.
5. Israel JF, Campbell DD, Kahn JH, Hornby TG (2006). Metabolic costs and muscle activity patterns during robotic- and therapist-assisted treadmill walking in individuals with incomplete spinal cord injury. *Phys Ther* 86 (11): 1466–78.

Vpliv vadbe gibalnih dejavnosti na grobo gibalno funkcijo otrok z downovim sindromom – pilotska študija z uporabo protokola kontrolne klinične študije

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Uvod: Vadba motoričnih aktivnosti omogoča sodelovanje otrok z Downovim sindromom (DS) pri uradnih športnih tekmovanjih specialne olimpijade. Zagotavlja enake možnosti zanje pri doseganju uspešnosti v gibalnih veščinah, potrebnih za posamezen šport specialne olimpijade oziroma tudi med vadbo gibalnih dejavnosti (1). Naraščajoča zahteva po celostnem pristopu pri večdimenzionalni rehabilitaciji otrok z Downovim sindromom potrebuje raziskovalni protokol, ki bi znanstveno ocenil predhodno netestiran vpliv specifične vadbe gibalnih dejavnosti na grobo gibalno funkcijo teh otrok (2). Pri določanju namena nevrofizioterapevtske obravnave in kratkoročnih ciljev ter izbiri primernih gibalnih nalog je fizioterapevt odgovoren za analizo trenutnih otrokovih zmogljivosti in identifikacijo gibalnih spretnosti (3), s katerimi bo prek motoričnega učenja ob upoštevanju načel razvojnonevrološke obravnave dosegal postavljene cilje pri tovrstni vadbi (4, 5). **Namen:** Namen pilotske študije je bil ugotoviti vpliv vadbe gibalnih dejavnosti na motorično učenje otrok z Downovim sindromom in vpliv na grobo gibalno funkcijo za doseganje bistvenih veščin, ki jih fizioterapevti identificiramo za doseganje napredka. Veljavnost učinkovitosti specifične vadbe gibalnih dejavnosti je bila ob upoštevanju načel razvojnonevrološke obravnave za grobo gibalno funkcijo otrok z Downovim sindromom raziskana z uporabo protokola kontrolne klinične študije, da bi bila tovrstna vadba v prihodnje del sodobne medicinske rehabilitacije otrok z Downovim sindromom. Sekundarni namen te pilotske študije pa je bil določiti izvedljivost prihodnje, večje kontrolne klinične študije o vplivu in učinkih vadbe gibalnih spretnosti pri otrocih z Downovim sindromom v kliničnem okolju. **Metode:** Deset otrok z Downovim sindromom iz Zavoda za usposabljanje, delo in varstvo Dobrna je bilo naključno razvrščenih v študijsko (N = 5) in kontrolno skupino (N = 5). Skupini sta bili deležni razvojnonevrološke obravnave, študijska skupina pa je bila deležna še vadbe gibalnih dejavnosti. Meritve grobih gibalnih funkcij GMFM 88 (6) v treh različno dolgih časovnih intervalih so med 12-mesečno študijo izvedli raziskovalci, ki niso vedeli, ali so bili otroci z Downovim sindromom v kontrolni ali študijski skupini. Podatke smo statistično obdelali s programom Statistical Package for Social Sciences (SPSS), različica 22. Uporabili smo analizo variance s ponovljenimi meritvami za analizo sprememb kvantitativnih podatkov med prvim testiranjem na začetku kontrolirane pilotske klinične študije, drugim testiranjem po 6 mesecih in tretjim po 12 mesecih. **Rezultati:** Statistično značilne razlike med skupinama so bile ugotovljene pri testu grobih gibalnih funkcij (GMFM-88). Študijska skupina je z dodatno možnostjo motoričnega učenja in vadbe gibalnih dejavnosti pridobila nove spretnosti, potrebne za posamezen šport specialne olimpijade. **Zaključki:** specifična vadba gibalnih dejavnosti zagotavlja otrokom z Downovim sindromom številne pozitivne učinke na telesno dejavnost, izboljšanje telesne pripravljenosti in funkcijske spretnosti. Rezultati kažejo, da bi tovrstna vadba lahko bila uporabna v nevrofizioterapevtski obravnavi otrok z DS, ki imajo slabšo grobo gibalno funkcijo.

Ključne besede: otroci z Downovim sindromom, specialna olimpijada, vadba gibalnih dejavnosti, razvojnonevrološka obravnava (RNO), GMFM-88, kontrolirana klinična pilotska študija.

Motor activities training program effects on gross motor function in children with down syndrome – pilot study using randomized control study design

Introduction: Motor activities training program leads to participation of children with Down Syndrome (DS) in official special olympics and tends to create equal opportunities for them in order to perform their personal best effort in those skills in a culminating event during a regular special olympics or during a separate motor activity training program (1). The growing demand for holistic approach to multidimensional Down syndrome rehabilitation requires a research program to evaluate scientifically previously untested impact of motor activities training program on gross motor function of children with DS (2). In order to set goals and short-term objectives, and select appropriate motor training activities during the neurodevelopmental treatment (NDT), a physiotherapist is responsible to determine the children's present abilities (3), identify motor skills on which the children train with NDT principles and develop goals and short-term objectives for the motor activities training program (4, 5).

Purpose: The purpose of the pilot study was to gather data on the short term effects of the motor activities training program on motor learning in children with DS and its impact on skills considered essential in the recognized skill progressions. The efficacy of motor activities training program on gross motor function was validated by a true experimental study design in order to be used as an integral part of contemporary medicine rehabilitation of children with DS. The secondary aim of this pilot study was to determine the feasibility of conducting a clinical trial of motor activities training program's impact on children with DS in a clinical care setting. **Methods:** 10 children with DS from ZUV Dobrna were randomised to the experimental (N=5) and to the control group (N=5). Both groups received the same NDT, while the experimental group additionally received motor activities training program. An experimental repeated measures design was used to investigate the GMFM-88 differences (6) over a 12-month period by blinded investigators using a standardised test. The data was analysed using Statistical Package for Social Sciences (SPSS) program v22. A repeated measures analysis of variance (ANOVA) was used to analyze the within subject changes over time: baseline, at 6 months and by 12 months. **Results:** Significant differences were found between the experimental and control groups in GMFM-88 scores over the study period and an ability for the experimental group to provide motor learning and training opportunities for children with DS in the study group to acquire skills considered essential in the recognized skill progressions leading to participation in Official Special Olympics. **Conclusions:** There are numerous benefits for children with DS who participate in the Special Olympics Motor Activity Training Program especially an increased physical activity that leads to improvement in motor skills, physical fitness and functional ability. The results indicate that motor activities training program could be a useful clinical intervention for the children with DS with low GMFM-88 scores.

Key words: children with Down Syndrome, Special Olympics, Motor Activity Training Program, neurodevelopmental treatment (NDT), GMFM-88, randomised controlled pilot study.

Literatura/References:

1. Special Olympics motor activity training program coaches guide (December 2012). <http://media.specialolympics.org/soi/files/sports/MATP/>.
2. Pitetti K, Baynard T, Agiovlasitis S (2013). Children and adolescents with Down syndrome, physical fitness and physical activity JSHS (2): 47–57.
3. Mondal S, Yadav AK, Varghese J (2013). Response of children with Down syndrome to physical activity programme on motor proficiency and functional abilities IJRHS (3): 150–56.
4. Alesi M. et al (2015). Improvement of gross motor and cognitive abilities by exercise training program: three case reports Neuropsychiatr Dis Treat. (10): 479–85.
5. Cowley PM, Ploutz-Snyder LL, Baynard T, Heffernan K, Jae SY, Hsu S, Lee M, Pitetti KH, Reiman MP, Fernhall B (2010). Physical fitness predicts functional tasks in individuals with Down syndrome. Med Sci Sports Exerc. 42 (2): 388–93.
6. Russel DJ, Rosenbaum PL, Wright M, Avery LM (2002). Gross Motor Function Measure (GMFM-66 and GMFM-88) User's Manual. Blackwell Publishing, 150–230.

Senzorni sistem za vadbo prezgodaj rojenih otrok

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Uvod: Prezgodaj rojeni otroci z majhno porodno težo spadajo v najbolj ogroženo skupino v smislu nevroloških motenj. Pogostnost cerebralne paralize znaša od 2 do 3 primere na 1000 rojstev, vendar se poveča na 40 do 100 primerov na 1000 rojstev v primeru prezgodaj rojenih otrok (1). Sodobne tehnologije omogočajo zgodnje zaznavanje nevroloških motenj in ukrepanje v prvih mesecih življenja, ko so možgani še zelo prilagodljivi. Vadbo otrok je mogoče v domačem okolju izvajati v posebej prirejeni igralnici, ki je opremljena z raznovrstnimi senzorji in zvočno-svetlobnimi dražljaji, vgrajenimi v pametne igrače. Senzorji omogočajo nemoteče spremljanje otrokovega razvoja (uravnavanje drže in ravnotežja prek pritiskovne merilne podloge in inercialnega senzorja na trupu ter spretnosti rokovanja in drugih gibalnih sposobnosti prek inercialnih senzorjev na zgornjih udih in v igračah). Zvočno-svetlobni dražljaji spodbujajo različne dejavnosti otroka in ga za pravilno izvedbo tudi nagrajujejo. Razvoj otroka je mogoče ocenjevati s kvantitativnimi parametri, ki vrednotijo nadzor gibanja trupa, glave, zgornjih udov in spretnosti prijemanja (2). **Metode:** V okviru projekta CareToy je bila razvita pametna igralnica in izvedena klinična študija, ki je vključevala 40 prezgodaj rojenih otrok, starih od 3 do 7 mesecev (popravljen starost). Študija je potekala s šestimi pametnimi otroškimi igralnicami hkrati. Tri igralnice so bile nameščene pri družinah prezgodaj rojenih otrok v Italiji, tri pa pri družinah na Danskem. Otroci so v igralnici vadili po en mesec. V tem času je vsak otrok izvedel približno 200 vadb s skupnim trajanjem vadbe vsaj 9 ur. Strokovni nadzor nad vadbo je bil izveden na podlagi koncepta telerehabilitacije. Vsakega otroka sta spremljala otroški nevrolog in fizioterapevt. Zanj sta pripravila individualni program vadbe. Strokovna klinična ocena otrokovih sposobnosti je bila izvedena pred vadbo in po njej. Podrobnosti protokola so predstavljene v (3). **Rezultati:** Rezultati študije kažejo na pozitivne spremembe v motoričnem razvoju, ki so posledica vadbe v igralnici. Pozitivne spremembe je mogoče zaznati tako v kliničnih ocenah kot tudi na podlagi objektivnih meritev s senzorji, vgrajenimi v igralnici. Spremembe so opazne v povezavi z gibanjem trupa, gibanjem zgornjih udov in prijemanjem igrač. Otroci so v igralnici v povprečju napredovali hitreje, kot bi bil pričakovani normalni razvoj brez dodatne spodbude. Negativni učinki vadbe niso bili zaznani. Sistem je bil pri starših dobro sprejet, čeprav so se v nekaterih primerih pojavljale tehnične težave, značilne za prototipne naprave. **Zaključki:** Koncept inteligentne igralnice omogoča prezgodaj rojenim otrokom, da skozi igro in pod nadzorom staršev zmanjšajo možnost pojava nevroloških motenj ali vsaj ublažijo njihove posledice. Prav prvi meseci življenja so najbolj kritični, saj so možgani še zelo plastični in pravilna vadba lahko pomembno vpliva na razvoj funkcij, ki so kritične za normalno življenje. Koncept pametne igralnice lahko postane primerno klinično orodje za spodbujanje pravilne vadbe otrok, ki zmanjša posledice nevroloških motenj v poznejših obdobjih razvoja. **Zahvala:** Raziskavo je delno financirala Evropska unija v okviru projekta CareToy po pogodbi ICT-2011.5.1-287932.

Ključne besede: prezgodaj rojeni otroci, nevrološke motnje, vadba, ocenjevanje.

Sensory system for training of preterm infants

Introduction: Prematurely born children with low birth weight represent the most endangered group in terms of neurological disorders. The incidence of cerebral palsy is 2 to 3 cases per 1000 births, but increases to 40 to 100 cases per 1000 births in the case of preterm infants (1). Modern technologies enable early detection of neurological disorders and targeted actions in the first months of life, when the brain is still very adaptive. Training of infants at home can be conducted in a specially designed gym equipped with various sensors and sound and light stimuli embedded in smart toys. Sensors allow for unobtrusive monitoring of child's development. Sounds and lights can stimulate a variety of child's activities as well as provide reward for properly completed actions. Child's development can be followed through various quantitative parameters that assess trunk, head and upper limbs control as well as grasping (2). **Methods:** Within the CareToy project a smart instrumented gym was developed and a clinical study with 40 three to seven months old (corrected age) preterm infants was conducted. Infants spent one month training in the gym. Within that period each infant performed approximately 200 training sessions in total duration of at least 9 hours. Clinical supervision of training was conducted based on the telerehabilitation approach. Each infant was monitored by a child neurologist and a physiotherapist that also prepared an individual training program for the particular infant. Clinical assessment of the infant's capabilities was obtained before and after the training. Details of the protocol are presented in (3). **Results:** The results of the study indicate a positive change in the motor development of children as a result of training in the gym. Positive changes can be detected in both clinical assessments as well as on the basis of objective measurements by sensors embedded in the gym. Changes are noticeable in relation to the movement of the trunk, movement of the upper limbs and grasping the toys. The children on average progressed faster while training in the gym than what would have been expected as a normal development without additional intervention. Negative effects of training were not detected. The system was well accepted by the parents, although in some cases, technical problems typical of prototype devices were encountered. **Conclusions:** The concept of the intelligent gym enables preterm infants to play under the supervision of their parents and through playing to reduce the chances of neurological disorders or at least mitigate their consequences. The first months of life are the most critical, because the brain is very plastic and appropriate training can have a significant impact on the development of functions that are critical for normal life. The concept of a smart gym can become a clinically relevant tool for encouraging proper training of infants, thus lowering the consequences of neurological disorders in later stages of development. **Acknowledgment:** This work was partially funded by the European Union Collaborative Project CareToy grant ICT-2011.5.1-287932.

Key words: preterm infants, neurological disorders, training, assessment.

Literatura/References:

1. Neurodevelopmental Outcomes of Preterm Birth from Childhood to Adult Life, editors: Nosarti C, Murray RM, Hack M (2010). Cambridge University Press.
2. Rihar A, Mihelj M, Pašič J, Kolar J, Munih M (2014). Infant trunk posture and arm movement assessment using pressure mattress, inertial and magnetic measurement units (IMUs). *Journal of neuroengineering and rehabilitation*. 11 (1), 133.
3. Sgandurra G, Bartalena L, Cioni G, Greisen G, Herskind A, Inguaggiato E, Sicola E (2014). Home-based, early intervention with mechatronic toys for preterm infants at risk of neurodevelopmental disorders (CARETOY): a RCT protocol. *BMC pediatrics*. 14 (1), 268.

Kako starši in strokovni sodelavci vidijo postopke oskrbe kronično bolnih otrok v programih zdravljenja in rehabilitacije

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Uvod: V zadnjih desetletjih se je v postopkih zdravljenja in rehabilitacije kronično bolnih otrok uveljavil koncept obravnave, ki je usmerjena v družino (1). Želeli smo preveriti, kako starši in strokovni sodelavci ocenjujejo postopke oskrbe v programih zdravljenja in rehabilitacije. **Metode:** K sodelovanju v raziskavi smo povabili starše, katerih otroci so bili vključeni v postopke oskrbe v različnih zdravstvenih ustanovah leta 2010. K sodelovanju smo povabili tudi strokovne sodelavce iz istih ustanov. Za ocenjevanje smo uporabili Vprašalnik za ocenjevanje postopkov oskrbe (angl. Measures of Processes of Care, MPOC-20), ki so ga izpolnili starši, in Vprašalnik za ocenjevanje postopkov oskrbe, ki so ga izpolnili strokovni sodelavci (MPOC-SP) (2). Vprašalnik MPOC-20 vključuje 20 vprašanj (pet podlestvic), vprašalnik MPOC-SP pa 27 vprašanj o postopkih oskrbe (štiri podlestvice). Na vsako vprašanje je mogoče odgovoriti z oceno od 7 (v zelo veliki meri) do 1 (sploh ne). Na voljo je tudi ocena 0, ki pomeni, da na vprašanje ni mogoče odgovoriti. **Rezultati:** V raziskavo se je vključilo 235 staršev (80 odstotkov mater; 55 odstotkov otrok je bilo dečkov) in 67 strokovnih sodelavcev (14 zdravnikov, 14 fizioterapevtov, 18 medicinskih sester, šest delovnih terapevtov, tri učiteljice, sedem logopedov ter pet psihologov in socialnih delavcev, trije niso označili strokovne izobrazbe; povprečna starost strokovnih sodelavcev: 43,9 leta, povprečna delovna doba v timu za delo s kronično bolnimi otroki: 17 let). Starši so poročali o dobrih ocenah vedenja strokovnjakov. Povprečne ocene posameznih lestvic MPOC-20 so bile 5,83 (SD 1,10) za Koordinirano in celostno oskrbo, 5,62 (SD 1,12) za Spoštljivo oskrbo, 5,45 (SD 1,23) za Partnerstvo in omogočanje aktivne vloge, 5,33 (SD 1,61) za Posredovanje specifičnih informacij o otroku in 4,59 (SD 1,65) za Posredovanje splošnih informacij. Podobno so o svojem vedenju v postopkih oskrbe poročali tudi strokovni sodelavci: povprečna ocena 7,5 (SD 0,7) za Spoštljiv odnos do ljudi, 5,2 (SD 1,5) za Občutljivost v medosebnih odnosih, 4,8 (SD 1,5) za Posredovanje specifičnih informacij o otroku in 4,3 (SD 1,3) za Posredovanje splošnih informacij. Starši in strokovni sodelavci so menili, da sta v postopkih oskrbe najbolj pomanjkljivi prav posredovanje splošnih informacij in posredovanje specifičnih informacij o otroku. **Zaključki:** Starši in strokovni sodelavci so bili najmanj zadovoljni s posredovanjem informacij v postopkih oskrbe, zato bo v prihodnosti na tem področju treba pripraviti izobraževanje o postopkih oskrbe, ki so usmerjeni v družino, in izboljšati organizacijo dela.

Ključne besede: postopki oskrbe, starši, strokovni sodelavci, ocenjevanje, MPOC.

Processes of care for chronically disabled children: views of parents and care providers

Background: The model of family centred care has been implemented for the last decades for treatment and rehabilitation of chronically ill children (1). We wanted to explore how parents feel about services of care and how service providers report on their own behaviours in treatment programs and rehabilitation. **Methods:** We invited parents whose children were involved in the processes of care at different health care institutions in 2010. We invited also the service providers from the same institutions. Parents filled in the Measure of processes of care, MPOC-20 (2); service providers filled in the MPOC-SP (2). The questionnaire MPOC-20 consists of 20 questions (five subscales), while the MPOC-SP consists of 27 issues (four subscales). The items are answered on a 7-point scale ranging from 7 (»to a very great extent«) to 1 (»not at all«), with a 0 for »not applicable«. **Results:** 235 parents participated in the study (80% mothers, 55% of the children were boys) and 67 service providers (14 medical doctors, 14 physiotherapists, 18 nurses, six occupational therapists, three teachers, seven speech therapists and five psychologists and social workers. Three didn't mark their profession. The average age of service providers was 43.9 years. They served at their current position for the last 16.6 years (SD 8.1 years) and all of them were employed for a full time. Parents reported a quite high level of satisfaction with the processes of care. The mean scores were high on all the MPOC-20 scales except Providing General Information: mean scores were 5.83 (SD 1.10) for Coordinated and Comprehensive Care, 5.62 (SD 1.12) for Respectful and Supportive Care, 5.45 (SD 1.23) for Enabling and Partnership, 5.33 (SD 1.61) for Providing Specific Information about the Child and 4.59 (SD 1.65) for Providing General Information. Service providers reported similar results: the MPOC-SP mean subscale scores were 5.2 (SD 0.9) for Showing interpersonal sensitivity, 4.3 (SD 1.3) for Providing general information, 4.8 (SD 1.5) for Communicating specific information and 5.7 (SD 0.7) for Treating people respectfully. **Conclusion:** Parents and experts were least satisfied with providing of specific and general information, so in the future we have to prepare training on family centred services and improve the organization of work.

Key words: processes of care, parents, professionals evaluation, MPOC.

Literatura/References:

1. King G, King S, Rosenbaum P, Goffin R (1999). Family-centred caregiving and well-being of parents of children with disabilities: linking process with outcome. *J Pediatr Psychol*, 24: 41–52.
2. Rosenbaum P, King S, King G (1995). The measure of Processes of care. A means to Assess Family Centered Behaviors of health Care Providers. Manual.

Vpliv vadbe hoje na sistemu lokomat na zmanjšanje mišičnega tonusa pri pacientki s popolno okvaro hrbtenjače – poročilo o primeru

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Uvod: Spastičnost je pri pacientih z okvaro hrbtenjače pogosta, pojavlja se v 65 do 78 odstotkih primerov (1). Pri vadbi hoje na tekočem traku z robotsko napravo lokomat so tri študije (2–4) s pacienti z nepopolnimi okvarami prikazale statistično značilno znižanje refleksne in intrinzične spastičnosti mišice gastrocnemius po štiritedenski vadbi. Predstavljene so že prve klinične izkušnje s pacienti s popolnimi okvarami, pri katerih je bil namen vadbe na sistemu lokomat zmanjšanje spastičnosti (5). Namen prispevka je bil ugotoviti vpliv vadbe hoje na lokomatu kot dodatek običajni fizioterapiji na spastičnost pri pacientki s popolno okvaro hrbtenjače. **Metode:** V poročilo o primeru smo vključili 47-letno pacientko s popolno okvaro hrbtenjače, štiri mesece od začetka okvare. Okvara je nastala zaradi zožitve hrbtencičnega kanala v prsnem predelu. Za obravnavo spastičnosti je med vadbo prejela enako vrsto in odmerek zdravil ter bila deležna standardne fizioterapevtske obravnave. V treh tednih je desetkrat vadila hojo na lokomatu, vsaka obravnava je trajala 30 minut, s 50-odstotno razbremenitvijo telesne teže, hodila je s hitrostjo 1,5 km/h. Pred prvo in zadnjo obravnavo smo tonus mišic fleksorjev kolkov in kolen ocenili po modificirani Ashworthovi lestvici. Mišični tonus smo ocenjevali tudi s pripomočkom L-stiff, ki je sestavni del lokomata. Meri mehanično togost mišic in navore v kolkih in kolenih med nadzorovanimi pasivnimi gibi spodnjih udov v mogočem obsegu giba, v podobnih gibih kot pri ocenjevanju z Ashworthovo lestvico. Veljavnosti in zanesljivosti pripomočka še niso preverjali. Osredotočili smo se na spremembo navorov v smeri ekstenzije kolkov in kolen, s čimer smo preverjali velikost upora mišic fleksorjev kolkov in kolen. Spremembe navorov smo merili znotraj pete obravnave. Poleg tega smo primerjali razlike med prvo in zadnjo obravnavo, obakrat smo upoštevali meritev pred začetkom vadbe. Spremembe smo izrazili v odstotkih. **Rezultati:** Po modificirani Ashworthovi lestvici se ocena ni spremenila in je ostala 3. Znotraj pete obravnave je prišlo do znižanja navorov v smeri ekstenzije levega kolka za 43 % in desnega za 36 %. Navori v smeri ekstenzije levega kolena so se zmanjšali za 42 % in desnega za 19 %. Med prvo in zadnjo obravnavo so se navori v smeri ekstenzije znižali za 4 % v levem kolku in 2 % v levem kolenu, medtem ko so se v desnem kolku povečali za 22 %, v desnem kolenu pa za 47 %. **Zaključki:** Znotraj pete obravnave so se navori zmanjšali. Po navedbah preiskovanke je bil učinek kratkotrajen, naslednji dan je bil zvišan mišični tonus spet enak. Po desetih obravnavah so se navori v desnem spodnjem udu povišali, kar morda lahko pripišemo spreminjajoči se naravi zvišanega mišičnega tonusa. V prihodnje bi bilo treba preveriti veljavnost in zanesljivost pripomočka L-stiff. Učinki vadbe na lokomatu na spastičnost so pri pacientih s popolno okvaro hrbtenjače nejasni, zato so potrebne nadaljnje raziskave.

Ključne besede: spastičnost, robotika, okvare hrbtenjače, rehabilitacija.

The effects of gait training using the lokomat system on reducing muscle tone in a patient with complete spinal cord injury – case report

Background: Spasticity is common in patients with spinal cord injury, it occurs in 65 % to 78 % of the cases (1). Three studies (2-4) using lokomat robotic device for treadmill training in patients with incomplete injury showed a statistically significant reduction in reflex and intrinsic gastrocnemius muscle spasticity as a result of a four-week training program. First clinical experience of reducing spasticity with lokomat in patients with complete lesions has already been presented (5). The purpose of this report was to determine the effects of gait training using lokomat in addition to conventional physiotherapy on reducing spasticity in a patient with complete spinal cord injury. **Methods:** We included a 47-year-old female with a complete lesion, four months after onset. Lesion was caused by spinal stenosis at the thoracic level. Antispastic drugs' type and dosage and standard physical therapy remained unchanged during training. She had ten sessions in three weeks, each lasted for 30 minutes, with 50 % of body weight support and walking speed of 1.5 km/h. Prior to the first and last session, we evaluated the muscle tone of hip and knee flexors using the Modified Ashworth scale. Muscle tone was also measured with a tool L-stiff, which is the integral part of lokomat. L-stiff determines the mechanical stiffness and torques which are produced in hips and knees during controlled passive movements of lower limbs across the range of motion of the joint, in similar movements as during the Modified Ashworth test. The tool has so far not been proven valid or reliable. We focused on the change in torque in the direction of hip and knee extension, consequently we checked the resistance of flexor muscles of hips and knees. Changes of torques were measured within the fifth session. We also compared the difference between the first and last session, we considered the measurement before treatment in both cases. The changes are shown in percentages. **Results:** Scores on Modified Ashworth scale remained 3. We noted a decrease in torques within the fifth session in the direction of left hip and knee extension by 43 % and 42 %, respectively. A decrease in the right hip and knee extension was 36 % and 19 %, respectively. Between the first and the last session, torques in the direction of the left hip and knee extension decreased by 4 % and 2 %, respectively. While the torques in the right hip and knee increased by 22 % and 47 %, respectively. **Conclusions:** The torques were reduced within the fifth session. According to the patient, the effect was short-term, increased muscle tone was the same the next day. After ten sessions, the torques in the right lower limb increased, which may be attributed to the changing nature of increased muscle tone. It is necessary to verify the validity and reliability of L-stiff in the future. Effects on spasticity of the training using lokomat in patients with complete spinal cord injury remain unclear, further research is required.

Key words: spasticity, robotics, spinal cord injuries, rehabilitation.

Literatura/References:

1. Adams MM, Hicks AL. Spasticity after spinal cord injury. *Spinal Cord* 2005; 43: 577–86.
2. Mirbagheri MM, Ness LL, Patel C, Quiney K, Rymer WZ (2011). The effects of robotic-assisted locomotor training on spasticity and volitional control. In: IEEE international conference on rehabilitation robotics, Rehab Week Zürich, ETH Zürich science city, Switzerland, June 29–July 1, 2011.
3. Mirbagheri MM, Niu X, Kindig M, Varoqui D (2012). The effects of locomotor training with a robotic-gait orthosis (lokomat) on neuromuscular properties in persons with chronic SCI. In: 34th annual international conference of the IEEE EMBS, San Diego, California, USA, August 28–September 1, 2012.
4. Mirbagheri MM, Kindig M, Niu X, Varoqui D, Conaway P (2013). Robotic-locomotor training as a tool to reduce neuromuscular abnormality in spinal cord injury. In: IEEE international conference on rehabilitation robotics, Seattle, Washington, USA, June 24–26, 2013.
5. Wirz M. Lokomat training with spinal cord injured ASIA A patients. http://knowledge.hocoma.com/fileadmin/user_upload/clinical_practice/lokomat/L_CEx_1_ASIA_A_Balgrist_la_unch.pdf. <25. 3. 2015>.

Učinki električne stimulacije z mrežno rokavico na funkcijo zgornjega uda pri pacientu po operaciji možganskega tumorja – poročilo o primeru

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Uvod: Pri nevroloških obolenjih, ki prizadenejo delovanje zgornjega motoričnega nevrona, kot je na primer možganski tumor, je pomanjkanje uravnavanja gibanja zgornjega uda pogosta posledica. Do zdaj je bilo uporabljenih veliko različnih fizioterapevtskih tehnik za izboljšanje funkcije zgornjega uda, med drugim tudi različne oblike električne stimulacije. Dosedanje raziskave kažejo, da uporaba električne stimulacije z mrežno rokavico učinkovito vpliva na zmanjšanje zvišanega mišičnega tonusa, izboljšanje funkcije in zavedanja okvarjenega zgornjega uda (1, 2). Mrežna rokavica je narejena iz več 100 kovinskih obročkov in predstavlja skupno anodo, ki je nameščena na roki. Dve samolepilni elektrodi, ki sta nameščeni na volarni in dorzalni strani zapestja, predstavljata katodi. Namen prispevka je bil ugotoviti vpliv stimulacije z mrežno rokavico na tonus mišic zapestja, obseg gibljivosti in bolečino v zgornjem udu ter posledično na izboljšanje motorične funkcije. **Metode:** V poročilo o primeru je bil vključen 62-letni pacient, 6 mesecev po operaciji možganskega tumorja (meningeom), s klinično sliko levostranske hemipareze. Poleg običajnega programa fizioterapije smo dva tedna izvajali še stimulacijo z mrežno rokavico, petkrat na teden, po 30 minut na dan. Stimulacija je bila podprazna, s frekvenco 50 Hz in časom trajanja impulza 300 mikrosekund. Uspešnost terapije smo preverili na začetku in po koncu desetih stimulacij. Ocenjevali smo pasivno gibljivost v zapestnem, komolčnem in ramenskem sklepu, tonus mišic fleksorjev in ekstenzorjev zapestja z modificirano Ashworthovo lestvico (MAS) in morebitno bolečino z vidno analogno lestvico. Za oceno funkcije zgornjega uda smo uporabili Wolfov test gibalnih funkcij (angl. Wolf motor function test – WMFT) in del ocene po Fugl-Meyerju (angl. Fugl-Meyer Assessment – FMA), in sicer za zgornji ud. **Rezultati:** Po obdobju električne stimulacije z mrežno rokavico je prišlo do izboljšanja pasivne gibljivosti zapestja v smeri dorzalne fleksije za 5° in v smeri volarne fleksije za 15°. V komolcu in ramenskem sklepu ni prišlo do spremembe pasivne gibljivosti. Prav tako preiskovanec ni navajal bistvenega zmanjšanja bolečine. FMA za zgornji ud je pokazal izboljšanje v 11 od 33 zahtevanih aktivnostih (25 na 36 točk). Pri oceni z WMFT je prišlo celo do poslabšanja skupnega povprečnega časa, ki je potreben za opravljanje funkcionalnih nalog, in sicer s 44,3 s na 45 s, vendar se je kakovost opravljenih nalog izboljšala z 1,9 na 2,1 točke. **Zaključki:** Glede na rezultate tega poročila o primeru in drugih objavljenih študij se zdi uporaba električne stimulacije z mrežno rokavico uporabna dopolnilna metoda v rehabilitaciji bolnikov po operaciji možganskih tumorjev. Za natančnejšo oceno indikacij za uporabo in učinkov stimulacije so potrebne dodatne raziskave.

Ključne besede: električna stimulacija z mrežno rokavico, funkcija zgornjega uda, mišični tonus.

Effects of mesh-glove electrical stimulation on the upper limb function in a patient after brain tumor operation – case report

Background: Impairment of motor control is a common deficit of neurological diseases, such as brain tumor, that affect upper motor neuron function. A lot of different physiotherapeutic approaches and also different types of electrical stimulation were developed to improve the upper limb function. The results from previous studies have shown that application of electrical mesh-glove stimulation resulted in reduction of muscle tone, improved function and awareness of the affected upper limb (1, 2). The aim of this case report was to describe an effect of mesh-glove electrical stimulation on muscle tonus, range of motion, pain and hand motor function. **Methods:** A case report of a 62-year-old man, 6 months after brain tumor (meningioma) surgery. The patient had left-sided upper limb hemiparesis. Additional to standard neurophysiotherapy, the patient also received 10 days of 30 min mesh-glove electrical stimulation. We used stimulation frequency of 50 Hz and pulse width of 300 microseconds and stimulation was performed below the sensory threshold. A mesh glove that consists of 100 conductive wires is fitted over the hand and represents the common anode. Two self-adhesive electrodes are placed on the volar and dorsal side of the wrist and represent cathodes. Before and after 10 days of stimulation the effects of mesh-glove electrical stimulation were evaluated which included an assessment of the passive range of motion of the wrist, elbow and shoulder joint, pain with the Visual Analog Scale (VAS) and muscle tonus with Modified Ashworth Scale. Hand motor functions were evaluated with the Wolf Motor Function Test (WMFT) and the upper extremity Fugl-Meyer Assessment (FMA). **Results:** After the end of mesh-glove electrical stimulation, we documented the increased passive range of motion in wrist dorsale flexion for 5° and volar flexion for 15°. The passive range of motion in elbow and shoulder didn't change. We didn't document any pain decrease. The motor function of the upper limb evaluated with the FMA improved in 11 of 33 activities that were evaluated (from 25 to 36 points). The WMFT showed even a slight prolongation of the average time required for functional activities (from 44.3 s to 45.0 s), although the quality of the activity performance improved (from 1.9 to 2.1 points). **Conclusion:** Based on the results of our case report study and according to the results of previous studies, it seems that the use of the mesh-glove electrical stimulation of the upper limb is a useful complementary rehabilitation method for patients after brain tumor surgery. For further evaluation of indications and effects of stimulation additional research is still needed.

Key words: mesh-glove electrical stimulation, upper limb function, muscle tonus.

Literatura/References:

1. Dimitrijević MM (1994). Mesh-glove. 1. A method for whole-hand electrical stimulation in upper motor neuron dysfunction. *Scand J Rehabil Med.* 26: 183–6.
2. Dimitrijević MM, Soroker N (1994). Mesh-glove. 2. Modulation of residual upper limb motor control after stroke with whole-hand electric stimulation. *Scand J Rehabil Med.* 26: 187–9.

Pojavnost padcev pri pacientih po možganski kapi, ki živijo v skupnosti

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Uvod: Ogroženost za padce je pri pacientih po možganski kapi visoka v vseh fazah (1). Med prebivalci, ki živijo v skupnosti, so padci pogostejši pri ljudeh po možganski kapi kot pri ljudeh brez kapi (2). Pojavnost padcev med posamezniki z možgansko kapjo, ki živijo v skupnosti, v Sloveniji še ni bila raziskana. Namen raziskave je bil predvideti pojavnost in dejavnike za padce pri vzorcu pacientov po možganski kapi, ki živijo v skupnosti. **Metode:** Izvedli smo presečno študijo na posameznikih, ki živijo v skupnosti. 233 članom ljubljanskega in ptujskega kluba bolnikov s cerebrovaskularno boleznijo je bil razdeljen 30-delni vprašalnik. Obsegal je demografske podatke, datum možganske kapi in njene posledice, sigurnost pri hoji, uporabo pripomočkov, pogostnost in posledice ter predvidene notranje in zunanje dejavnike padca v zadnjih šestih mesecih. **Rezultati:** Odzivnost je bila 54,9 %. Padlo je 41,4 % preiskovancev, od katerih je bilo 64,2 % moških. Tisti, ki so padli, so bili v povprečju stari 63 let (SO: 11,4) in v povprečju 11 let (SO: 9,1) po možganski kapi. 62,3 % preiskovancev, ki so padli, je imelo levostransko hemiplegijo in pri skoraj dveh tretjinah (71,7 %) sklepamo na posledično zanemarjanje polovice telesa. Vsi, ki so padli, so poročali o motnjah hoje, četrtnina o resnejših, zato je večina preiskovancev (62,3 %) uporabljala pripomočke za hojo, najpogosteje eno berglo (26,4 %), voziček (22,6 %) in sprehajalno palico (17,0 %). Večina padcev se je zgodila dopoldan (39,9 %) in popoldan (34,0 %), manj zvečer ali ponoči. Več kot polovica jih je padla enkrat, 28,3 % dvakrat in 30,2 % več kot dvakrat. 59,0 % padcev se je zgodilo doma in 18,9 % pred stanovanjskim objektom. Do več kot polovice padcev je prišlo med hojo, 22,6 % se jih je zgodilo med stoji in 15,1 % med vstajanjem s stola ali postelje. Po padcu 64,2 % preiskovancev ni bilo sposobnih samostojno vstati. Najpogostejše posledice padca so bile udarnine ali odrgnine (66,0 %) in 20,8 % jih je potrebovalo zdravniško oskrbo. Po mnenju preiskovancev so bili glavni notranji dejavnik za padeč moteno ravnotežje (52,8 %), težaven dvig stopala med korakom (35,9 %), slabše občutenje okvarjene noge (28,3 %) in vrtoglavice (26,4 %). Kot glavni zunanji dejavnik za padeč so označili drseča tla (20,8 %), visok prag vrat ali rob pločnika (18,8 %) in neravna tla (11,3 %). 73,6 % preiskovancev je navedlo strah pred ponovnim padcem, zaradi katerega jih 49,1 % omejuje svoje gibalne dejavnosti. Med preiskovanci, ki so padli, in tistimi, ki niso, nismo ugotovili statistično značilnih razlik v spolu in strani hemiplegije. **Zaključki:** Preprečevanje padcev je pri pacientih po možganski kapi pomemben cilj zdravstvene oskrbe (3). Ta presečna študija daje podatke za razumevanje odnosa med možgansko kapjo in padci ter omogoča slovenskim fizioterapevtom, da obravnavajo padce kot temeljno grožnjo, zaradi katere bi bilo v prihodnje treba pregledovati ogroženost in delovati preventivno. Za ugotavljanje dejanske pojavnosti padcev med pacienti po možganski kapi, ki živijo v skupnosti, je potrebna študija na večjem vzorcu.

Ključne besede: nezgodni padci, značilnosti, dejavniki, možganska kap.

Falls prevalence in patients residing in the community after stroke

Background: Stroke survivors are at high risk for falls in all stages post stroke (1). Falls are more frequent among community residing patients after stroke than in people without stroke (2). The prevalence of falls among patients with stroke living in community was not established previously in Slovenia. The purpose was to estimate fall prevalence and identify factors related to fall occurrence in a sample of patients residing in a community after stroke. **Methods:** A cross-sectional study with individuals residing in the community was carried out. The 30 items questionnaire was distributed to the 233 members of the Ljubljana and Ptuj Stroke clubs. The questionnaire included demographic data, date of stroke and its consequences, confidence in walking, use of assistive devices, prevalence and circumstances, and the estimated intrinsic and extrinsic risk factors of a fall in the last six months. **Results:** Respond rate was 54.9 %. Falls occurred in 41.4 % of patients, 64.2 % of them were males. Fallers were in average 63 years old and in average 11 years after stroke. 62.3 % of fallers had left-sided hemiplegia and almost two thirds (71.7 %) probably had hemi-neglect. All fallers had gait disturbances; a quarter of them had severe disturbances. For these reasons majority of fallers (62.3 %) used assistive devices, most frequently a crutch (26.4 %), a wheelchair (22.6 %), and a walking stick (17.0 %). Most of the falls happened in the forenoon (39.9 %) and afternoon (34.0 %), and less in the evening or during the night. More than half of fallers fell once, 28.3 % fell twice and 30.2 % more than twice. 59.0 % falls occurred at home and 18.9 % near home. More than a half falls happened during walking, 22.6 % during standing and 15.1 % during rising from a chair or bed. After the fall 64.2 % of fallers were not able to get up by themselves. The most prevalent consequence of falls were contusions and abrasions (66.0 %) and 20.8 % of fallers needed medical care. By the opinion of fallers, the main intrinsic factor for falls were balance limitation (52.8 %), difficulty rising a foot (35.9 %), decreased sensory function of the affected leg (28.3 %) and dizziness (26.4 %). The main extrinsic factors were slippery walking surface (20.8 %), doorstep or pavement edge, which was too high (18.8 %), and uneven walking surface (11.3 %). 73.6 % had fear of falling and for that reason 49.1 % of them restricted their mobility. We did not find statistically significant difference in gender or side of hemiplegia between fallers and non-fallers. **Conclusions:** Preventing falls in patients affected by stroke is an important healthcare goal (3). These studies provide information for understanding the relationship between stroke and falls and enable Slovenian physiotherapists to acknowledge falls as an essential threat, implying a need for risk screening and prevention. To establish the actual prevalence of falls in patients residing in the community after stroke in Slovenia, a study on large sample size is needed.

Key words: accidental falls, characteristics, risk factors, CVI.

Literatura/References:

1. Forster A, Young J (1995). Incidence and consequences of falls due to stroke: a systematic inquiry. *BMJ* 1995; 31: 83–6.
2. Jorgensen L, Engstad T, Jacobsen BJ (2002). Higher incidence of falls in long-term stroke survivors than in population controls: depressive symptoms predict falls after stroke. *Stroke*, 33: 542–7.
3. Jensen J, Nyberg L, Gustafson Y, Lundin-Olsson L (2003). Fall and injury prevention in residential care--Effects in residents with higher and lower levels of cognition. *J Am Geriatr Soc*, 51: 627–35.

Zgodnja fizioterapija po parezi obraznega živca zлагоftalmusom

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Uvod: Pareza obraznega živca je lahko posledica supranuklearnih, nuklearnih ali infranuklearnih lezij. Glede na raven poškodbe ločimo centralni in periferni tip pareze živca. Pri centralnem tipu pride do lezije supranuklearno, pri perifernem tipu pa je poškodba v jedru ali stebelu obraznega živca (1). Obrazni živec je mešani živec, zato se pri osebi poleg težav z gibanjem ene polovice obraza pojavljajo tudi spremljajoče težave: suho in pekoče oko, občutljivost na svetlobo, pretirano soljenje ali pomanjkanje solz, oteklina obraza, bolečina v ušesu, hiperakuzija, šumenje v ušesu, težave pri žvečenju, oteženo požiranje, suha usta, moteno okušanje, težave pri govoru in mimiki (2, 3). Prognoza je večinoma dobra, odvisna je od ravni okvare in stopnje prizadetosti živca (1, 2, 3). Namen prispevka je poudariti pomen zgodnje fizioterapije po nastanku pareze za doseganje čim boljše funkcije zapiranja očesa in preprečitev negativnih posledic za vid. **Metode:** Prikaz fizioterapevtske obravnave pacientov s hujšo prizadetostjo obraznega živca, vključno z uporabo nove tehnike lepjenja elastičnih lepilnih trakov za izboljšanje funkcije zapiranja očesa. **Rezultati:** Uspešnost zapiranja očesa se po redni in vodeni fizioterapiji bistveno izboljša. V posameznih primerih pa je potrebno še dodatno kirurško ukrepanje. **Zaključek:** Z zgodnjo vključitvijo bolnika s parezo obraznega živca v fizioterapevtsko obravnavo dosežemo hitrejšo regeneracijo živca ter zmanjšamo resnost in pogostost težav zaradiлагоftalmusa, zmanjšamo število kirurških intervencij in omogočimo boljše ohranjanje vida.

Ključne besede: mimične mišice, fizioterapija, elastični lepilni trakovi.

Early physiotherapy treatment after facial nerve palsy with lagophthalmus

Background: Facial nerve palsy may be due to a lesion on the supranuclear level, in the nucleus itself or on the infranuclear level. Considering the level of the injury, facial paralysis is divided into a central and peripheral type. At central type there is a lesion on the supranuclear level, at the peripheral type there is an injury in the nucleus or in the stalk of a facial nerve (1). A facial nerve is a mixed nerve, the patient has difficulties with mimetic muscle movements on the affected side of the face as well as the accompanying symptoms: a dry and burning, sore eye, a photosensitive, excess tearing or reduced lacrimal fluid production, a swelling of the face, a pain inside of the ear, a hyperacusis, a tinnitus, problems with mastication and swallowing, a dry mouth, taste disorders, as well as problems with speech and facial expression (2, 3). The prognosis is mostly good, depending on the level of the lesion and the degree of the nerve injury (1, 2, 3). The purpose of this presentation is to emphasize the meaning of the early physical therapy after the onset of facial nerve palsy for achieving the best eye closure and preventing negative consequences for the vision. **Methods:** Physical therapy treatment presentation of the patient with a severe impairment of a facial nerve, including the new method of applying an elastic adhesive tape to improve the eye closure function. **Results:** The success of the eye closure after regular and guided physical therapy has significantly improved. In some cases however, a further surgical intervention is required. **Conclusion:** Early physical therapy after facial nerve palsy allows faster facial nerve rehabilitation, decreases severity and the frequency of a lagophthalmus issue, decreases the number of surgical interventions and ultimately allows better preservation of the vision.

Key words: mimetic muscles, physical therapy, elastic adhesive tape.

Literatura/References:

1. Karničnik K, Kos N (2010/2011). Pareza facialisa. In: Izzivi družinske medicine: učno gradivo – zbornik seminarjev študentov Medicinske fakultete v Mariboru, 4. letnik 2010/2011. (Družinska medicina 2012; 10, Suppl 1). Ljubljana: Zavod za razvoj družinske medicine, 156–64.
2. Farragher D (1993). A Loss of face – facial paralysis, A guide to self help. 3rd ed. Leicester: Total Enterprises Ltd. 3. Bell's Palsy Information Site. <http://bellspalsy.ws/>. <9. 3. 2015>.

Funkcionalni izid po dorzalni rizotomiji in fizioterapiji pri deklici s cerebralno paralizo – študija primera

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Uvod: Eden izmed možnih terapevtskih pristopov za zmanjšanje spastičnosti pri otrocih s cerebralno paralizo je selektivna dorzalna rizotomija, pri kateri se z delno prekinitvijo dorzalnih živčnih korenin od prve ledvene do druge križnične korenine zmanjša senzorni priliv s teh delov in s tem spastičnost (1). Namen: Želeli smo oceniti funkcijski izid gibanja pri deklici po selektivni dorzalni rizotomiji in intenzivnem programu fizioterapije. **Metode:** Deklica s spastično diparetično obliko cerebralne paralize, z večjo okvaro na levi strani, ki je bila rojena z gestacijsko starostjo 33 tednov, porodno težo 2270 g in oceno po Apgarjevi 8/8/8. Gibalni razvoj je potekal upočasnjeno, vključena je bila v program fizioterapije. Po lestvici GMFCS je bila razvrščena v II. stopnjo. Pri starosti dveh let in sedem mesecev je bila operirana v ZDA, kjer so naredili rizotomijo. Za spremljanje funkcijskega izida je isti tim strokovnih sodelavcev opravil oceno grobih gibalnih veščin s testom GMFM-88 (2) pred operacijo, nato pa še en mesec, štiri mesece, osem in osemnajst mesecev po operaciji. Deklica je bila eno leto in pol vključena v program individualne vadbe od 4- do 5-krat na mesec v prvih šestih mesecih, naslednje tri mesece od 3- do 4-krat na teden, nato devet mesecev od 2 do 3-krat na teden. Fizioterapija je bila usmerjena v učenje in izboljšanje funkcionalnih veščin gibanja (izboljšanje selektivnosti gibanja, dinamične stabilnosti, ravnotežja), vaje za raztezanje mehkih tkiv in krepitev mišic. Vključena je bila tudi v vadbo hoje na tekočem traku, ki so jo izvajali večinoma doma. Pri hoji je uporabljala nizke opornice za gleženj in stopalo. Ponoči je imela nameščene opornice za kolena. **Rezultati:** Ocena z GMFM-88 je pred rizotomijo znašala 70,8 %. Takoj po operaciji se je ocena poslabšala (70,0 %), nato pa izboljševala, najbolj v prvih štirih mesecih. Po štirih mesecih se je ocena zvišala za 9,8 %, po osmih mesecih za 12,4 %, po letu in pol pa za 18,7 % glede na izhodiščno vrednost. Analiza rezultatov posameznih podlestvic je pokazala največje izboljšanje veščin pri hoji, pri kateri se je rezultat štiri mesece po rizotomiji izboljšal za 25,0 %, ter veščin pri stoji, pri kateri se je rezultat v istem obdobju izboljšal za 20,5 % glede na izhodiščno vrednost. **Zaključek:** Deklica je napredovala v gibanju skozi vse ocenjevalno obdobje enega leta in pol. Grobe motorične veščine so se po selektivni dorzalni rizotomiji prehodno nekoliko poslabšale, nato pa po intenzivnem programu fizioterapije izboljšale, še najbolj v prvih štirih mesecih po operaciji. Podobno izboljšanje grobih gibalnih funkcij po rizotomiji in programu fizioterapije sta pokazali tudi analiza treh randomiziranih kontroliranih študij (3) ter študija s kontrolno skupino (1). Pridobivanje funkcijskih veščin pri deklici je bilo postopno, kar kaže na pomen dolgotrajne vadbe in učenja gibalnih veščin. Glede na rezultate lahko predvidevamo, da se bodo dekličine grobe gibalne funkcije še izboljševale, vendar trenutno ne moremo predvideti, do kdaj.

Ključne besede: cerebralna paraliza, rizotomija, funkcionalna sprememba, izid intervencije, spastičnost.

Functional outcome following dorsal rhizotomy and physiotherapy in a girl with cerebral palsy – single case study

Introduction: Selective dorsal rhizotomy is one of the possible therapeutic approaches for treating spasticity in children with cerebral palsy (CP), where sensory inflows on level L1-S2 of nerve roots are partially interrupted and spasticity is reduced (1). Purpose: We wanted to assess the functional outcome in movement for a girl with CP following a selective dorsal rhizotomy and intensive physiotherapy.

Methods: A girl with diparetic spastic CP, with greater disability on her left side. The girl was born in 33rd week of gestation, her birth weight was 2270 g and Apgar score was 8/8/8. Her movement development was delayed so she attended a physiotherapy program. According to the GMFCS classification, she is categorised into level II. At the age of 2 years and 7 months, she was operated in the USA, where rhizotomy was performed. In order to assess the functional outcome one team of colleagues performed assessment of gross motor function measure (GMFM-88) (2) before the surgery and one, four, eight and 18 months after the surgery. The girl attended an individual training program for a year and half, 4-5 sessions per week in the first six months after surgery, 3-4 sessions per week for the next three months and 2-3 sessions per week in the last nine months. Physiotherapy focused on learning and improving functional skills (improvement of movement selectivity, dynamic stability and balance), on stretching exercises for soft tissue and muscle strengthening. In addition, she was walking on treadmill, mostly at home. When walking she used low ankle and foot orthoses. At night she wore knee orthoses.

Results: The value of GMFM before the surgery was 70.8%, after surgery this value deteriorated (70.0%), afterwards improved, fastest in the first four months. Four months after surgery the value increased by 9.8%, eight months after by 12.4% and after 18 months by 18.7% in comparison to the baseline. The analysis of results for each subgroup showed greatest improvement in walking skills, where the result improved by 25.0%, and in standing skills, where the result improved by 20.5% compared to the baseline, four months after rhizotomy. **Conclusion:** The girl's movement abilities improved throughout the whole assessment period of 18 months. Gross motor functions slightly deteriorated in transition after selective dorsal rhizotomy, but after the physiotherapy program, they improved, the most in the first four months after the surgery. The analysis of three randomised controlled trials (3) and the controlled research (1) showed similar improvement of gross motor skills after rhizotomy and physiotherapy. Improvement in functional skills in the girl's case occurred gradually, which shows the importance of long-term therapy and learning functional skills. According to the results, we can assume that the girl's gross motor functions will continue to improve, however we cannot foresee for how long.

Key words: cerebral palsy, rhizotomy, functional change, intervention outcome, spasticity.

Literatura/References:

1. Engsborg JR, Ross SA, Collins DR, Park TS (2006). Effect of selective dorsal rhizotomy in the treatment of children with cerebral palsy. *J Neurosurg.* 105 (1): 8–15.
2. Alotaibi M, Long T, Kennedy E, Bavishi S (2014). The efficacy of GMFM-88 and GMFM-66 to detect changes in gross motor function in children with cerebral palsy (CP): a literature review. *Disabil Rehabil.* 36 (8): 617–27.
3. McLaughlin J, Bjornson K, Temkin N, Steinbok P, Wright V, Reiner A, Roberts T, Drake J, O'Donnell M, Rosenbaum P, Barber J, Ferrel A (2002). Selective dorsal rhizotomy: meta-analysis of three randomized controlled trials. *Dev Med Child Neurol.* 44: 17–25.

Vloga vključenega in opolnomočenega pacienta v fizioterapiji

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Uvod: Vključitev pacienta v proces zdravstvene obravnave kot enakopravnega člana zdravstvenega tima je temeljni pogoj kakovostne obravnave. Pacient prevzame odgovornost za svoje zdravje (1), pri čemer je treba upoštevati njegove vrednote, prioritete in splošne poglede ter vzajemno izmenjevati podatke (2). Aktivna vključitev pacienta v zdravstveno obravnavo v sodelovanju s fizioterapevti je mogoča v vlogi vključenega ali opolnomočenega pacienta, pri čemer se obe vlogi malenkostno razlikujeta. Medsebojni odnos med partnerjema ni enakovreden (3), zato so bistvenega pomena zaupnost (4), pacientova zavzetost in postavitev realističnih ciljev (5). Namen: Z raziskavo smo želeli preučiti, koliko fizioterapevti poznajo pomen vključenosti in opolnomočenja pacienta. **Metode:** Raziskava je potekala junija 2014, in sicer med fizioterapevti v javnem zdravstvu. Kot instrument raziskave smo uporabili spletni anketni vprašalnik. V vzorec smo zajeli prvih 25 pravilno izpolnjenih anketnih vprašalnikov. Za obdelavo podatkov smo uporabili računalniška programa SPSS Statistics 20 in Microsoft Office Excel. **Rezultati:** Odgovornost za zdravje so anketiranci v večini (60 %) primerov pripisali pacientom. Kot najpomembnejšo fizioterapevtovo nalogo so izbrali določitev cilja zdravstvene obravnave (92 %) v sodelovanju s pacientom in sledenje navodilom fizioterapevta (64 %). Večina (84 %) fizioterapevtov meni, da se njihova vloga v procesu zdravstvene obravnave s povečanjem vloge pacienta ne bo zmanjšala. Toda nekateri pacienti (20 %) imajo po mnenju fizioterapevtov raje pasivno kot aktivno vlogo v zdravstveni obravnavi. Anketiranci so za dvig kakovosti pri obravnavi pacienta zaznavali potrebo po dodatnem znanju (76 %), predvsem po znanju psihologije in psiholoških pristopov (58 %) ter komunikacijskem znanju (31 %). **Zaključki:** Za dvig kakovosti v fizioterapiji je nujna aktivna vključitev pacienta v tim kot tudi v proces fizioterapevtske obravnave. Termin »opolnomočenje« je še precej neznan in tudi v teoriji težje razložljiv ter pogosto enačen s terminom »vključen pacient«. Potrebno je zavedanje, da s prenosom odgovornosti oziroma z delitvijo odgovornosti pridobijo vsi udeleženci v procesu zdravstvene obravnave.

Ključne besede: pacient, vključenost, opolnomočenje, zdravstvena obravnava, fizioterapija.

The role of involved and empowered patient in physiotherapy

Introduction: The patient's involvement in the process of medical treatment as an equal member of the medical team is of great importance, since by doing so the patient takes over the responsibility for his or her own health (1). It is important to consider his or her values, priorities and general points of view as well as mutual exchange of information (2). An active involvement of a patient in the health treatment in cooperation with physiotherapists is only possible for a patient by playing a role of an involved or empowered patient, where both roles differ slightly. The relationship between both partners is not equal (3), therefore the basic elements and values of the partnership are confidence (4), engagement of the patient and setting realistic goals (5). **Purpose:** With the present research, we wished to study to which extent physiotherapists know the meaning of the patient's involvement and empowerment. **Methods:** The research was done in June 2014 among physiotherapists working in public healthcare. As an instrument of the research, we used an internet questionnaire. We included the first 25 correctly filled in questionnaires into the sample. We used SPSS Statistics 20 and Microsoft Office Excel computer programs for data processing. **Results:** According to the respondents, the responsibility for health was in most cases (60%) attributed to patients. As the most important task of the physiotherapist they chose the goal setting of the medical treatment (92%) in cooperation with the patient and following the instructions of the physiotherapists (64%). According to physiotherapists' opinion (84%), their role with the patient's involvement into the process of medical treatment is not reduced. However, the respondents' opinion is, that some patients (20%) prefer passive to active role in medical treatment. The respondents perceived the need of additional knowledge in the treatment of the patient (76%), above all psychology as well as psychological approaches (58%) and of communication skills (31%). **Conclusion:** In order to raise the quality of the physiotherapeutic treatment of a patient it is necessary to include the patient into the team and into the process of his/her health treatment actively. The term »empowerment« is still relatively unknown, also in the theory it is difficult to be interpreted and is often equated with the term »involved patient«. It is necessary to become aware that by transferring the responsibility, respectively, by sharing the responsibility every participant benefits from something in the process of health treatment.

Key words: patient, involvement, empowerment, medical treatment, physiotherapy.

Literatura/References:

1. Logar V, Turk K, Šubic A, Tetičkovič Ranfl M, Petek Uhan M, Blažević M idr. (2007). Vključevanje bolnikov v lastno zdravljenje (Raziskovalno poročilo). http://www.drmed.org/javne_datoteke/novice/datoteke/13308-SESTAVA.pdf. <23. 6. 2013>.
2. Burke D (2012). Specification of tools and services supporting patient empowerment (Raziskovalno poročilo). http://p-medicine.eu/fileadmin/p-medicine/public_website/downloads/p-medicine_270089_D2_5_Specification_of_tools_and_services_supporting_patient_empowerment_v3-0.pdf. <6. 7. 2013>.
3. Pesjak K (2007). Komunikacija bolnika in zdravnika. V: Vključevanje bolnika v zdravljenje. Družinska medicina 2007. Ljubljana: Združenje zdravnikov družinske medicine SZD, 38–43.
4. Tušek-Bunc, K. (2007). Spoštovanje partnerskega odnosa bolnik - zdravnik zaupnost v partnerskem odnosu. V: Vključevanje bolnika v zdravljenje. Družinska medicina 2007. Ljubljana: Združenje zdravnikov družinske medicine SZD, 4–9.
5. Fras, Z. in Maučec Zakotnik, J (2009). Vplivi in načini spreminjanja življenjskega sloga na srčno-žilno ogroženost. V: XVIII. Strokovni sestanek Sekcije za arterijsko hipertenzijo. Ljubljana: Slovensko zdravniško društvo, sekcija za arterijsko hipertenzijo, 37– 60.

Fizioterapevtska mreža osnovne zdravstvene dejavnosti od leta 2004 do 2014

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Uvod: V osnovni zdravstveni dejavnosti se problematika mreže pokritosti s fizioterapevtsko dejavnostjo kaže v oteženem dostopu zavarovanih oseb do storitev kot tudi v preveliki obremenjenosti fizioterapevtov posameznih območnih enot. **Metode:** V analizi so zajeti celotna populacija zavarovanih oseb in vsi izvajalci fizioterapije v osnovnem zdravstvenem varstvu od leta 2004 do 2014. Porazdelitev zavarovanih oseb, fizioterapevtskih programov in obremenjenosti posameznega fizioterapevta je prikazana v desetih območnih enotah Zavoda za zdravstveno zavarovanje Slovenije. **Rezultati:** Zavod za zdravstveno zavarovanje je korekcijo programov izvedel šestkrat. Analiza podatkov celotnega obdobja je pokazala 5-odstotno rast števila zavarovanih oseb in 22-odstotno povečanje števila fizioterapevtskih programov. Primerjava med posameznimi območnimi enotami prikazuje tudi do 100-odstotno razliko v obremenjenosti fizioterapevtov, ki v celotnem raziskovalnem obdobju ne kaže trenda po izenačitvi. Koeficient korelacije po Pearsonu med razliko v številu zavarovanih oseb in fizioterapevtskimi programi kaže le šibko medsebojno povezanost (0,25). **Zaključek:** Dobljeni rezultati nedvomno kažejo, da se stanje v mreži pokritosti s fizioterapevtsko dejavnostjo na področju osnovnega zdravstvenega varstva ne izboljšuje. Za načrtovalce korekcije programov sprememba v številu zavarovanih oseb v preteklosti ni bila najpomembnejši dejavnik. Mrežo fizioterapevtskih programov bi bilo v prihodnje treba postaviti na načelih, ki bi zagotavljali enakost tako za uporabnike kot tudi za izvajalce.

Ključne besede: zavarovane osebe, območne enote, mreža fizioterapevtske dejavnosti, obremenjenost, korelacija.

Physiotherapy network in primary health care in the period 2004–2014

Introduction: In the field of primary health care, the problems of the network of physiotherapeutic activity coverage are reflected in an aggravated access to services for insured persons and in excessive workload for physiotherapists in several regional units. **Methods:** The analysis comprises the total population of insured persons and all physiotherapy practitioners in the field of primary health care within the period 2004–2014. The distribution of insured persons, physiotherapeutic programmes and individual physiotherapists' workloads are presented in ten regional units of the Health Insurance Institute of Slovenia. **Results:** The Health Insurance Institute of Slovenia has performed six corrections of programmes. An analysis of data for the entire period of time showed a 5% increase in the number of insured persons and a 22% increase in the number of physiotherapeutic programmes. A comparison between separate regional units showed differences in individual therapists' workloads amounting up to 100%, and in the entire research period no trend towards balancing can be seen. The Pearson correlation coefficient between the number of insured persons and the physiotherapeutic programmes shows only a feeble connection (0.25). **Conclusion:** The obtained results undoubtedly show that the situation in the network of physiotherapeutic activity coverage in the field of primary health care is not improving. In the past a change in the number of insured persons was not seen as a key factor by the planners of programme corrections. In future the physiotherapy programme network should be based on principles ensuring equality both for users and practitioners.

Key words: insured persons, regional units, physiotherapeutic activity network, workload, correlation.

Literatura/References:

1. Zavod za zdravstveno zavarovanje Slovenije (-2004, številka 1). Podatki o obveznem zdravstvenem zavarovanju: 3.
2. Zavod za zdravstveno zavarovanje Slovenije (-2005, številka 3). Podatki o obveznem zdravstvenem zavarovanju: 2.
3. Zavod za zdravstveno zavarovanje Slovenije (-2006, številka 3). Podatki o obveznem zdravstvenem zavarovanju: 2.
4. Zavod za zdravstveno zavarovanje Slovenije (-2007, številka 3). Podatki o obveznem zdravstvenem zavarovanju: 2.
5. Zavod za zdravstveno zavarovanje Slovenije (-2008, številka 3). Podatki o obveznem zdravstvenem zavarovanju: 2.
6. Zavod za zdravstveno zavarovanje Slovenije (-2009, številka 3). Podatki o obveznem zdravstvenem zavarovanju: 2.
7. Zavod za zdravstveno zavarovanje Slovenije (-2010, številka 3). Podatki o obveznem zdravstvenem zavarovanju: 2.
8. Zavod za zdravstveno zavarovanje Slovenije (-2011, številka 3). Podatki o obveznem zdravstvenem zavarovanju: 2.
9. Zavod za zdravstveno zavarovanje Slovenije (-2012, številka 3). Podatki o obveznem zdravstvenem zavarovanju: 2.
10. Zavod za zdravstveno zavarovanje Slovenije (-2013, številka 3). Podatki o obveznem zdravstvenem zavarovanju: 2.
11. Zavod za zdravstveno zavarovanje Slovenije (-2014, številka 3). Podatki o obveznem zdravstvenem zavarovanju: 2.
12. Področni dogovor za zdravstvene domove in zasebno zdravniško dejavnost za pogodbeno leto 2004. <http://www.zzzs.si/zzzs/info/egradiva.nsf/o/444B79D2D07AFE6CC1256E9E004262DB?OpenDocument> <15. 3. 2015>.
13. Področni dogovor za zdravstvene domove in zasebno zdravniško dejavnost za pogodbeno leto 2005. <http://www.zzzs.si/zzzs/info/egradiva.nsf/o/EA816092343114AC12570500025DE81?OpenDocument> <15. 3. 2015>.
14. Področni dogovor za zdravstvene domove in zasebno zdravniško dejavnost za pogodbeno leto 2006. <http://www.zzzs.si/zzzs/info/egradiva.nsf/o/F4517E7D0ED5A6F8C12571AF003DE70E?OpenDocument> <15. 3. 2015>.
15. Zavod za zdravstveno zavarovanje Slovenije (-2007, številka 3). Občasnik: 13.
16. Zavod za zdravstveno zavarovanje Slovenije (-2008, številka 3). Občasnik: 8–29.
17. Zavod za zdravstveno zavarovanje Slovenije (-2009, številka 3). Občasnik: 90–104.
18. Splošni dogovor za pogodbeno leto 2010. <http://www.zzzs.si/zzzs/info/egradiva.nsf/obvestilo?readform&y=1&x=/zzzs/info/egradiva.nsf/o/9A5C83D33340B453C12576FD00468384> <15. 3. 2015>.
19. Splošni dogovor za pogodbeno leto 2011. <http://www.zzzs.si/zzzs/info/egradiva.nsf/o/C90374414A174BE7C1257810004666C0?OpenDocument> <15. 3. 2015>.
20. Zavod za zdravstveno zavarovanje Slovenije (-2012, številka 2/1. del). Občasnik: 99–115.

Šestminutni test hoje v bazenu pri obravnavi pacientov s kronično razširjeno nerakavo bolečino na URI - Soča – poročilo o primeru

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Uvod: Kronično razširjen bolečinski sindrom prizadene mehko tkivne strukture. Sprožijo ga bolečinski in nebolečinski dražljaji, pri čemer se čutne zaznave v osrednjem živčevju nepravilno procesirajo (1), zato so bolnikove psihofizične sposobnosti močno zmanjšane. Zdravljenje je dolgotrajen in večplasten proces, v katerem se poudarja multidisciplinaren pristop z načeli interdisciplinarnosti. Od leta 2013 na URI - Soča potekata dva programa za obravnavo oseb s kronično razširjeno nerakavo bolečino: 4-tedenski prilagojeni interdisciplinarni rehabilitacijski program (PIRP) in 5-tedenski interdisciplinarni program funkcionalne obnove (IPFO). Progresivna vadba v vodi (2) in učenje sproščanja v njej (3) pomembno pripomoreta k izboljšanju pacientovega počutja. Za spremljanje pacientovega napredka in vrednotenje fizioterapevtskih postopkov v bazenu ni razvitih enostavnih testov (4), zato je namen poročila o primeru prispevka predstaviti 6-minutni test hoje v bazenu za oceno vzdržljivosti pacientov, vključenih v PIRP.

Metode: 45-letna pacientka s sindromom fibromialgije je bila vključena v 4-tedenski PIRP. Za oceno vzdržljivosti smo izvedli 6-minutni test hoje v bazenu z osnovno analizo hoje (dolžina koraka, dostop, gibanje rok, koordinacija gibanja, drža telesa) pred začetkom PIRP-a in po njem. Pred testiranjem so bila dana kratka ustna navodila za izvedbo testa. Med izvajanjem je fizioterapevt spremljal pacientko ob bazenu in jo vsaki 2 minuti opozoril na preostanek časa. Test se je izvajal v bazenu, globokem od 120 do 140 cm in dolgem 15 m, s temperaturo vode od 31 do 33 °C. Ocena bolečine je bila izvedena pred začetkom in po koncu 6-minutnega testa hoje. Rezultati testa, ocena bolečine in osnovna analiza hoje so se zapisali v obrazec. Ob koncu programa so bili rezultati testiranja vključeni v končno fizioterapevtsko poročilo. **Rezultati:** Ob začetku programa je preiskovanka prehodila 85 m, ocena bolečine pred testom in po njem je bila 7/8; po koncu programa je prehodila 105 m z oceno bolečine 5/5,5. Primerjava pokaže, da je prehojena razdalja povečana za 23 odstotkov ob hkratnem zmanjšanju bolečine za 34 odstotkov.

Zaključki: 6-minutni test hoje v bazenu je enostaven za izvedbo in razumljiv. Dobro pokaže bolnikovo splošno telesno pripravljenost in njegovo osnovno gibanje po doprso globokem bazenu. Primeren je za spremljanje napredka bolnikov s kronično razširjeno nerakavo bolečino v času rehabilitacije. Na URI - Soča so rezultati 6-minutnega testa hoje vključeni v končno fizioterapevtsko poročilo. Test še ni standardiziran. V prihodnje bi bilo koristno test standardizirati, tako za ovrednotenje bolnikovega napredka kot za zapisovanje fizioterapevtskega dela v bazenu.

Ključne besede: 6-minutni test hoje v bazenu, hidroterapija, kronično razširjena nerakava bolečina.

Six-minute walk test in a swimming pool in a trial of patients with chronic widespread non-cancer pain in URI - Soča – case report

A chronic widespread syndrome affects soft-tissue structures and is caused by pain and non-pain irritation, which provokes false sensual perception in central nervous system (1). Because of that, the patient's psycho-physical capabilities are very weak. The treatment is long-lasting and often very comprehensive where the best results are achieved with multidisciplinary approach combined with interdisciplinary principles. In URI - Soča two interdisciplinary programmes for patients with chronic widespread non-cancer pain have been developed since 2013: 4-weeks' adapted interdisciplinary rehabilitation programme (PIRP) and 5-weeks' interdisciplinary programme of physical restoration (IPFO). Progressive exercising programme in water (2) and teaching of relaxation in it (3) help a lot to improve the patient's state of health. There are no easy tests in written form to evidence and to attend the patient's progress and the physiotherapist's work in pool, too (4). The purpose of the report was to present the 6-minute walk test in pool to assess the patient endurance in PIRP programme. **METHODS:** A 45-year-old woman was included in 4-weeks' PIRP. To assess the endurance, a 6-minute walking test in pool was used combined with basic walking analysis (step length, a touch of foot, an arm moving, a coordination of movement, a posture) before the beginning of the PIRP and after. Before starting the test, the patient was given short oral instructions; while walking the patient was attended from outside the pool by the physiotherapist, every 2 minutes, the patient was reminded about how much time was left. The test was done in a pool, which was 120 to 140 cm deep and 15 m long, with the water temperature 31°-33°C. Assessment of pain was done before and after the walking test. The results of each test, the pain assessment and the basic gait analysis were noted. At the end of the programme, all the results were included in the main physiotherapist's report. **RESULTS:** At the beginning of the programme, the included patient walked 85 m, the pain assessment was before/after the test 7/8. At the end of the programme, she walked 105 m and the pain was assessed 5/5.5. The comparison showed that the walking length increased for 23% and the pain decreased for 34%. The results of each test and the walking analysis were noted. At the end of the programme, everything was included in the physiotherapist's main report. **CONCLUSION:** The 6-minute walking test in a pool is an easily usable test. It showed the patient's endurance and his basic movement in a chest-deep pool well. It is suitable to assess the improvement of patients with chronic widespread non-cancer pain during their rehabilitation. In URI - Soča the results of the 6-minute walking test are included in the main physiotherapist's report. The standardisation hasn't been done yet. It is necessary to do the standardisation to evidence the patient's improvement and the physiotherapist's work as well.

Key words: 6-minute walk test in a pool, hydrotherapy, chronic widespread non-cancer pain.

Literatura/References:

1. Logar D (2007). Novosti v razumevanju patogeneze in zdravljenju sindroma fibromialgije. V: Rehabilitacija poškodovancev z nihajno poškodbo vratne hrbtenice: učna delavnica. Strokovno srečanje fizioterapevtov mariborske regije, Maribor, 19. april 2007. Maribor. Splošna bolnišnica, Oddelek za fizikalno in rehabilitacijsko medicino, 77-88.
2. Rosenstein AA, Water exercise for fibromyalgia: the gentle way to relax and reduce pain. Enumclaw, WA: Idyll Arbor, 2006.
3. Gangaway J (2011). Aquatic therapy supports fibromyalgia patients. <http://physical-therapy.advanceweb.com/features/Articles/Aquatic-Therapy-Supports-Fibromyalgia-Patients.aspx>. <8. 3. 2012>.
4. Klar N, Divjak M (2012). Program stopnjevanje vadbe v vodi pri poskusni multidisciplinarni obravnavi sindroma fibromialgije. Diplomsko delo. Ljubljana: Zdravstvena fakulteta, Oddelek za fizioterapijo.

Zanesljivost meritev občutka za položaj zgornjega skočnega sklepa v odprti kinetični verigi

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Uvod: Občutek za položaj sklepa je pomemben del propiocepcije, ki prek specializiranih mehanoreceptorjev posreduje informacije o dejanskem položaju telesnih segmentov (1). Ker je oslabitev propiocepcije lahko eden izmed prvih znakov razvoja nevroloških in mišično-skeletnih okvar (2), je za njeno ocenjevanje treba zagotoviti zanesljivost merilne naprave in testnega postopka. Namen raziskave je bil ugotoviti zanesljivost meritev občutka za položaj zgornjega skočnega sklepa pri zdravih mladih preiskovancih, merjenega z elektrogoniometrom. **Metode:** V raziskavi je sodelovalo 30 zdravih preiskovancev (27 žensk, 3 moški), v povprečju starih $20,7 \pm 1,5$ leta. Za merjenje občutka za položaj sklepa je bil dvakrat v razmiku sedmih dni uporabljen elektrogoniometer Biometrics SG110, nameščen po poteku Ahilove tetive. Protokol je bil narejen na podlagi pregleda podobne raziskave (3). Vse meritve so preiskovanci opravili sede z zaprtimi očmi, na način aktivno pri 10° dorzalne fleksije ter 25° in 40° plantarne fleksije v zgornjem skočnem sklepu. Celoten postopek je trajal približno 20 minut. Izračunali smo absolutno razliko med doseženim in testnim kotom v sklepu ter absolutno napako. Iz absolutnih napak je bil izračunan intraklasni koeficient korelacije (ICC) in 95-odstotni interval zaupanja. **Rezultati:** Pri vseh kotih so se pri drugem merjenju absolutne napake zmanjšale. Povprečna vrednost absolutnih napak pri prvem merjenju je znašala $4,0^\circ$, pri drugem pa $3,3^\circ$. Največja razlika med absolutnimi napakami prvega in drugega merjenja je bila pri kotu 25° plantarne fleksije, pri katerem so bile pri prvem testiranju absolutne napake največje. Kot 25° plantarne fleksije se je tako izkazal za najmanj zanesljivega (ICC od 0,07 do 0,08). ICC pri 10° dorzalne fleksije je bil med 0,14 in 0,40. Najvišji ICC je bil pri 40° plantarne fleksije med 0,52 in 0,54, kar kaže na zmerno zanesljivost (4). **Zaključki:** Glede na rezultate lahko sklepamo, da meritve občutka za položaj zgornjega skočnega sklepa z elektrogoniometrom Biometrics SG110 niso dovolj zanesljive. Vir napak bi lahko bil protokol, merilna naprava, preiskovanci ali preiskovalec. Testni koti so za nekatere preiskovance predstavljali tudi njihovo končno mejo gibljivosti, zato so ta položaj težko dosegli in ga vzdrževali zahtevanih 5 sekund, s čimer se je povečala stopnja napak. Vir napak je lahko izbira tipa elektrogoniometra, nenatančna namestitvev in posledično težava pri določitvi ničelnega položaja ali premik kože med gibanjem. Razvidno je tudi, da so povsod pri ponovnem testiranju absolutne napake manjše, kar kaže na dejavnik učenja. Potrebne so dodatne raziskave za zagotovitev zanesljivega protokola za testiranje občutka za položaj zgornjega skočnega sklepa z elektrogoniometrom. Raziskava je potekala v okviru ARRS projekta L3-5509.

Ključne besede: zanesljivost, občutek za položaj zgornjega skočnega sklepa, elektrogoniometer, propiocepcija, odprta kinetična veriga.

Reliability of the talocrural joint position sense measurement in the open kinetic chain

Background: Joint position sense is one of the important parts of proprioception which provides information about the actual position of body segments through specialized mechanoreceptors (1). Since decline in proprioception may be one of the first signs of neurological and musculoskeletal impairment (2), proprioception requires a reliable measuring device and procedure for its evaluation. The purpose of the study was to determine the reliability of measurements of the talocrural joint position sense in healthy young subjects, measured by electrogoniometer. **Methods:** 30 healthy subjects (27 female, 3 male) an average age of 20.7 ± 1.5 years participated in the study. For measuring joint position sense, electrogoniometer Biometrics SG 110 was used twice in a seven-day interval. The electrogoniometer was placed over Achilles' tendon and a protocol described in the study by Bronner et al (3), was used. All measurements were made active (active) in a sitting position with eyes closed in three test angles: 10° dorsal-flexion, 25° and 40° plantar-flexion in the talocrural joint. Testing lasts approximately 20 minutes. Absolute differences between target and testing angle in the talocrural joint and absolute error were calculated. On the basis of absolute errors, the intraclass correlation coefficient (ICC) and a 95% confidence interval were calculated. **Results:** For all angles in the second measurement, absolute errors were smaller. Average of absolute errors in the first measurement was 4.0° and in the second measurement it was 3.3° . The largest differences in the absolute errors between the first and the second measurement were at 25° of plantar-flexion, where the absolute errors in the first measurement were the largest. The least reliable angle was 25° of plantar-flexion (ICC: 0.07–0.08). ICC at 10° of dorsal-flexion was between 0.14 in 0.40. The highest ICC (0.52–0.54) was at 40° of plantar-flexion, which shows moderate reliability (4). **Conclusions:** According to the results, it can be concluded that measurement of talocrural joint position sense using electrogoniometer Biometrics SG110 is not reliable. The source of errors could be the measurement protocol itself, the device, subjects or the tester. In some subjects, testing angles were at the end range of their motion and therefore, it was difficult to reach and maintain this position for 5 seconds, which caused an increase in error. The possible source of errors could be the type of electrogoniometer, imprecise placing and consequently difficulty to determine null position or skin movement. It is evident, that in all re-tests the absolute errors were decreased, which indicates learning process. Further research is required to establish a reliable protocol for measuring the ankle joint position sense using electrogoniometer. The research was made according to the ARRS project L3-5509.

Key words: reliability, talocrural joint position sense, electrogoniometer, proprioception, open kinetic chain.

Literatura/References:

1. Olsson L, Lund H, Henriksen M, Rogind H, Bliddal H, Danneskiold-Samsøe B (2004). Test-retest reliability of a knee joint position sense measurement method in sitting and prone position. *Adv Physiother* 6 (1): 37–47.
2. Deshpande N (2001). Reliability and sensitivity of ankle proprioceptive measures. Master's thesis. Kingston: Queen's University.
3. Bronner S, Agraharasamakulam S, Ojofeitimi S (2010). Reliability and validity of a new ankle electrogoniometer. *J Med Eng Technol* 34 (5–6): 350–55.
4. Juul-Kristensen B, Lund H, Hansen K, Christensen H, Danneskiold-Samsøe B, Bliddal H (2008). Test-retest reliability of joint position and kinesthetic sense in the elbow of healthy subjects. *Physiother Theory Pract* 24 (1): 65–72.

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Več kot 80 odstotkov ljudi ima vsaj enkrat v življenju težave z osteoartritisom. LLLT (low level light therapy – nizkoenergijska svetlobna terapija) je nov pristop za zdravljenje številnih medicinskih stanj, pri katerih je treba zmanjšati bolečino in vnetje, spodbuditi zdravljenje in preprečiti tkivno smrt po poškodbi ali infarktu. Fotoni rdeče ali NIR-svetlobe se absorbirajo v citokrom c oksidazi (encim respiratorne verige v mitohondrijih), kar vodi v povečano sintezo ATP in sprožitev signalnih poti. V več študijah so ugotavljali protivnetne učinke LLLT in ugotovili zmanjšanje vnetnih celic (nevtrofilci, makrofagi, limfociti, mastociti) in vnetnih citokinov (interlevkin 1, TNF- α). LLLT se klinično uporablja že več let. V številnih študijah na živalskih modelih in ljudeh je bilo ugotovljeno, da obsevanje z LLLT vpliva na proliferacijo in sekrecijo hondrocitov, zmanjšuje bolečine in izboljša obseg gibanja. LLLT se uporablja kot metoda biostimulacije. Rezultati različnih študij se med seboj razlikujejo in so odvisni od parametrov, kot so valovna dolžina, energijska gostota moči, število in trajanje zdravljenja ter velikost obsevanega predela. Mehanizmi delovanja LLLT na hrustanec še vedno niso točno znani. Verjetno delujejo na proliferacijo hondrocitov in sekrecijo ekstracelularnega matriksa. Fototerapija zmanjša vnetje in bolečine ter izboljša gibljivost sklepov in tako prispeva k boljši kakovosti življenja. Obsevanje z LED ima nekaj prednosti pred terapijo z laserjem. LED emitirajo svetlobo v več valovnih dolžinah hkrati in tako lahko stimulirajo več dejavnikov zdravljenja. Obsevamo lahko več vrst različnih tkiv in večje površine tkiva (sklepi, mišice). So veliko cenejše in imajo daljšo življenjsko dobo. Prav od uporabe pravih svetlobnih parametrov je odvisen učinek zdravljenja.

Ključne besede: osteoartroza, obsevanje z LED, fotobiomodulacija, nizkoenergijska terapija z laserjem, nizkoenergijska svetlobna terapija.

Light Therapy in Arthrosis

More than 80% of people have problems caused by osteoarthritis at least once in their life. LLLT (low level light therapy) is a new way to treat a lot of medical conditions, where it is necessary to reduce pain and inflammation, stimulate healing and prevent tissue death after injury or infarct. Photons of red or NIR light are absorbed in the cytochrome c oxidase (enzyme in mitochondrial respiratory chain), leading to an increased synthesis of ATP and initiate signalling pathways. Several studies examined the anti-inflammatory effects of LLLT and a decrease in inflammatory cells (neutrophils, macrophages, lymphocytes, mast cells) and the reduction of proinflammatory cytokines (interleukin 1, TNF- α). LLLT has been clinically used for many years. In several animal and human studies, it has been found that irradiation with LLLT affects the proliferation and secretion by chondrocytes, attenuates pain and improves the rate of motion. LLLT is used as a method of biostimulation. The results of the various studies differ and depend on parameters such as wavelength, energy density power, the number and duration of treatment, and the size of the irradiated area. Mechanisms of LLLT effect on the cartilage is still not known exactly. It is likely, that it acts on the proliferation of chondrocytes and secretion of extracellular matrix. Phototherapy has an effect on reducing inflammation and pain, improves flexibility of joint, thereby contributing to a better quality of life. Irradiation by LED has several advantages over laser therapy. LEDs emit light in the longer wavelengths at the same time and can also stimulate a number of factors of treatment. You can irradiate several different types of tissue and larger areas of tissue (joints, muscles). They are much cheaper and have a longer life. It is precisely the use of correct lighting parameters, that the treatment effect depends on.

Key words: osteoarthritis, LED-light emitting diode irradiation, photobiomodulation, low level light therapy, low level light therapy.

Literatura/References:

1. Hamblin MR (2013). Can osteoarthritis be treated with light? *Arthritis research & Therapy*, 15: 120.
2. Weston J (2006). Effects of Light on Osteoarthritis and Cartilage Repair, BioCare Systems, Inc. <http://www.betterbraces.com/media/Effects%20of%20Light%20Therapy%20on%20Cartilage%20Repair%20and%20Osteoarthritis%20Healing.pdf>. <15. 3. 2015>.
3. Frangež I, Kuralt T, Ban-Frangež H, Smrke DM (2012). Symptomatic therapy of mild to moderate osteoarthritis of the knee with light emitting diode. *Photodiagnosis and Photodynamic therapy* 9 (Suppl 1): S32(94).
4. Alghadir A, Omar MTA, Al-Askar AB, Al-Muteri NK (2014). Effect of low-level laser therapy in patient with chronic osteoarthritis: a single-blinded randomised study. *Laser Med Sci* 29: 749–55.

Zdravje na delovnem mestu

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Uvod: V prispevku prikažemo preventivni izobraževalni program Zdravje na delovnem mestu, katerega namen je ohraniti prožno in zdravo hrbtenico za zdravo telo za delo in življenjske aktivnosti. Premalo fizične aktivnosti in skrbi za mišično moč, gibljivost in koordinacijo je najpogostejši vzrok za bolečino v hrbtenici, zato je vsebina programa usmerjena v motiviranje udeležencev za aktivno življenje in športne aktivnosti. Že leta 1958 je v Kanadi dr. Fahrni (1) razvil koncept edukacije za svoje paciente. Razvil je več tehnik za sprostitvev, mehaniko gibanja, razbremenilne položaje in edukacijo obvladovanja bolečine v hrbtenici. Leta 1969 je nastala Švedska šola proti bolečini v hrbtenici v tovarni Volvo (2). Model je bil zelo uspešen pri vračanju delavcev na delovno mesto. Znano je, da je za paciente, ki v enem ali dveh mesecih ne zmanjšajo bolečine, bolj verjetno, da razvijejo kronično bolečino (3). **Metode dela:** Leta 2011 smo preventivne izobraževalne programe vključili v delovne organizacije Zavod za zaposlovanje RS, Zavarovalnico Triglav in Domel v obliki delavnice. Vsebina delavnice se je prilagajala glede na način dela udeležencev, ki ga opravljajo. Delavnice so trajale dve uri. Zdravnica je predstavila uvodni del namena raziskave, fizioterapevtka preventivo na delovnem mestu in praktično izvedbo vaj, delovna terapevtka pa ergonomsko urejenost na delovnem mestu. Fizioterapevtski del delavnice temelji na vsebini Šole proti bolečini v hrbtenici, ki poteka v okviru fizioterapevtskih programov na URI - Soča od leta 1990. Vsebina je razdeljena v teoretični in praktični del. Cilji so zmanjšanje bolečine, preprečitev ponovne epizode bolečine v hrbtenici in aktivna skrb za lastno hrbtenico. Teoretični del vsebuje anatomijo in funkcijo hrbtenice, biomehaniko gibanja pri gibanju v različnih položajih, optimalno držo in ergonomijo. Praktični del pa vsebuje učenje pravilne drže, vzravnane drže pri sedenju, pravilnega pobiranja bremen, razbremenilnih položajev, samovleka in tehnike samopomoči, vaje za sproščanje in stabilizacijo ter vaje za moč, gibljivost in koordinacijo. **Rezultati:** Od leta 2011 je bilo v izobraževanje vključenih 1384 udeležencev iz različnih delovnih organizacij. V anketi udeleženci navajajo visoko zavedanje, da je znanje za ohranjanje zdravja pri delu pomembno (povprečna ocena 4,77 od 5), da je bila delavnica dobra in vsebina primerno izbrana glede na njihove potrebe na delovnem mestu (4,6) in da je bilo sodelovanje na delavnici koristno (4,75). **Zaključki:** Preventivni programi v delovnih organizacijah s prilagojeno vsebino glede na njihove potrebe in način dela so se pokazali kot zelo uspešni in so spodbuda k aktivni skrbi za zdravje na delovnem mestu.

Ključne besede: fizioterapija, izobraževanje, preventiva, delovno okolje, vadba.

Health in the work place

Introduction: In this paper we present the preventive education program »health in the work place« to keep flexible and healthy spine for a healthy body for work and life activities. Lack of physical activities and care for muscle strength, flexibility and balance are the most common causes of back pain. For this reason, the program is aimed at motivating participants for an active life style and sporting activities. In 1958 dr. Fahrni (1) in Canada developed the concept of educating his patients. He developed a lot of techniques for relaxing, movement, resting positions, and training in managing back pain. In 1969 the Swedish Low Back School was developed in the Volvo factory (2). This model was very successful in returning workers to their jobs. It is known that in patients that do not reduce pain in one or two months' time probability of developing chronic pain is a lot bigger (3). **Methods:** In 2011 we prepared the preventive educational program for work organisations Zavod za zaposlovanje RS, Zavarovalnica Triglav and Domel in the form of workshops which are customized based on the work environment and work done. Workshops last 2 hours. A doctor presents the introduction, a physical therapist presents preventive measures and practical execution of exercises, and an occupational therapist presents ergonomics in the work place. The physical therapist's part is based on the Back school program that has been implemented at URI-Soča since 1990. The content is divided into theoretical and practical parts. Goals are to reduce pain, prevent re-occurrence and care of the spine. The theoretical part includes anatomy and function of the spine, biomechanics of movement in various positions, optimal posture and ergonomics. The practical part includes correct posture training, good posture while sitting, correct ways to pick up loads, resting positions, auto traction and self-help, and exercises for relaxation, stabilization, strength, flexibility and balance. **Results:** Since 2011, 1384 employees from various work organisations have attended these workshops. The survey's results show that participants had high awareness that knowing how to keep healthy in the work place is important (average 4.77 out of 5), that the workshop was suitable and the content appropriate considering their work place (4.60), and that participation in the workshop was beneficial (4.75). **Conclusions:** Preventive programs in work organizations where the content is customized based on their needs and work environment have shown to be very beneficial and encourage employees to be active and care for maintaining health in the work place.

Key words: physiotherapy, education, prevention, work place, exercise.

Literatura/References:

1. White AH (1983). Back School and other conservative approaches to low back pain, 44–5.
2. Heymans MW (2014). Back School for acute and subacute non specific low-back pain (Protokol); The cochrane colaboratin, 1–2.
3. Waddell GA (1987). A new clinical model for the treatment of low back pain. Spine 12: 32–44.

Funkcijska zmogljivost hospitaliziranih starejših oseb

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Uvod: Krhkost ni bolezensko stanje, temveč sindrom, ki ga sestavlja skupek simptomov in znakov. Ti simptomi napovedujejo izid zdravstvenega stanja in služijo kot ocena bolnikovega splošnega zdravstvenega stanja (1). Številne študije navajajo različne definicije za označevanje sindroma pri starejših oseb, kot najpogostejši klinični kazalniki sindroma pa se navajajo zmanjšana mobilnost, motnja ravnotežja, zmanjšana mišična zmogljivost, slabši prehranski status in zmanjšana telesna dejavnost (2). Namen raziskovalne študije je predstaviti funkcijsko sposobnost hospitaliziranih starejših oseb ob sprejemu in odpustu, poleg tega pa tudi predstaviti razliko med spoloma v funkcijski sposobnosti.

Metode: V raziskavo je bilo vključenih 99 pacientov, hospitaliziranih na oddelku klinike Center za vojne veterane. Povprečna starost žensk je bila 81,8 (8,0) leta, moških pa 78,8 (9,4) leta. Za predstavitev rezultatov smo uporabili deskriptivne statistične metode. Povezanost med posameznimi spremenljivkami smo ugotavljali s koeficientom korelacije (r) po Pearsonu. Pri postopni multipli regresiji smo predpostavili, da so odvisne spremenljivke (izidi) testi, ki smo jih opravili na koncu hospitalizacije. Ti so relativna zmogljivost prijema glede na telesno težo, funkcijska zmogljivost, ki smo jo ocenili z indeksom Barthel (BI), in hitrost hoje. Za merjenje hitrosti hoje smo uporabili kronometer (JUNOS-230, Shenzhen Junsu Electronic Co, Kitajska) in lepilni trak, s katerim smo označili razdaljo štirih metrov. Za oceno prehranjenosti je bila uporabljena mini prehranska anamneza. Statistično pomembnost razlik med spoloma smo določali s Studentovim testom in Mann-Whitneyjevim testom ($p < 0,05$).

Rezultati: Relativna zmogljivost prijema ob odpustu je bila statistično značilno ($p < 0,0001$) pozitivno povezana z relativno zmogljivostjo prijema ob sprejetju in negativno povezana s telesno težo. BI ob odpustu je bil statistično značilno ($p < 0,001$) pozitivno povezan z BI ob sprejetju, programom fizioterapije in mini prehransko anamnezo. Hitrost hoje ob odpustu je bila statistično značilno ($p < 0,001$) pozitivno povezana z BI ob sprejemu, s programom fizioterapije in z relativno zmogljivostjo prijema ob sprejetju, negativno pa je bila povezana s starostjo pacientov. V povprečju so bili moški višji in težji, zato je bil tudi njihov energetski vnos hrane statistično značilno višji ($p = 0,003$), v povprečju za 243,2 kcal. BI je bil ob sprejemu pri moških v primerjavi z ženskami statistično značilno višji ($p = 0,028$), v povprečju za 2,9 točke, ob odpustu pa je bil pri ženskah višji v povprečju za 2,0 točki. Moški so imeli v povprečju statistično značilno višji rezultat relativne zmogljivosti ob sprejetju ($p < 0,0001$), povprečno za 0,09 kg/kgTT, od žensk, ob odpustu je bila relativna zmogljivost pri moških statistično značilno višja ($p = 0,006$), povprečno za 0,07 kg/kgTT. Moški so bili v povprečju statistično značilno hitrejši ($p = 0,022$), v povprečju za 0,17 m/s.

Zaključki: Pridobljeni podatki o funkcijskem stanju pacientov nam dajejo orientacijsko oceno pacientove samostojnosti pri opravljanju vsakodnevnih opravil. Glede na to, da so bili v povprečju moški višji in težji, je bil tudi njihov energetski vnos hrane statistično značilno višji. Ob sprejemu je bila relativna zmogljivost prijema pri moških statistično značilno višja od relativne zmogljivosti prijema žensk, prav tako je bilo tudi ob odpustu. Relativna zmogljivost prijema na koncu hospitalizacije je bila statistično značilno pozitivno povezana z relativno zmogljivostjo prijema ob sprejetju in negativno povezana s telesno težo. BI ob sprejemu je bil v primerjavi z ženskami statistično značilno višji pri moških. Barthelov indeks na koncu hospitalizacij kot kazalnik funkcijske zmogljivosti je bil statistično značilno pozitivno povezan z Barthelovim indeksom ob sprejetju, programom fizioterapije in mini prehransko anamnezo. Moški so bili v povprečju statistično značilno hitrejši od žensk. V naši raziskavi je bila hitrost hoje na koncu hospitalizacije statistično značilno pozitivno povezana z Barthelovim indeksom ob sprejetju, programom fizioterapije in relativno zmogljivostjo prijema ob sprejetju, negativno pa je bila povezana s starostjo pacientov.

Ključne besede: sindrom krhkosti, staranje, sarkopenija, nezmožnost, telesna dejavnost.

Functional ability of hospitalized elderly persons

Introduction: Fragility is not a condition of illness, but a group of symptoms and signs, which define the fragility syndrome or physical weakness. These indicators predict the result of a health condition or in other words serve as a general assessment of a patient's health condition. Numerous studies report a different definition of frailty syndrome. These are reduced grip capacity, exhaustion, unexplained weight loss, reduced walking speed and reduced physical activity. These indicators predict the result of health condition or in other words serve as a general assessment of a patient's health condition. The aim of the research study report is to present functional ability of hospitalized elderly persons. The second aim is to present the difference between sexes in functional ability. **Methods:** The research included 99 patients, hospitalized in the section of Center za vojne veterane. The average age of women was 81.8 (8.0) years, and of men 78.8 (9.4) years. We used descriptive statistical methods to present the results. The connection between individual variables was determined with Pearson's correlation coefficient (r). At the gradual multiple regression analysis we assumed that the dependent variables (results) were the tests which were performed in the end of hospitalization. These are grip capacity and functional capacity, which were assessed with the Barthel index and walking speed. Walking speed was measured with chronometer and the masking tape was used to mark the distance of four meters. To assess the nutritional status, Mini nutritional assessment was used. The statistical importance of sex differences was determined with the Student's test and Mann-Whitney test ($p < 0.05$). **Results:** Relative grip capacity (RZP2) at the time of remission was statistic-wise typically ($p < 0.0001$) positively related to the relative grip capacity at the time of admission (RZP1) and negatively related to physical weight (TT). Remission BI (BI2) was statistic-wise typically ($p < 0.001$) positively correlated to admission BI (BI1), physiotherapy programme (FT) and mini nutritional assessment (MNA). The walking speed (HH) at the time of remission (BI2) was statistic-wise typically ($p < 0.001$) positively related to BI at the time of admission (BI1), physiotherapy programme (FT), relative grip strength at the time of admission (RZP1) and negatively correlated to the patients' age (S). In average, men were taller and heavier and consequently their food energy intake was statistic-wise typically higher ($p = 0.003$), for 243.2 kcal on average. The admission BI was in comparison to women statistic-wise typically higher at men ($p = 0.028$), for 2.9 points on average, whereas the remission BI at women was higher for 2.0 points on average. On average, men had a statistic-wise typically higher result of the relative capacity when admitted ($p < 0.0001$), on average for 0.09 kg/kgTT, than women, and when dismissed the male relative capacity was statistic-wise typically higher ($p = 0.006$), for 0.07 kg/kgTT on average. On average, men were statistic-wise typically faster ($p = 0.022$), for 0.17 m/s on average. **Conclusion:** The obtained data about the patients' functional condition gave us an approximate assessment of patient's independence at performing daily chores. On average, men were taller and heavier and consequently their food energy intake was statistic-wise typically higher. Upon acceptance, men had a statistic-wise typically higher result of the relative capacity than women, the same was true at discharge. Relative grip capacity at the time of remission was statistic-wise typically positively related to the relative grip capacity at the time of admission and negatively related to physical weight. The admission BI was in comparison to women statistic-wise typically higher at men. Remission BI was statistic-wise typically positively connected to admission BI, physiotherapy programme and mini nutritive anamnesis. On average, men were statistic-wise typically faster. Walking speed at the time of remission was statistic-wise typically positively related to BI at the time of admission, physiotherapy programme and relative grip capacity at the time of admission. It was negatively related to the patients' age.

Key words: fragility syndrome, ageing, sarcopenia, incapacity, physical activity.

Literatura/References:

1. Evans WJ, Paolisso G, Abbatecola AM et al (2010). Frailty and muscle metabolism dysregulation in the elderly. *Biogerontology*, 11: 527–36.
2. Fried LP, Walston J (2003). Frailty and failure to thrive. In: *Principles of Geriatric Medicine and Gerontology*. 5th Ed. Hazzard WR, Blass JP, Ettinger WH Jr, Halter JB, Ouslander J, eds. New York: McGraw-Hill; 1487–502.
3. Veninšek G (2011). Kako do optimalne oskrbe v bolnišnici – Celostna geriatrična ocena. V: Mencej M. *Bolezni in sindromi v starosti*. Ljubljana: Gerontološko društvo Slovenije, 91–112.

Takojšnji učinki masaže stopala na statično ravnotežje pri zdravih mladih preiskovancih

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Uvod: Predvideva se, da različne senzorne spodbude preko stopal, bodisi z masažo ali z vibracijami, vplivajo na izboljšanje ravnotežja (1). Namen raziskave je bil ugotoviti takojšnje učinke 5-7 minutne klasične terapevtske masaže stopala in gležnja na statično ravnotežje zdravih mladih preiskovancev. **Metode:** Testiranih je bilo 80 (71 žensk in 9 moških) preiskovancev, povprečne starosti 22,9 ($\pm 2,0$) let, s povprečnim indeksom telesne mase 21,6 ($\pm 2,4$). Po začetni izvedbi testa stoje na eni nogi na trdi podlagi z odprtimi in zaprtimi očmi (2) in na mehki podlagi z odprtimi in zaprtimi očmi (3), izmenično na eni in drugi nogi, smo masirali stopalo in gleženj ene noge po postopku, ki sta ga opisali Holey in Cook (4). Da bi zmanjšali učinek učenja in dominantnosti noge, smo nogo, ki je bila masirana in testirana, določili z žrebom. Po masaži smo ocenjevanje ravnotežja ponovili na masirani in nemasirani nogi. Naslednji dan smo celotni postopek ponovili, le da smo masirali drugo nogo. Za primerjavo povprečnih in najdaljših časov stoje podatkov pred in po masaži smo uporabili parni test t za odvisne vzorce. **Rezultati:** Pri testnem pogoju stoje na eni nogi na trdi podlagi z odprtimi očmi so preiskovanci že pred masažo dosegli najdaljši čas testa (45 sekund). Pri vseh drugih testnih pogojih so bili povprečni in najdaljši časi stoje preiskovancev po masaži višji kot pred masažo. Primerjava povprečnega časa stoje preiskovancev na masirani nogi pred masažo in po masaži je pokazala statistično pomembno izboljšanje na trdi podlagi z zaprtimi očmi prvi ($p \leq 0,01$) in drugi dan ($p \leq 0,01$), na mehki podlagi z odprtimi očmi samo prvi dan ($p \leq 0,05$) ter na mehki podlagi z zaprtimi očmi prvi ($p \leq 0,01$) in drugi dan ($p \leq 0,01$). Primerjava najdaljših časov stoje preiskovancev na masirani nogi pred masažo in po masaži je pokazala statistično pomembne razlike na trdi podlagi z zaprtimi očmi prvi ($p \leq 0,01$) in drugi dan ($p \leq 0,01$) ter na mehki podlagi z zaprtimi očmi prvi ($p \leq 0,01$) in drugi ($p \leq 0,05$) dan. Pri stoji na mehki podlagi z odprtimi očmi, statistično pomembnih razlik nismo ugotovili, ne prvi niti drugi dan. Pri stoji na nogi, ki je nismo masirali, nismo ugotovili statistično pomembnih razlik pri nobenem testnem pogoju niti prvi, niti drugi dan. **Zaključki:** Masaža stopala je vplivala na takojšnje izboljšanje statičnega ravnotežja pri stoji na eni nogi na trdi in mehki podlagi z zaprtimi očmi. Predvidevamo, da je na izboljšanje stoje na eni nogi po masaži vplival zvečan priliv iz receptorjev za dotik in pritisk ter proprioceptorjev s področja stopala in gležnja. Pri testnem pogoju na mehki podlagi z odprtimi očmi je bil učinek masaže manjši, saj se pri uravnavanju ravnotežja, ko postanejo somatosenzorne informacije manj zanesljive, zanašamo predvsem na vidni priliv (5). Obstaja potreba po raziskovanju kratkoročnih in dolgoročnih učinkov različnih somatosenzoričnih spodbud na izboljšanje ravnotežja pri zdravih in pri pacientih.

Ključne besede: ravnotežje, stoji na eni nogi, masaža gležnja in stopala.

The immediate effects of foot massage on static balance in young healthy subjects

Background: It is assumed that various sensory stimulations of feet, either massage or vibrations, can improve balance (1). The purpose of the study was to investigate immediate effects of 5-7 minute classical therapeutic massage of foot and ankle on static balance of healthy young subjects. **Methods:** A total of 80 subjects (71 females and 9 males), with mean age 22,9 (\pm 2,0) years, average body mass index 21,6 (\pm 2,4), were included in the study. Following one-leg stance test on firm surface with eyes open and closed (2), and on a compliant surface with eyes open and closed (3) with each leg, one foot was massaged according the described protocol (4). To minimise learning and dominance effect the leg which was tested and massaged first was determined by drawing lots. After massage of one foot, balance on each leg was tested again. The same testing procedure was repeated next day with massaging the other leg. The before and after massage average and maximal performance values were compared by a paired t-test for dependent patterns. **Results:** In one-leg stance test on firm surface with eyes open all subjects achieved the maximum testing time before the massage (45 sec). In all other testing conditions the average and maximal performance values of subjects increased after massage. The comparison of before and after massage data showed statistically significant improvement of average subject's performance time with the massaged leg stance on a firm surface with eyes closed on first and second day ($p \leq 0,01$; $p \leq 0,01$, respectively), on a compliant surface with eyes opened on first day only ($p \leq 0,05$), and on a compliant surface with eyes closed on first and second day ($p \leq 0,01$; $p \leq 0,01$, respectively). The comparison of maximal subject's values before and after the massage showed statistically significant differences for stance with the massaged leg on a firm surface with eyes closed on first and second day ($p \leq 0,01$; $p \leq 0,01$, respectively), and on a compliant surface with eyes closed on first and second day ($p \leq 0,01$; $p \leq 0,05$, respectively). No statistically significant difference was found for stance on a compliant surface with eyes opened neither on day one nor day two. For the non-massaged leg, no statistically significant difference was found in any of the test conditions. **Conclusions:** It can be concluded that foot massage had an immediate effect on improvement of balance during one-leg stance on firm and compliant surface with eyes closed. We anticipate that this is due to increased input from the receptors for light touch and pressure, and proprioceptors in the area of foot and ankle. In the test condition on a compliant surface with eyes open the effect of massage was minor, because balance control relies mainly on a visual input when somatosensory information becomes less reliable (5). There is a need for research of short- and long-term effects of different somatosensory stimulations on balance improvement in healthy people and patients.

Key words: balance, one-leg stance, ankle and foot massage.

Literatura/References:

1. Vaillant J, Rouland A, Martigne P, Braujou R, Nissen MJ, Caillat-Miousse JL, Vuillerme N, Nougier V, Juvin R (2009). Massage and mobilization of the feet and ankles in elderly adults: Effect on clinical balance performance. *Man Ther* 14 (6): 661–64.
2. Springer BA, Marin R, Cyhan T, Roberts H, Gill NW (2007). Normative values for the unipedal stance test with eyes open and closed. *J Geriatr Phys Ther* 30 (1): 1–7.
3. Emery CA, Cassidy JD, Klassen TP, Rosychuk RJ, Rowe BB (2005). Development of a clinical static and dynamic standing balance measurement tool appropriate for use in adolescents. *Phys Ther* 85 (6): 502–14.

Terapija z ogledalom pri pacientu s fantomsko bolečino po amputaciji – poročilo o primeru

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Uvod: Večina pacientov po amputaciji uda poroča o občutenju manjkajočega uda. Od 60 do 90 odstotkov vseh pacientov po amputaciji naj bi poročalo tudi o fantomski bolečini. To je bolečina amputiranega uda, ki največkrat preide v kronično bolečino in jo je težko zdraviti (1). Pacienti jo opisujejo kot krčevito, intenzivno in pekočo bolečino ter kot občutek nenormalnega položaja uda (2, 3). Fantomska bolečina pomembno zmanjšuje kakovost življenja teh oseb. Pri zdravljenju se uporabljajo zdravila in različne metode fizioterapije, tudi terapija z ogledalom. Na podlagi Ramachandranove teorije o delovanju terapije z ogledalom lahko s primerno vidno povratno informacijo (odsev neokvarjenega uda) vplivamo na zaznavanje na ravni možganov in posledično zmanjšamo bolečino (4). Namen poročila o primeru je bil dokazati učinkovitost terapije z ogledalom na zmanjšanje fantomske bolečine pri pacientu po nadkolenski amputaciji. **Metode:** Sodeloval je 35-letni pacient dva meseca po nadkolenski amputaciji z vsakodnevno fantomsko bolečino. Z enim delom vprašalnika za oceno proteze (angl. ProsthesisEvaluationQuestionnaire – PEQ) je bila ocenjena fantomska bolečina pred začetkom, enkrat na teden ter po štirih tednih terapije z ogledalom. Pacient je imel dvajset 15-minutnih terapij. Terapijo je izvajal v polsedečem položaju z ogledalom med obema iztegnjenima spodnjima udoma. Pacient je v ogledalu opazoval zdravi ud ter izvajal gib dorzalne in plantarne fleksije stopala. Poleg te terapije je izvajal še druge fizioterapevtske postopke in prejemal protibolečinska zdravila. **Rezultati:** Po štiritedenski terapiji z ogledalom se je fantomska bolečina zmanjšala. Zmanjšala sta se pogostost bolečine (nekajkrat na dan) in njeno trajanje (od nekaj minut do ene ure). Bolečina je postala manj moteča, zmanjšala se je tudi njena intenzivnost. **Zaključek:** Terapija z ogledalom je zmanjšala jakost, čas trajanja in pogostost fantomske bolečine. Je lahko dostopna ter cenovno ugodna rešitev pri zdravljenju fantomskih bolečin po amputaciji uda in se lahko uporablja tudi v domačem okolju. Potrebne so nadaljnje raziskave s širšo skupino pacientov po amputaciji, ki ne bi prejemale druge protibolečinske terapije, da bi z dokazi podprli učinkovitost terapije z zrcalom na fantomsko bolečino.

Ključne besede: fantomski ud, amputacija, zdravljenje, vprašalnik PEQ, fantomske zaznave.

Mirror therapy in a patient with the phantom limb pain – case report

Background: After the limb amputation, most patients report awareness of a phantom limb. Additionally, 60-90% of amputees report the phantom limb pain. This is a sensation of pain located in the amputated limb, which has a high rate of chronicity and is difficult to treat (1). They describe it as an intensive, burning, cramping pain and feeling of the phantom limb in sustained uncomfortable positions (2, 3). The phantom pain significantly reduces the quality of an amputee's life. Various methods are used for the treatment of physical and medical therapy and mirror therapy. On the basis of Ramachandran theory about mechanisms of mirror therapy, we can influence with suitable visual feedback (reflection unaffected limb) on perception at the brain level and consequently reduce pain (4). The purpose of this case report was to show the effectiveness of mirror therapy on pain reduction in patients with the above-knee amputation. **Methods:** A 35-year-old man two months after amputation above knee had severe phantom limb pain. The part of Prosthesis Evaluation Questionnaire (PEQ) was used at the beginning, between and at the end of the mirror therapy. All 20 15-minute treatments were distributed to four weeks. The therapy was carried out in half-sitting position, with a mirror placed between the lower extremities. The amputated limb was placed behind the mirror. With the unaffected leg he did movements of dorsal and plantar flexion of the ankle. During the mirror therapy he had other physiotherapy procedures and pain medicament therapy. **Results:** After four weeks of mirror therapy, the phantom limb pain decreased. Distraction, strength and duration of the phantom limb pain were reduced (from several minutes to one hour). **Conclusions:** The mirror therapy has influence on reduction of intensity, incidence and duration of the phantom limb pain. It is an accessible and cost-effective method for pain reduction and can be used in home environment. Further research with a wider group with no additional therapies to reduce pain is necessary to demonstrate the efficacy of the mirror therapy.

Key words: phantom limb, amputation, treatment, PEQ-questionnaire, phantomsensations.

Literatura/References:

1. Foell J, Bodman BR, Diers M, Flor H (2014). Mirrortherapyforphantom limb pain: Brainchangesandthe role ofbodyrepresentation. *EJP* 18: 729–39.
2. Nicole EA, Souvlis T, Moseley GL (2007). Stroke, complexregionalpainsyndromeandphantomlimbpain: cancommonalitiesdirect future management?. *J Rehabil Med* 39: 104–14.
3. Ramachandran RD, Ramachandran VS (1996). Synesthesia in phantomlimsinducedwithmirrors. *TheRoyalSociety* 263: 377–86.
4. Puh U, Hlebš S (2013).Učinki in mehanizmi delovanja terapije z ogledalom-pregled literature. *Zdrav Vestn* 82: 410–18.

Krepitev mišic z elektrostimulacijo za izboljšanje funkcije pri osebah z okvaro zgornjega motoričnega nevrona

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Uvod: S krepitvijo mišic vplivamo na maksimalno silo, ki jo mišica lahko razvije. Zmožnost mišice ustvariti maksimalno silo se nanaša na mišično moč, ki predstavlja jakost mišice (1). Vadba za povečanje moči mora temeljiti na načelu nadobremenitve, kar pomeni, da mora predstavljati večji stres za telo, kot ga je telo sicer vajeno. To pomeni, da mora biti vadba zadovoljive intenzivnosti, frekvence in trajanja (2). Za pridobivanje mišične zmogljivosti obstaja več metod. Ena izmed njih je tudi električna stimulacija. Kots je že leta 1973 opisal vlogo električne stimulacije mišic pri povečanju mišične zmogljivosti. Trdil je, da so možnosti za povečanje mišične sile z električno stimulacijo večje kot pri običajni vadbi z utežmi. Njegove trditve so povzročile veliko zanimanje in sprožile nadaljnje raziskave, ki so potrdile omenjene učinke električne stimulacije (3). Namen pregleda literature pod mentorstvom doc. dr. Darje Rugelj je bil ugotoviti, ali električna stimulacija okrepi mišice pri osebah z okvaro zgornjega motoričnega nevrona. **Metode:** Pregled literature je vključeval pregled raziskav, ki so raziskovale vpliv električne stimulacije na izboljšanje funkcije pri osebah z okvaro zgornjega motoričnega nevrona (možganska kap, multipla skleroza, poškodbe hrbtenjače in cerebralna paraliza). Najdenih in pregledanih je bilo 124 raziskav, od tega je vključitvenim merilom ustrezalo 23 raziskav. Objavljene so bile od leta 1979 do 2011. Na temo električne stimulacije ter cerebralne paralize in multiple skleroze je bilo vključenih 8 raziskav. Pri raziskavah, narejenih na osebah po možganski kapi, jih je bilo vključenih 9, pri poškodbah hrbtenjače pa 6 raziskav. **Rezultati:** Rezultati študij pri cerebralni paralizi so pokazali izboljšanje moči v vseh preiskovalnih skupinah (kontrolna, z električno stimulacijo, placebo hotena vadba (krepitev mišic brez električne stimulacije)) znotraj študij, med skupinami ni prišlo do razlik. Pri multipli sklerozi so raziskave pokazale izboljšanje mišične moči samo v skupinah, ki so imele kombinacijo stimulacije s hoteno vadbo. Pri študijah, narejenih na osebah po možganski kapi, je prišlo do izboljšanja moči pri vseh preiskovanih skupinah, vendar je bilo izboljšanje moči največje pri skupini z električno stimulacijo. Rezultati v raziskavah na osebah po poškodbi hrbtenjače poročajo o nasprotujočih si rezultatih. **Zaključki:** Kljub dejstvu, da je pri vseh bolezenskih stanjih značilna okvara zgornjega motoričnega nevrona in da so študije med boleznimi uporabljale podobne metode in načela krepitve mišic, so samo študije, narejene na osebah po možganski kapi, imele boljše rezultate v prid električni stimulaciji. Potrebni je več raziskav glede krepitve mišic z električno stimulacijo pri osebah z okvaro zgornjega motoričnega nevrona.

Ključne besede: Električna stimulacija, krepitev, mišična moč, okvara zgornjega motoričnega nevrona.

Strengthening of muscle with electrical stimulation to improve function in persons with spinal cord injury

Introduction: When we strengthen the muscles, we influence the maximal force, which a muscle can develop. The ability of the muscle to create the maximum force refers to the muscular strength, which represents the intensity of the muscle (1). Strength training is based on overload principle, which means that the body has to be exposed to a bigger work stress than it is used to. The exercise has to be of sufficient intensity, duration and frequency. (2). There are several methods for muscle strengthening. One of them is electrical stimulation. As early as in 1973, Kots presented an article, in which he described the use of muscle electrical stimulation in muscle strengthening. He claimed that the possibilities for increasing muscle strength with electrical stimulation are greater than with regular exercise with weights. This caused a lot of interest and further research, which confirmed these effects of electrical stimulation (3). The purpose of the literature research under the mentorship of Darja Rugelj, PhD, was to find out if electrical stimulation strengthens the muscles after upper motor neuron injury. **Methods:** The literature research thesis is based on the expert and scientific literature research, which investigated whether muscle electrical stimulation improves function after motor neuron injury (brain stroke, multiple sclerosis, spinal cord injury, cerebral palsy). Based on the key words, I have found and researched 124 studies and 23 researches among them have met the criteria for integration. They were published from 1979 to 2011. The topics cerebral palsy and multiple sclerosis were included in eight researches. There were nine researches, which included the topic stroke, and six were adequate for spinal cord injuries. **Results:** The results of the cerebral palsy studies showed improvement in strength inside all researched groups (control, with electrical stimulation, placebo, strengthening exercise); there were no differences between the groups. The researches of multiple sclerosis have showed that the improvement of muscular strength has been done only in the groups, which had a combination of stimulation with weight training. The studies on the persons after brain stroke have showed improvement of strength with all groups. However, the improvement has been better with stimulation group. The studies on the persons with spinal cord injuries have showed opposite results. **Conclusion:** Despite the fact that all diseases are caused by upper motor neuron injury, and that studies used similar methods and principles of muscle strengthening, only the studies on the persons after brain stroke achieved better results in the electrical stimulation group. However, the fact is that more studies should be done.

Key words: Electric stimulation, strengthening, muscle strength, injury of upper motor neuron.

Literatura/References:

1. Knuttgen HG, Komi PV (1994). Basic definitions for exercise. In: Komi PV, eds. Strength and power in sport. The encyclopaedia of sports medicine. Australia: Blackwell Science, 3–6.
2. Åstrand PO, Rodahl K (1986). Textbook of work physiology. Physiological bases of exercise. 3th ed. United States of America: McGraw-Hill.
3. Kocjan D (2002). Primerjava različnih oblik električne stimulacije skeletnih mišic. Diplomsko delo. Ljubljana: Visoka šola za zdravstvo.

Vpliv sprostitvenih metod na psiho-fiziološko stanje zdravih nosečnic in nosečnic z visokim tveganjem – pregled literature

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Uvod: Zdrave nosečnice in nosečnice z visokim tveganjem se v svoji nosečnosti velikokrat srečajo s stresnimi situacijami, ki povzročijo anksiozno ali depresivno razpoloženje, se počutijo napete, utrujene in se celo sprašujejo, ali bodo zmogle prenesti vse to (1, 2). Sprostitvene metode, ki jih uporabljajo med nosečnostjo, prispevajo k izboljšanju psihičnega stanja in fizioloških sprememb ter zmanjšanju zapletov, ki se lahko pojavijo v nosečnosti (3). Namen pregleda literature je bil na podlagi pregleda domače in tuje strokovne ter znanstvene literature ugotoviti, kakšen vpliv ima sproščanje na psihično stanje in fiziološke spremembe pri zdravih nosečnicah in nosečnicah z visokim tveganjem ter kakšen je vpliv sprostitve na zmanjšanje zapletov pri nosečnicah z visokim tveganjem. **Metode:** Iskanje tuje in domače strokovne ter znanstvene literature je potekalo na internetu z brskalniki ter elektronskimi bazami podatkov in z ročnim iskanjem v knjižnicah Univerze v Ljubljani, Zdravstvene fakultete in Medicinske fakultete. Iskanje literature je bilo omejeno na angleški, hrvaški in slovenski jezik ter na članke med letoma 2005 in 2012. Metodologija raziskovanja je vključevala randomizirane nadzorovane raziskave, randomizirane eksperimentalne raziskave, kvazi eksperimentalne raziskave, eksperimentalne raziskave, nadzorovane klinične raziskave in pilotne randomizirane nadzorovane raziskave, ki so ugotavljale učinke sprostitve na izboljšanje psiho-fizioloških sprememb zdravih nosečnic in nosečnic z visokim tveganjem ter zmanjšanje nosečniških zapletov nosečnic z visokim tveganjem. **Rezultati:** Po iskalni strategiji je merilom izbora ustrezalo trinajst raziskav. Od teh je pet raziskav proučevalo vpliv sprostitvenih metod na psihično stanje in fiziološke spremembe nosečnic brez nosečniških zapletov, štiri raziskave so ugotavljale vpliv sprostitvenih metod na psihično stanje in fiziološke spremembe nosečnic z visokim tveganjem, štiri raziskave pa so raziskovale vpliv sprostitvenih metod na zmanjševanje zapletov pri nosečnicah z visokim tveganjem. V raziskavah so sodelovale ženske v obdobju nosečnosti, med katerimi je bilo skupaj 578 zdravih nosečnic in 764 nosečnic z visokim tveganjem. Preiskovanke so bile deležne različnih sprostitvenih metod, ki so bile zelo preproste, neinvazivne in nizkstroškovne, kar je omogočilo lažji dostop vsem nosečnicam. Uporabljene so bile progresivna mišična relaksacija, vodena imaginacija, preponsko dihanje, glasba in joga. Rezultati raziskav so pokazali, da slednje sprostitvene metode vplivajo na zmanjšanje anksioznega ter depresivnega stanja in izboljšanje počutja. Prav tako so pripomogle k zmanjšanju stresnih hormonov, izboljšanju kardiovaskularnega sistema, podaljšanju nosečnosti ter zmanjšanju zapletov prezgodnjih porodov. **Sklep:** Sprostitvene metode se med seboj razlikujejo predvsem v načinu izvedbe. Njihov osnovni namen je zavestna sprostitvev s pripadajočimi fiziološkimi spremembami in izboljšanim duševnim počutjem. Ukvarjanje s sprostitvijo med nosečnostjo lahko nosečnicam omogoči boljši potek nosečnosti, razvoj ploda, lažji porod in hitrejšo okrevanje po porodu. Tako lahko glede na rezultate pregledanih raziskav zaključimo, da je izvajanje različnih sprostitvenih metod med nosečnostjo uspešen način za izboljšanje psihičnega stanja in fizioloških sprememb ter za zmanjšanje zapletov, ki se pojavijo v nosečnosti.

Ključne besede: nosečnost, stres, anksioznost, depresija, sprostitvev v nosečnosti.

Relaxation methods impact on psycho-physiological state in healthy and high-risk pregnant women – literature review

Introduction: Healthy and high-risk pregnant women in their pregnancy are often confronted with stressful situations that cause anxiety or depression, they feel tense, tired and even wondering if they are able to handle all of this (1,2). Relaxation methods they use during pregnancy contribute to improving the psychological state and physiological changes and reduce complications that can occur during pregnancy (3). The purpose of the thesis is based on a review of domestic and foreign professional and scientific literature to determine the impact of the release on mental state and physiological changes in healthy and high-risk pregnant women and the influence of relaxation on reducing complications in high-risk pregnant women. **Methods:** Search for domestic and foreign scientific and professional literature was conducted through the internet with web browsers and electronic databases and hand searching in libraries of the University of Ljubljana, Faculty of Health Sciences and the Faculty of Medicine. Literature search was limited to English, Croatian and Slovenian language as well as articles between 2005 and 2012. The Methodology of research included randomised controlled studies, randomised experimental researches etc. Their aim was to determine the effect of relaxation on improvement of psychophysiological changes of healthy pregnant women and high-risk pregnant women as well as on reducing the complications that occur during pregnancy. **Results:** According to the search strategy, 13 studies complied with the inclusion criteria. Five of these studies examined the impact of relaxation methods on the mental condition and the physiological changes of pregnant women with no pregnancy complications, four studies examined the impact of relaxation methods on the mental condition and physiological changes of women having high-risk pregnancies, while the remaining four studies focused on the impact of relaxation methods on the reduction of complications in women having high-risk pregnancies. The studies involved pregnant women, among them 578 healthy pregnant women and 764 women having high-risk pregnancies. The women practiced various simple, non-invasive and low-cost relaxation techniques which made them therefore easier accessible to all pregnant women. The techniques included progressive muscle relaxation, conducted imagination, diaphragmatic breathing, music and yoga. The study results indicated that different forms of relaxation methods contributed to the improvement of the mental condition and the physiological changes of healthy pregnant women as well as women with high-risk pregnancies, and that they also reduced complications that developed during pregnancy. **Conclusion:** Relaxation contributes to bringing the body, mind, emotions and spirit into balance, which improves the course of pregnancy, the development of the foetus and helps make giving birth easier. It also contributes to faster recovery after delivery. On the basis of the results it can therefore be concluded that practising various relaxation methods during pregnancy is a successful way to improve a woman's mental condition, her physiological changes and to reduce complications that might develop during pregnancy.

Key words: pregnancy, stress, anxiety, depression, relaxation during pregnancy.

Literatura/References:

1. Bastani F, Hidarnia A, Kazemnejad A, Vafaei M, Kashanian M (2005). A randomized controlled trial of the effects of applied relaxation training on reducing anxiety and perceived stress in pregnant women. *JMWH* 50 (4): 36–40.
2. Haslam J (2004). Physiology of pregnancy. In: Mantle J, Haslam J, Barton S, eds. *Physiotherapy in obstetrics and gynaecology*. Edindburgh Ltd: Butterworth Heinemann, 27–52.
3. Urech C, Fink N, Hoesli I, Wilhelm F, Bitzer J, Alder J (2010). Effects of relaxation on psychobiological wellbeing during pregnancy: A randomized controlled trial. *PNE* 35 (9): 1348–55.

Učinkovitost medeničnega pasu in fizioterapevtskih nasvetov pri nosečnicah z bolečino v medeničnem obroču

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Uvod: Bolečina v medeničnem obroču (BMO) je posebna oblika bolečine v križu, ki se lahko pojavi ločeno ali v povezavi z bolečino v križu. Približno 20 odstotkov žensk med nosečnostjo občuti bolečino v medeničnem obroču (1). Take nosečnice lahko varno zdravimo v kateri koli višini nosečnosti (2). V literaturi je za bolečino v medeničnem obroču navedenih veliko različnih vrst zdravljenja, namenjenih obvladovanju bolečine in zmanjšanju nezmožnosti žensk s tovrstno bolečino (3). Namen: Namen raziskave je bil ugotoviti učinkovitost medeničnega pasu in fizioterapevtskih nasvetov pri nosečnicah z bolečino v medeničnem obroču. **Metode:** Raziskava je potekala v Porodnišnici Ljubljana. Od 83 nosečih prostovoljk je bilo v raziskavo glede na vključitvena in izključitvena merila vključenih 43 nosečih prostovoljk z bolečino v medeničnem obroču med 18. in 37. tednom nosečnosti. Tri nosečnice so od raziskave odstopile. Nosečnice so bile z žrebom naključno razdeljene v skupino s fizioterapevtskimi nasveti in medeničnim pasom (N = 21) in v skupino z nasveti (N = 19). Podatke o nosečnici in bolečini v medeničnem obroču smo pridobili s strukturiranim vprašalnikom, intenzivnost bolečine pa smo ocenjevali z vizualno analognost lestvico (4). Ocenjevanje smo izvedli na začetku raziskave in ga ponovili čez dva tedna. Uporabili smo statistične metode Anova, Pearsonov Hi-kvadrat, Pearsonovo korelacijo, test t za odvisna vzorca in Wilcoxonov test vsote rangov. **Rezultati:** Medenični pas se je v kombinaciji s fizioterapevtskimi nasveti pri lajšanju povprečne bolečine v medeničnem obroču v nosečnosti izkazal kot statistično pomembno bolj učinkovit kot samo fizioterapevtski nasveti ($p = 0,009$). Ugotovljeno je bilo, da pri lajšanju tovrstne bolečine v nosečnosti, ko je ta najhujša, medenični pas v kombinaciji s fizioterapevtskimi nasveti ni bolj učinkovit kot samo fizioterapevtski nasveti. Medenični pas v kombinaciji s fizioterapevtskimi nasveti ni vplival na večje zmanjšanje števila bolečih predelov in števila dnevni aktivnosti kot samo fizioterapevtski nasveti. V skupini z medeničnim pasom in fizioterapevtskimi nasveti se je število pozitivnih kliničnih testov statistično pomembno zmanjšalo ($p = 0,003$), v skupini s fizioterapevtskimi nasveti pa je ostalo nespremenjeno. **Zaključki:** Rezultati so pokazali, da je medenični pas v kombinaciji s fizioterapevtskimi nasveti pri lajšanju povprečne bolečine v medeničnem obroču v nosečnosti bolj učinkovit kot samo fizioterapevtski nasveti. Na podlagi pridobljenih rezultatov in visoke prevalence bolečine v medeničnem obroču v nosečnosti so potrebne nadaljnje randomizirane kontrolirane raziskave s področja učinkovitosti različnih fizioterapevtskih postopkov za zdravljenje bolečine v medeničnem obroču v nosečnosti, s katerimi bi lahko pripomogli k nadaljnjemu razvoju smernic za njeno zdravljenje v nosečnosti.

Ključne besede: bolečina v medeničnem obroču, nosečnost, medenični pas, nasveti, fizioterapija.

Effect of pelvic belt and physiotherapy advice on pain in pregnant women with pelvic girdle pain

Background: Pelvic girdle pain (PGP) is a specific form of low back pain that can occur separately or in conjunction with low back pain. Estimates of the prevalence of PGP in pregnancy suggest that at least 20% of women experience PGP during pregnancy (1). It can be treated safely at any stage during pregnancy (2). A number of research studies have attempted to identify best intervention and prevention practices for these dysfunctions (3). The purpose of the study was to determine the efficacy of pelvic belt and physiotherapy advice in pregnant women with PGP. **Purpose:** The purpose of the study was to determine the efficacy of pelvic belt and physiotherapy advice in pregnant women with PGP. **Methods:** The study was conducted in the Maternity hospital in Ljubljana. The eligibility criteria ruled in 43 participants out of the cohort of 83 women in their 18 to 37 weeks of pregnancy. Three pregnant women declined their participation in the study. The participants were randomly assigned to physiotherapy advice plus non-rigid pelvic belt (N=21), and to physiotherapy advice alone (N=19). The data about the pregnant women and PGP were recovered through a structured questionnaire and the pain intensity was assessed with visual analogue scale. The assessment was carried out at the beginning of the study and repeated after two weeks. Statistical analysis included Anova, Pearson's chi-squared test, Pearson's correlation, paired samples t-test and Wilcoxon signed-ranks test. **Results:** Results of the study show that physiotherapy advice plus non-rigid pelvic belt was statistically significantly more effective in the treatment of the average PGP in pregnancy than physiotherapy advice alone ($p=0.009$). In cases of worst PGP in pregnancy, the pelvic girdle belt in conjunction with physiotherapy advice was not statistically significantly more effective than physiotherapy advice alone. The combination of therapeutic approaches also did not statistically significantly decrease the number of painful areas and the amount of daily living activities as compared to physiotherapy advice alone. In the group treated with physiotherapy advice plus non-rigid pelvic belt, the number of positive clinical tests was statistically significantly reduced in the second assessment ($p=0.003$), while in the physiotherapy advice group it remained the same. **Conclusions:** Results of the study show that the pelvic belt in conjunction with physiotherapy advice is more efficient in alleviating the average PGP in pregnancy than physiotherapy advice alone. Taking into consideration the results of the study and the high prevalence of the PGP in pregnancy, further randomised controlled trials need to be undertaken to determine the efficacy of different physiotherapeutic approaches in the treatment of PGP in pregnancy and to further develop the guidelines for its management during pregnancy.

Key words: pelvic girdle pain, pregnancy, pelvic belt, advice, physiotherapy.

Literatura/References:

1. Vleeming A, Albert HB, Östgaard HC, Sturesson B, Stuge B (2008). European guidelines for the diagnosis and treatment of pelvic girdle pain. *Eur Spine J* 17 (6): 794–819.
2. The Association of Chartered Physiotherapists in Women's Health (2011). Pregnancy-related pelvic girdle pain. Guidance for health professionals: 1–20.
3. Pennick V, Liddle SD (2013). Interventions for preventing and treating pelvic and back pain in pregnancy. *Cochrane Database Syst Rev* (8): CD001139.
4. Patricia A, McGrath PA, Cheryl E, Seifert CE, Speechley KN, Booth JC, Stitt L, Gibson MC (1996). A new analogue scale for assessing children's pain: an initial validation study. *Pain* 64 (3): 435–43.

Pojavnost stresne urinske inkontinence med fizioterapevti v Univerzitetnem kliničnem centru Maribor

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Uvod: Stresna urinska inkontinenca (SUI) je nehoteno uhajanje urina pri fizičnih aktivnostih, kot so dvigovanje bremen in športne aktivnosti, ter pri kihanju ali kašljanju (1). Z izvajanjem vaj za krepitev mišic medeničnega dna (MMD) kot preventiva pred stresno urinsko inkontinenco, se lahko bistveno izboljša kakovost življenja (2). Z našo raziskavo smo želeli ugotoviti pojavnost stresne urinske inkontinence med fizioterapevti v primerjavi z medicinskimi sestrami, zaposlenimi v UKC Maribor. **Metode:** Uporabili smo anketni vprašalnik, ki je obsegal 20 vprašanj večinoma zaprtega tipa. Raziskovalni vzorec je vključeval 48 fizioterapevtov in fizioterapevtek, starih od 20 do 60 let, zaposlenih v UKC Maribor. **Rezultati:** Dobljene rezultate smo primerjali z raziskavo, opravljeno o pojavu stresne urinske inkontinence pri medicinskih sestrah v UKC Maribor, iz leta 2008 (3). Glede na dejavnik tveganja pri opravljanju poklica, kot je opravljanje težjih fizičnih opravil, smo z raziskavo ugotovili, da se stresna urinska inkontinenca pogosteje pojavlja pri medicinskih sestrah kot pri fizioterapevtih. Med drugim smo ugotovili tudi, da so fizioterapevti v primerjavi z medicinskimi sestrami bolje seznanjeni in ozaveščeni glede pomena in učinkov izvajanja vaj za krepitev mišic medeničnega dna. **Zaključek:** Tako fizioterapevti kot medicinske sestre bi si morali prizadevati za večjo promocijo kontinence in širjenje ustreznih informacij o preprečevanju pojavnosti inkontinence. Večji poudarek bi moral biti namenjen izvajanju vaj za krepitev mišic medeničnega dna, ki se svetujejo kot prvi izbor v konzervativnem zdravljenju stresne in drugih tipov urinske inkontinence.

Ključne besede: stresna urinska inkontinenca, dejavniki tveganja, mišice medeničnega dna, fizioterapevti.

Occurrence of urinary stress incontinence in physiotherapists in University clinical center Maribor

Introduction: Stress urinary incontinence (SUI) is involuntary urinary leakage, which occurs with physical activity such as lifting heavy objects, sports activities, sneezing and coughing (1). Regular exercising of pelvic floor muscles (PFM) as a preventive measure of SUI may aid to improvement of quality of life (2). The aim of our research was to examine the occurrence of SUI among physiotherapists employed at UKC Maribor. **Methods:** For this purpose, a questionnaire with 20 questions, of mainly closed type, was used. 48 physiotherapists, aged 20-60 years and employed at UKC Maribor were included. **Results:** Our results were compared with results of the research on occurrence of SUI among nurses at UKC Maribor made in 2008 (3). Taking into account the risk factors of the profession, SUI at the work place occurs more common in nurses than in physiotherapists. Results also confirm, that physiotherapists, compared to nurses, are more familiar with the purpose and effect of exercises for PFM strengthening. **Discussion:** As health professionals, both professions should strive for the promotion of continence, dissemination of relevant information on the prevention of incontinence. Bigger emphasis should be put to the importance of PFM exercises, which are recommended as first-line treatment in conservative management programs for women with stress and other types of urinary incontinence.

Key words: stress urinary incontinence, risk factors, pelvic floor muscles, physiotherapists.

Literatura/References:

1. Deepak P, Kumar TN, Sen TK (2011). Evaluation of efficacy of duloxetine in stress urinary incontinence in women. *Indian J Pharmacol.* 43 (2): 176–9.
2. Ghaderi F, Oskouei AE (2014). Physiotherapy for women with stress urinary incontinence: a review article. *J Phys Ther Sci.* 26 (9): 1493–9.
3. Rodeš B (2008). Stresna urinska inkontinenca pri medicinskih sestrah glede na dejavnike tveganja v našem poklicu. V: 80 let hospitalne ginekologije in porodništva v Mariboru. Mednarodni znanstveni simpozij, Maribor. Univerzitetni klinični center Maribor: 691–706.

Fizioterapevtska obravnava pri disfunkciji odvajanja blata – poročilo o primeru

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Uvod: Zaprtje je subjektiven izraz, ki se uporablja za opis težav pri odvajanju blata, bodisi zaradi nerednega odvajanja majhnih količin trdega blata bodisi zaradi čezmernega napenjanja med odvajanjem ali obojega (1). Prevalenca zaprtja pri odraslih ženskah je med 3 in 17 odstotki. Številni dejavniki, ki so povezani z zaprtjem, so povezani tudi s slabšo funkcijo mišic medeničnega dna. Ponavljajoče se čezmerno napenjanje med odvajanjem blata lahko poslabša že prisotno slabšo funkcijo, kar ima lahko za posledico šibkost mišic medeničnega dna, čezmeren spust presredka med napenjanjem in sekundarne anatomske spremembe (2). **Prikaz primera:** 32-letna pacientka je bila napotena na fizioterapijo z napotno diagnozo zaprtje. Težave so se začele pred nekaj leti, ko je nekega dne zavrla poziv na blato in po tem dogodku deset dni ni odvajala. Neredno odvajanje blata se je občasno še ponovilo. Pred dvema letoma pa so se težave začele stopnjevati do te mere, da je blato odvajala samo enkrat na teden, in še to le z vbrizganjem vode v rektum. Konsistenca blata je bila navadno trda (ocena 1 po lestvici Bristol) (3), zato je bilo pri odvajanju blata prisotno čezmerno napenjanje. Pacientka je predhodno že opravila kolonoskopijo in ultrazvok abdomna, ki nista pokazala posebnosti. Opravila je tudi magnetnoresonačno dinamično slikanje medeničnega dna, ki je pokazalo relaksacijo medeničnega dna prve stopnje (blaga), prolaps rektuma druge stopnje (zmeren) in blago anteriorno rektokelo. Fizioterapevtski pregled je obsegal oceno perineja, anusa, vagine in anorektuma v mirovanju, med kontrakcijo mišic medeničnega dna in med napenjanjem navzdol. Pri napenjanju se je pojavil spust perineja, večji od 2 do 3 cm. Pri rektalnem pregledu smo ugotovili blago paradokšno kontrakcijo mišic medeničnega dna. Pri oceni vzorca odvajanja blata smo ugotovili nepravilen vzorec z nepravilnim položajem telesa in čezmerno koncentrično aktivnostjo mišice rectus abdominis. Fizioterapevtska obravnava je vključevala učenje pravilnega vzorca odvajanja blata, katerega namen je bil povečati anorektalni kot in zmanjšati čezmerno napenjanje. Za učenje relaksacije mišic medeničnega dna smo uporabili biološko povratno zvezo z rektalno EMG-sondo. Za simulacijo odvajanja blata smo uporabili rektalni balon, napolnjen z vodo. Pri tem smo pacientko naučili tehnik za stabilizacijo perineja in korekcijo rektokele med napenjanjem. Fizioterapevtska obravnava traja pol leta, enkrat na mesec in še ni končana. Pacientka zdaj poroča o občasnem odvajanju tudi dvakrat na teden, pri odvajanju ji ni treba vedno vbrizgavati vode v rektum. Paradokсна kontrakcija mišic medeničnega dna je ob poskusu odvajanja navzoča le še občasno, koncentrična kontrakcija mišice rectus abdominis pa ne več. Pri večini poskusov odvajanja blata rektalni balon, napolnjen z vodo, pacientki izpade iz rektuma. Pacientka je na zbirniku za oceno zaprtja (4) pred fizioterapijo zbrala 25 točk (od možnih 30 točk), po pol leta pa 19 točk (nad 15 točk je zaprtje). **Zaključki:** Zaradi večletnega čezmernega napenjanja med odvajanjem blata so pri pacientki verjetno nastale anatomske spremembe medeničnega dna, ki so bile ugotovljene s preiskavami. Posledica je bil spremenjen vzorec odvajanja. Cilj fizioterapevtske obravnave je bil vzpostaviti pravilen vzorec odvajanja z namenom učinkovite izpraznitve rektuma in preprečevanja nastanka sekundarnih anatomskih sprememb. V pol leta je pacientka vzpostavila pravilen vzorec odvajanja, ki se kaže tudi v učinkovitejšem in pogostejšem odvajanju blata.

Ključne besede: disfunkcija odvajanja blata, zaprtje, ocena vzorca odvajanja blata, vadba, biološka povratna zveza.

Physiotherapy treatment in bowel dysfunction – case report

Introduction: Constipation is a subjective term used to describe difficulty in defecation, either because of the infrequent passage of small hard stools, or because of straining at defecation, or both (1). The prevalence of constipation in adult women is between 3 and 17%. Many of the factors that are associated with constipation are also linked to dysfunction of the muscles of the pelvic floor. Repeated straining at stool is thought to exacerbate the damage, and can result in weakness of the pelvic floor, perineal descent during straining, and secondary anatomical changes (2). **Case report:** A 32-year-old nulliparous patient was referred to physiotherapy due to constipation. The problems started a few years ago when she voluntarily restrained a call to stool and has then not defecated for 10 days. Her irregular bowel movements repeated occasionally. Two years ago the issue escalated to the point that she could only defecate once a week with the help of injecting water into the rectum. The consistency of the stool was usually hard (Type 1 on the Bristol scale) (3), which caused excessive straining while passing stools. The patient previously underwent a colonoscopy and abdominal ultrasonography, which were both unremarkable. The patient had a dynamic MRI scan that showed a Stage 1 pelvic floor relaxation (mild), Stage 2 rectal prolapse (moderate) and a mild anterior rectocele. Physiotherapy examination included an assessment of the perineum, anus, vagina and anorectum at rest, during a contraction of the pelvic floor muscles and during straining. The following is a summary of our findings: during straining there is an occurrence of perineal descent of more than 2 to 3 cm; rectal examination revealed a mild paradoxical contraction of the pelvic floor muscles; assessment of her defecation pattern revealed an incorrect pattern of bowel movements with an incorrect body position and excessive concentric activity of rectus abdominis muscle. Physiotherapy treatment included teaching the patient the correct pattern of bowel movements, the purpose of which was to increase the anorectal angle and reduce excessive straining. We taught relaxation of the pelvic floor muscles using biofeedback with an EMG rectal probe. For the stimulation of the bowel movements, we used a rectal balloon filled with water. At the same time we taught the patient techniques for stabilizing the perineum and correcting the rectocele during straining. We have been treating the patient for half a year now, with once a month visits, the treatment is still ongoing. The patient reports that now occasionally she defecates twice a week and it is not always necessary to inject water into the rectum. Paradoxical contraction of the pelvic floor muscles is only present occasionally during bowel movements; concentric contractions of rectus abdominis muscle are not present any more. During most bowel movements the rectal balloon, filled with water, falls out of the rectum. The Constipation System Score improved from 25 (out of a possible 30) to 19 (4). **Conclusions:** Due to several years of excessive straining during bowel movements there were anatomical changes of the pelvic floor, which were established through various diagnostic procedures. The changes led to a changed pattern of bowel movements. The aim of the physiotherapy treatment was to establish a correct pattern of bowel movements for the purpose of efficiently emptying the rectum and to prevent the occurrence of secondary anatomical changes. In a period of six months, the patient has established the correct pattern of defecation, which also reflected in more efficient and more frequent bowel movements.

Key words: dysfunctional defecation, constipation, assessment of defecation pattern, training, biofeedback.

Literatura/References:

1. Chiarelli PE. Constipation. In: Laycock J, Haslam J, eds. (2008). Therapeutic management of incontinence and pelvic pain. Pelvic organ disorders. London: Springer-Verlag London Limited: 213–22.
2. Swash M, Snooks SJ, Henry MM (1985). Unifying concept of pelvic floor disorders and incontinence. *J R Soc Med*: 78: 906–11.
3. Amarenco G. (2014). Bristol Stool Chart. Prospective and monocentric study of "stools introspection" in healthy subjects. *Prog Urol* 14: 24: 708–13.
4. Agachan F, Chen T, Pfeifer J, Reissman P, Wexner SD (1996). A constipation scoring system to simplify evaluation and management of constipated patients. *Dis Colon Rectum* 39: 681–5.

Vadba mišic medeničnega dna pred zaporo sigmoidstome – dvojno poročilo o primeru

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Uvod: Vadba mišic medeničnega dna se uporablja za ohranjanje in izboljšanje funkcije mišic medeničnega dna (1). Prikazana sta dva primera, v katerih je bila vadba mišic medeničnega dna indicirana za izboljšanje funkcije mišic medeničnega kot priprava na odstranitev sigmoidstome, po poškodbi oziroma abscesu anusa. **Prikaz primera 1:** Petnajstletni fant je zbolel za akutno T-celično limfoblastno levkemijo. Zdravljen je bil s kemoterapijo. Ko je bila levkemija že v remisiji, se je razvil perianalni absces, zaradi katerega je prišlo do septičnega šoka, ob tem gangrena perineja. Vstavljena je bila sigmoidstoma. Zaradi dolgotrajne potrebe po mehanski ventilaciji je bila nato opravljena perkutana traheostoma. Začel je prejemati oralno vzdrževalni odmerek kemoterapevtika. Po stabilizaciji kliničnega stanja in ozdravitvi okužbe so opravili kožno kritje rektosakralnega predela. Po kemoterapiji je prišlo tudi do nevropatije in parapareze. Po enomesečni rehabilitaciji je bil pacient sposoben samostojne hoje z berglami. Bil je napoten na fizioterapijo zaradi vadbe mišic medeničnega dna pred odstranitvijo sigmoidstome. Jakost kontrakcije mišic medeničnega dna je bila 2 (ocenjeno po lestvici Oxford (2)), vzdržljivost kontrakcije je bila 2 (ocenjena po shemi Perfect). V začetku je pacient izvajal vadbo mišic medeničnega dna z biološko povratno zvezo ambulantno in doma, pozneje samo ambulantno (3). V pol leta je imel pacient deset obravnav. Po končanih obravnavah je bila ocena jakosti kontrakcije mišic medeničnega dna 4, vzdržljivost kontrakcije pa 10. Po kirurški zapori sigmoidstome je bil pacient kontinenten, prav tako ni imel težav z odvajanjem blata. **Prikaz primera 2:** Trinajstletni fant je padel iz 12. nadstropja in utrpel številne notranje poškodbe. Potrebno je bilo operativno zdravljenje raztrganja aorte, poškodbe pljuč in jeter, odstranjena je bila vranica. Operativno so korigirali avulzijo anusa, narejena je bila sigmoidstoma. Poškodba mehkih tkiv v glutealnem predelu je bila prekrita z režnjem. Operativno so bili zdravljeni zlomi medenice in stegenice. Ugotovljena je bila huda okvara živcev spodnjih udov. Po stabilizaciji kliničnega stanja je bil vključen v program rehabilitacije, nato pa napoten na fizioterapijo zaradi vadbe mišic medeničnega dna pred odstranitvijo sigmoidstome. Pacient je med obravnavo še vedno potreboval pomoč pri dnevni opravih. Jakost kontrakcije mišic medeničnega dna je bila 1 (ocenjeno po lestvici Oxford (2)), vzdržljivost kontrakcije 2 (ocenjena po shemi Perfect). Pacient je v začetku ambulantno in doma izvajal vadbo mišic medeničnega dna z biološko povratno zvezo (3). V štirih mesecih je imel pet obravnav. Fizioterapevtska obravnava je bila nato prekinjana zaradi operativnega posega na sapniku. Pričakujemo, da bosta funkcija in zmogljivost mišic medeničnega dna v dveh mesecih na taki stopnji, da bo pacient pripravljen na zaporo stome in da ne bo imel težav z inkontinenco in/ali odvajanjem blata. **Zaključki:** Vzrok nastanka težav v perinealnem predelu je bila pri naših pacientih različna, vendar z enako posledico, in sicer vstavitvijo sigmoidstome. Cilj fizioterapevtske obravnave v obeh primerih je bil izboljšati funkcijo mišic medeničnega dna in tako zagotoviti kontinenco po zapori stome.

Ključne besede: mišice medeničnega dna, sigmoidstoma, ocena, vadba, izboljšanje funkcije.

Pelvic floor muscle training before a sigmoid colostomy reversal – two case reports

Introduction: Pelvic floor muscle training is indicated to maintain and improve the function of the pelvic floor muscles (1). Two case reports are presented where pelvic muscle floor training is indicated to improve the function of the pelvic muscles in preparation for the removal of sigmoid colostomy after an injury or anal abscess. **Case report 1:** A 15-year-old boy suffered from acute T-cell lymphoblastic leukemia and was treated with chemotherapy. As the leukemia was already in remission, he developed a perianal abscess, causing septic shock due to perineum gangrene. He underwent sigmoid colostomy surgery. Due to the long-term need for mechanical ventilation a percutaneous tracheostomy was made. He began to receive a maintenance dose of the chemotherapeutic agent orally. After stabilization of the clinical status and infections a skin graft was placed to cover the recto-sacral defect. He also suffered from paraparesis due to the chemotherapy. After one month of rehabilitation he was able to walk with crutches independently. He was referred to physiotherapy in order to exercise the pelvic floor muscles before reversing the sigmoid colostomy. The strength of muscle contractions was measured as 2 (according to the Oxford scale) (2) and contraction endurance with a value of 2. At first the patient performed pelvic floor muscle training with biofeedback at the outpatient clinic and at home, later on just at the outpatient clinic. He had 10 treatments in a half-year period. At the end of the treatment the strength of the pelvic floor muscle's contractions was evaluated at 4 and the endurance with a 10. After the reversal of the sigmoid colostomy the patient had no continence problems and normal bowel movements. **Case report 2:** A 13-year-old boy fell from the 12th floor resulting in numerous internal injuries. He underwent surgical treatment of a rupture of the aorta, lung damage and liver, the spleen was removed. Anorectal avulsion was performed along with a sigmoid colostomy. Soft tissue defect in the gluteal area was covered with a flap. Fractures in the area of the pelvis and femur were treated surgically. There was evidence of severe damage to the nerves of the lower limbs. After stabilization of the clinical status he was included in the rehabilitation program and then underwent physiotherapy in order to exercise the pelvic floor muscles before reversing the sigmoid colostomy. At the time of treatment the patient still needed help with his daily tasks. For the assessment of the function of the pelvic floor muscles the same method was used as in the first case. The strength of muscle contractions was 1 (according to the Oxford scale) (2) and endurance of the contractions was 2. In this case the patient also performed pelvic floor muscle training with biofeedback both at the outpatient clinic and at home in the beginning (3). Within four months the patient had 5 treatments. The strength of the pelvic floor muscles has improved. Physiotherapy treatment was then suspended due to surgery on the trachea. We expect that the function and strength of the pelvic floor muscles to be, in two months, at a level that the patient will be able to undergo sigmoid colostomy reversal and he will not have any problems with incontinence and / or bowel movement. **Conclusions:** The etiology of the occurrence of issues in the perianal area was different in both cases, but with the same result, i.e. the insertion of a sigmoid colostomy. The aim of physiotherapy treatment in both cases was the same, to improve the function of the pelvic floor muscles and provide continence after the reversal of a sigmoid colostomy, which we succeeded in the first case.

Key words: pelvic floor muscles, sigmoid colostomy, assessment, training, improve the function.

Literatura/References:

1. Dumoulin C, Hay-Smith J, Habée-Séguin GM, Mercier J (2015). Pelvic floor muscle training versus no treatment, or inactive control treatments, for urinary incontinence in women: A short version Cochrane systematic review with meta-analysis. *Neurourol Urodyn* 34: 300–8. doi: 10.1002/nau.22700.
2. Laycock J (1994). Clinical evaluation of the pelvic floor. In: Schussler B, Laycock J, Norton P, Stanton S, eds. *Pelvic floor re-education: principles and practice*. London /ect./: Springer-Verlag: 42–9.
3. K Moore et al (2013). Adult conservative management. In: Abrams, P, Cardozo L, Khoury S, Wein AJ, eds. *Incontinence*. 5th ed. 5th International consultation on incontinence. ICUD-EAU: 965–83.

Preventiva porodnih poškodb presredka – pregled literature

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Uvod: Podaljšanje pričakovane življenjske dobe žensk je privedlo do večjega zanimanja za dejavnike tveganja, ki dolgoročno vplivajo na kakovost življenja starejših žensk, zlasti na prolaps medeničnih organov (1). To je obudilo ponovno zanimanje raziskovalcev za poškodbe medeničnega dna, povezane s porodom, in njihove dolgoročne posledice (1). Vaginalni porod lahko poškoduje medenično dno, zlasti mišico levator ani (2). Stopnja in razsežnost poškodb vplivata na možnost spontane obnove in uspešnost poporodnih intervencij za preprečevanje nadaljnjih posledic oslabiljenega delovanja podpornega sistema medeničnega dna, torej urinske in fekalne inkontinence (2). Poškodbe presredka med porodom so povezane z različnimi dejavniki (3). Tudi carski rez se kaže kot neučinkovit poseg pri varovanju medeničnega dna, zlasti če je izveden po dolgi drugi porodni dobi (4). Namen pregleda literature je bil ugotoviti, ali so fizioterapevtske tehnike učinkovite za preprečevanje in/ali zmanjšanje pojavnosti poškodb presredka med porodom. **Metode:** Pregled strokovne in znanstvene literature, objavljene med januarjem 2005 in marcem 2014 v angleškem jeziku v bazah podatkov Springer Link, Science Direct, Ovid, Pubmed, Medline, Web of science in Willey na temo nefarmakoloških fizioterapevtskih intervencij za preprečevanje poškodb presredka med porodom. Vključene randomizirane kontrolirane ali klinične raziskave in prospektivne kontrolirane raziskave so na PEDrovi lestvici dosegle vsaj osem točk. Retrospektivne deskriptivne raziskave in sistematični pregledi literature Cochrane zaradi svoje zasnove niso bile ocenjevane po tej lestvici. Raziskave drugih tipov so bile vključene, če sta vključitvena merila izpolnjevali vsaj dve raziskavi, ki sta obravnavali enako intervencijo, da bi njihove rezultate lahko primerjali med seboj. **Rezultati:** Sedem študij je obravnavalo vpliv intervencij v nosečnosti: ena masažo presredka, štiri vadbo oziroma zmerno telesno dejavnost in dve trening s pripomočkom EPI-NO®. Dvanajst študij je obravnavalo vpliv intervencij med porodom na porodne poškodbe presredka: dve tople obkladke, dve masaže presredka in osem položaj v fazi iztisa. Statistično pomembne rezultate za preprečevanje poškodb presredka med porodom dosega le masaža presredka od 35. tedna nosečnosti naprej. Tehnike, uporabljene na presredku v fazi iztisa, ne dosegajo statistične pomembnosti. Vadba mišic medeničnega dna in telesna dejavnost v nosečnosti ter pokončni porodni položaji niso pomembno povezani s tveganjem poškodb presredka med porodom. **Zaključki:** S fizioterapevtskega stališča lahko poškodbe presredka pred in med porodom preprečujemo z obveščeno nosečnic in uporabo fizioterapevtskih tehnik za boljše raztezanje in sproščanje presredka. Opravljeni pregled literature podpira učinkovitost masaže presredka v nosečnosti in izogibanje prerezu presredka. Dodatno kaže, da pokončni položaji niso vzročno povezani s povečanim tveganjem za porodne poškodbe presredka, prispevajo k boljši porodni izkušnji in sami po sebi delujejo varovalno proti prerezu presredka. Intervencije v drugi porodni dobi na predelu presredka niso pomembno povezane z zmanjšanjem poškodb, vendar jih porodnice večinoma dobro sprejemajo. Opravljeni pregled literature je pokazal tudi, da vadba mišic medeničnega dna in jakost mišic medeničnega dna nista dejavnika tveganja za poškodbe presredka med porodom in slabše porodne izide pri materi in otroku.

Ključne besede: presredok, porod, faza iztisa, poškodbe porodne poti.

Prevention of birth related perineal trauma – literature review

Background: Improvements in women's life expectancy have led to an increasing focus on chronic conditions that adversely affect quality of life in older women, such as female pelvic organ prolapse (1). This has triggered renewed interest in childbirth related injuries of the pelvic floor and their consequences. (1). For certain women changes that occur as a result of vaginal delivery during the reproductive years can lead to increased problems later in their life span that result in prolapse of the pelvic organs and urinary incontinence; problems referred to as pelvic floor dysfunction (2). Perineal trauma is influenced by various risk factors, some of which (e.g. nutritional status, maternal body mass index, ethnic origin, birth weight, foetal position) cannot be altered by obstetricians at the time of delivery (3). Other factors (e.g. maternal position) can be altered, thus possibly reducing perineal damage (3). Muscle and nerve damages of the pelvic floor have been reported to be a consequence of vaginal childbirth (4). Caesarean section performed for obstructed labour or after the onset of labour has been reported to be ineffective in protecting the pelvic floor, especially after a long second stage of labour (4). The purpose of the literature review was to research, whether physiotherapeutic techniques used during labour are effective in preventing/decreasing birth-related perineal trauma. **Methods:** Professional literature published between January 2005 and March 2014 in databases: Springer Link, Science Direct, Ovid, Pubmed, Medline, Web of science and Willey on non-pharmacological prevention of birth-related trauma to the perineum was reviewed. The included randomized, clinical and prospective trials reached at least 8 points on PEDro scale; not randomized studies were included if the same intervention was studied in at least two trials, so their results can be compared. **Results:** Significance of interventions during pregnancy was studied in 7 articles: 1 regarded perineal massage, 4 physical activity and 2 training with EPI-NO® device. Significance of interventions during labour and birth was studied in 12 articles: 2 regarded warm compresses on the perineum, 2 perineal massage and 8 maternal position during the birth. Only antenatal perineal massage from 35 weeks of gestation reaches statistical significance; techniques applied on the perineum during the birth do not reach statistical significance. Pelvic floor muscle training and/or physical activity in pregnancy as well as supine birthing positions and birth-related perineal trauma are not significantly correlated. **Conclusions:** From a physiotherapist's point of view, birth-related perineal trauma can be prevented with information delivered to pregnant women and with the use of physiotherapeutic techniques for improving extensibility and relaxation of the perineum. Cited literature review proves significant effectiveness of antenatal perineal massage and restrictive use of episiotomy. Furthermore, it shows that supine positions during birth are not correlated with perineal damage and are an independent protective factor against episiotomy. Interventions on the perineum in the second stage are not significantly protective against perineal damage but are generally well accepted by birthing women. Cited literature review also shows that pelvic floor exercises/physical activity in pregnancy and pelvic floor muscle strength do not have negative impact on the perineum as well as maternal and foetal birth outcomes.

Key words: perineum, birth, expulsion phase, genital tract trauma.

Literatura/References:

1. Shek KL, Chantarasorn V, Langer S, Phipps H, Dietz HP (2011). Does the Epi-No® Birth Trainer reduce levator trauma? A randomised controlled trial. *Int Urogynecol J Pelvic Floor Dysfunct* 22: 1521–8.
2. Ashton-Miller JA in DeLancey J (2007). Functional anatomy of the female pelvic floor. *Ann N Y Acad Sci* 1101: 266–96.
3. Meyvis I, Van Rompaey B, Goormans K, Truijen S, Lambers S, Mestdagh E, Mistiaen W (2012). Maternal position and other variables: effects on perineal outcomes in 557 Births. *Birth* 39 (2): 115–20.
4. Sigurdardottir T, Steingrimsdottir T, Arnason A, Bø K (2011). Pelvic floor muscle function before and after first childbirth. *Int Urogynecol J Pelvic Floor Dysfunct* 22: 1497–503.

Ugotavljanje zanesljivosti merjenja zmogljivosti mišic medeničnega dna z napravo Myomed 632

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Uvod: Mišice medeničnega dna so na dnu medenične votline. Dobra zmogljivost mišic medeničnega dna je pomembna za njihovo pravilno funkcijo (1). Zmogljivost teh mišic je mogoče izmeriti z različnimi instrumenti, ki imajo različno stopnjo zanesljivosti, svoje posebnosti in različne metrične značilnosti (2). Aktivacija mišic medeničnega dna je zaradi svoje lege znotraj medenice težje merljiva, zato je pri postopkih merjenja zmogljivosti mišic medeničnega dna z ustreznimi napravami potrebna doslednost (3). **Namen:** Namen raziskave je bil ugotoviti zanesljivost meritev med dvema preiskovalkama in zanesljivost meritev ene preiskovalke za meritve zmogljivosti mišic medeničnega dna z napravo Myomed 632. **Metode:** V raziskavi je sodelovalo 20 zdravih preiskovank. Za pridobivanje preiskovank je bila uporabljena metoda priložnostnega vzorčenja. K sodelovanju so bile povabljene zdravstvene delavke. Testiranje sta izvajali dve fizioterapevki tako, da je prva najprej izvedla meritve na desetih preiskovankah. Čez 24 ur je bilo deset istih preiskovank ponovno testiranih, in sicer tako, da je prva fizioterapevka izvedla meritve na prvih petih preiskovankah, druga pa na drugih petih preiskovankah. Za preostalih deset preiskovank je bil postopek enak, le da je meritve začela druga fizioterapevka. Za ugotavljanje zanesljivosti je bil uporabljen medrazredni korelacijski koeficient (ICC). **Rezultati:** Pri meritvah maksimalnega pritiska med kontrakcijo mišic medeničnega dna je pri prvi preiskovalki vrednost ICC znašala 0,968, pri drugi pa 0,962. Pri meritvah povprečnega pritiska med kontrakcijo mišic medeničnega dna je pri prvi preiskovalki vrednost ICC znašala 0,991, pri drugi pa 0,975. Pri meritvah v mirovanju preiskovanke je pri prvi preiskovalki vrednost ICC znašala 0,853, pri drugi pa 0,171. Pri ugotavljanju zanesljivosti med preiskovalkama pri meritvah maksimalnega pritiska med kontrakcijo mišic medeničnega dna je vrednost ICC znašala 0,952, pri povprečnem pritisku med kontrakcijo pa 0,976. Pri meritvah v mirovanju preiskovanke je vrednost ICC znašala -0,253. **Razprava in sklep:** Ugotovljena je bila zelo dobra zanesljivost obeh preiskovalk in med obema preiskovalkama za merjenje maksimalnega in povprečnega pritiska med kontrakcijo mišic medeničnega dna, na napravi Myomed 632, za merjenje zmogljivosti mišic medeničnega dna pri zdravih preiskovankah.

Ključne besede: mišice medeničnega dna, merjenje sprememb pritiska v nožnici, zanesljivost, medrazredni korelacijski koeficient, Myomed.

Determining the reliability of measuring the capacity of the pelvic floor muscles with the Myomed 632 device

Introduction: The muscles of the pelvic floor are located at the bottom of the pelvic cavity. Good capacity of the pelvic floor muscles is important for the proper function of the pelvic bottom muscles (1). The capacity of these muscles can be measured with different instruments. These instruments differ in reliability; they have their peculiarities and various psychometric characteristics (2). Due to its location within the pelvis, the activation of the pelvic floor muscles is more difficult to measure therefore consistency is needed in the processes of measuring the pelvic floor muscles capabilities with appropriate devices (3). **Objectives:** The purpose of this thesis was to determine the reliability of measurements between two individual investigators. At the same time, we intended to determine the reliability of one investigator's measurements for measuring the capacity of the pelvic floor muscles with the Myomed 632 device. **Methods:** The study included 20 healthy subjects. The testing has been carried out by two physiotherapists. Initially, the first physical therapist carried out measurements on 10 subjects. In 24 hours, these subjects were re-tested. The first five subjects were tested by the first therapist and the second five by the second one. For the remaining 10 subjects the procedure was the same, except that the measurements were initiated by the second physical therapist. For the determination of the reliability, we used an interclass correlation coefficient (ICC). **Results:** When determining the maximum pressure during the contraction of the pelvic floor muscles, the first investigator measured ICC = 0.968, while the second investigator measured ICC = 0.962. When measuring the average pressure during the contraction of the pelvic floor muscles the first investigator determined ICC = 0.991, while the second investigator determined ICC = 0.975. During resting, the first investigator got an ICC = 0.853, while the second investigator got an ICC = 0.171. When determining the reliability between the two investigators in measuring the maximum pressure during the contraction of the pelvic floor muscles, we got an ICC = 0.952, for the average pressure during the contraction we got an ICC = 0.976 and during resting we got an ICC = -0.253. **Discussion and conclusion:** With the aim to measure the capacity of the pelvic floor muscles in healthy women with the Myomed 632 device, we established that both investigators were individually very reliable and that there was a precise reliability between the two in measuring the maximum and average pressure during the contraction of the pelvic floor muscles.

Key words: pelvic floor muscles, vaginal pressure measurement, reliability, interclass correlation coefficient, Myomed.

Literatura/References:

1. Perucchini D, DeLancey J (2008). Functional anatomy of the pelvic floor and lower urinary tract. In: Baessler K, Schussler B, Burgio KL, Moore KH, Norton PA, Stanton SL. Pelvic floor re-education. 2nd ed. London: Springer-Verlag London, 3–21.
2. Hay-Smith EJ, Bø K, Berghmans LC, Hendriks HJ, de Bie RAM, van Waalwijk van Dorn ES (2007). Pelvic floor muscle training for urinary incontinence in women. Cochrane Database Syst Rev 1: CD001407.
3. Bø K, Sherburn M (2005). Evaluation of female pelvic-floor muscle function and strength. Phys Ther 85 (3): 269–82.

Primerjava prepoznavnosti pojava urinske inkontinence med študenti fizioterapije in zdravstvene nege na AME-ECM

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Teoretična izhodišča: Urinska inkontinenca je zelo moteča motnja, ki ženskam in moškim vseh starostnih skupin bistveno poslabša kakovost življenja (1). Z dobro promocijo in edukacijo treninga mišic medeničnega dna lahko preprečimo nastanek urinske inkontinence, z ustreznim konzervativnim zdravljenjem pa bistveno izboljšamo ali celo popolnoma pozdravimo urinsko inkontinenco (2). **Metoda:** S spletnim anketnim vprašalnikom smo med študenti tretjih letnikov fizioterapije in zdravstvene nege študija na Alma Mater Europaea – Evropskem centru Maribor v Murski Soboti izvedli kvantitativno raziskavo. Anketni vprašalnik je obsegal osemnajst vprašanj zaprtega tipa. Natančna navodila s povezavo do spletne ankete so bila poslana po elektronski pošti vsem študentom, ki so bili v študijskem letu 2013/2014 vpisani v tretji letnik programa fizioterapija in zdravstvena nega na AME – ECM Murska Sobota. V raziskavo je bilo zajetih sedemnajst anket študentov fizioterapije in petnajst anket študentov zdravstvene nege. Zbrane podatke smo grafično obdelali in preverili postavljene hipoteze. **Rezultati:** Rezultati naše raziskave so prikazali poznavanje konzervativnega zdravljenja urinske inkontinence med študenti tretjih letnikov zdravstvene nege in fizioterapije. Z zbranimi podatki, ki smo jih statistično obdelali s programom SPSS, smo dokazali, da je poznavanje konzervativnega zdravljenja urinske inkontinence med študenti fizioterapije natančnejše in bolj poglobljeno kot pri študentih zdravstvene nege. Njihovo delovanje na primarni ravni je namreč le preprečevalno oziroma edukativno, vloga fizioterapevta pri konzervativni obliki zdravljenja UI pa je konkretnjša, saj obsega fizioterapevtsko oceno, edukacijo treninga mišic medeničnega dna ter izvajanje treninga mišic medeničnega dna s pripomočki. **Razprava:** Iz rezultatov raziskave je razvidno, da je poznavanje urinske inkontinence in njenega zdravljenja pri študentih zdravstvene nege in fizioterapije dobro. Študentje zdravstvene nege bi s svojim znanjem o urinski inkontinenci in poznavanjem njenega zdravljenja zmogli zadovoljivo svetovati bolnikom, ki bi jim zaupali težave o uhajanju urina. Študentje fizioterapije pa natančneje poznajo vrste in tehnike konzervativnega zdravljenja UI. Študentje so promocijo urinske inkontinence v Sloveniji ocenili kot slabo. Za natančnejše podatke o promociji urinske inkontinence v Sloveniji bi bilo treba izvesti dodatne raziskave med posamezniki s težavami urinske inkontinence.

Ključne besede: konzervativna obravnava UI, trening MMD, nehoteno uhajanje urina, promocija UI, obveščenost fizioterapevtov in diplomiranih medicinskih sester o pojavi UI.

Comparison of recognisability of urinary incontinence occurrence among students of physiotherapy and nursing at the AME-ECM

Theoretical background: Urinary incontinence is a very disturbing disorder, which significantly decreases the quality of life of all age groups, both in men and women. With well-targeted promotion and by learning the pelvic floor muscles training we can prevent the emergence of urinary incontinence. Moreover, an appropriate conservative treatment can significantly improve or even cure the urinary incontinence completely. **Method:** A quantitative research was carried out among the students of physiotherapy and health care in their third year of studies, studying at Alma Mater Europaea – the European Centre, Maribor (ECM), located in Murska Sobota, by using an online questionnaire. The questionnaire consisted of eighteen questions of the closed-ended type. Detailed instructions including a link to the online survey were sent via e-mail to all the students enrolled in the third year of the programmes of physiotherapy and health care in the academic year 2013/2014 at the AME - ECM Murska Sobota. The study involved seventeen surveys of students of physiotherapy and fifteen surveys of students of health care. The collected data were processed graphically and the set hypotheses were verified. **Results:** The results of our research demonstrate the knowledge of conservative treatment of urinary incontinence among third year students of nursing and physiotherapy. With the data collected, which were statistically analyzed with SPSS software, it was demonstrated that the knowledge of the conservative treatment of urinary incontinence among students of physiotherapy is more precise and detailed than in students of nursing. The work of the latter at the primary level is namely only preventive or educational, while the role of a physiotherapist in the form of conservative treatment of UI is more concrete, since it includes physiotherapy assessment, education of pelvic floor muscle training and the implementation of pelvic floor muscle training with devices. **Discussion:** The results show a good level of knowledge of urinary incontinence and its treatment in the students of health care and physiotherapy. With their knowledge of urinary incontinence and its treatment, the students of health care meet the needs for good counselling to patients, who would entrust them with their problems of leaking urine. However, the students of physiotherapy are more familiar with the types and methods of conservative treatment of urinary incontinence. The promotion of urinary incontinence in Slovenia was assessed as poor by the students. For more detailed information on the promotion of urinary incontinence in Slovenia, it would be necessary to carry out a further survey among the individuals who have problems with urinary incontinence.

Key words: conservative treatment of urinary incontinence, pelvic floor muscles training, uncontrolled leakage of urine, promotion of urinary incontinence, information of physiotherapists and graduate nurses on emergence of urinary incontinence.

Literatura/References:

1. Tušek Bunc A, Klemenc Ketiš Z (2010). Urinska inkontinenca v očeh zdravnika družinske medicine. In: Kakovostna obravnava bolnika v družinski medicini, Zbornik predavanj, 36. srečanje delovnih skupin, Ljubljana 21.–22. maj 2010, 49–60.
2. Hlebš S (2008). Ozaveščenost Slovenskih zdravstvenih delavcev o osnovni problematiki urinske inkontinenca. *Obzor Zdr N.* 2008; 42 (4): 261–72.
3. Lukanovič A (2011). Sodobni pristopi zdravljenja urinske inkontinenca pri ženskah. In: Zbornica fizioterapevtov Slovenije, 1. znanstveni simpozij fizioterapevtov Slovenije, Zbornik, Radenci 29. september–1. oktober 2011, 120–31.
4. Kralj B (2006). Urinska inkontinenca pri ženskah. In: Borko E, Takač I, eds. *Ginekologija*, 2. dopolnjena izdaja. Maribor: Visoka zdravstvena šola, 2006, 337–60.
5. Ščepanović D (2010). Konzervativna obravnava motenega delovanja medeničnega dna pri odraslih osebah. *Rehabilitacija.* 2010; 9 (1): 40–7.
6. Glodež S (2008). Vloga medicinske sestre pri preventivi uhajanja urina v nosečnosti in po porodu. In: 80 let hospitalne ginekologije in porodništva v Mariboru, Mednarodni znanstveni simpozij, Maribor, 17. oktober 2008, 719–26.
7. Brglez, A (2009). Kakovost življenja žensk s prekomerno aktivnostjo sečnega mehurja [diplomska naloga]. Maribor: Visoka zdravstvena šola, 2009.
8. Rodeš B (2008). Stresna urinska inkontinenca pri medicinskih sestrah glede na dejavnike tveganja v našem poklicu. In: 80 let hospitalne ginekologije in porodništva v Mariboru, Mednarodni znanstveni simpozij, Maribor, 17. oktober 2008, 691–706.
9. Hlebš S (2011). Pomoč fizioterapevta pri nehotenem uhajanju urina pri starejših. *Kakovostna starost.* 2011; 14 (1): 27–36.

Učinkovitost treninga mišića zdjeličnog dna prema Filipec-Jadanec metodi kod fekalne inkontinencije – pilot studija

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Uvod: Fekalna inkontinencija ima značajan utjecaj na izvođenje aktivnosti svakodnevnog života i na kvalitetu života pacijenata. Incidencija fekalne inkontinencije raste s većom životnom dobi (>50 godina) i varira od 2,2 do 8,3% (1). Trening mišića zdjeličnog dna kao konzervativan oblik liječenja ima veliki utjecaj na smanjenje simptoma fekalne inkontinencije te poboljšanje snage mišića zdjeličnog dna (2). **Metode:** Uzorak je odabran metodom slučajnog odabira i obuhvaćao je 136 ispitanika s fekalnom inkontinencijom kronološke dobi od 50 do 65 godine. Svaka skupina, eksperimentalna i kontrolna, obuhvaćala je 68 ispitanika, 42 osobe ženskog i 16 osoba muškog spola. Provedena je procjena mišića zdjeličnog dna putem PERFECT scheme kao pouzdanog i osjetljivog alata procjene mišića zdjeličnog dna prije početka i nakon vježbanja (3). Eksperimentalna skupina provodila je trening mišića zdjeličnog dna po Filipec-Jadanec metodi koja je uključivala aktivaciju izlaza rodnice, mokraćne cijevi i izlaza debelog crijeva kroz spore i brze kontrakcije mišića zdjeličnog dna, vježbe niskog i visokog intenziteta, te vježbe mišića zdjeličnog dna kroz funkcionalne obrasce. Kontrolna skupina provodila je vježbe putem aktivacije glutealne, adduktorne i abduktorne muskulature s i bez pomagala. Eksperimentalna i kontrolna skupina provodila je vježbe 7 dana u tjednu, dva puta dnevno po 30 minuta kroz 7 tjedana. **Rezultati:** Dobiveni rezultati upućuju na poboljšanje snage od 87,2 %, izdržljivosti 85,7%, broja ponovljenih kontrakcija 82,5% i brzih kontrakcija 83,4% mišića zdjeličnog dna kod eksperimentalne skupine. Kod kontrolne skupine je zabilježeno poboljšanje snage od 31,4%, izdržljivosti 27,3%, broja ponovljenih kontrakcija 25,2% i brzih kontrakcija 22,8% mišića zdjeličnog dna. Uočena je statistička značajnost u poboljšanju snage, izdržljivosti, broja ponovljenih kontrakcija i brzih kontrakcija mišića zdjeličnog dna između eksperimentalne i kontrolne skupine ($p < 0,001$). **Zaključak:** Prisutno je poboljšanje snage i izdržljivosti mišića zdjeličnog dna po Filipec-Jadanec metodi što upućuje na mogućnost šire kliničke primjene navedene metode kao konzervativnog oblika liječenja kod fekalne inkontinencije. Ograničenje rada je mali uzorak, pa bi navedene rezultate trebalo provjeriti na većem uzorku.

Ključne besede: fekalna inkontinencija, trening mišića zdjeličnog dna, snaga, izdržljivost.

Effectiveness of pelvic floor muscles training by Filipec-Jadanec method at fecal incontinence – a pilot study

Background: Fecal incontinence has significant influence on performing activities of daily living and quality of a patient's life. The incidence of fecal incontinence increases with age (> 50 years) and varies from 2.2 to 8.3% (1). Training pelvic floor muscles as a conservative form of treatment has a major impact on reducing symptoms of fecal incontinence and improves the strength of pelvic floor muscles (2). **Methods:** The sample was selected randomly and included 136 respondents with fecal incontinence, aged 50-65. Each group, the experimental and the control one, included 68 patients, 42 females and 16 males. To assess pelvic floor muscles perfect scheme was used as a reliable and sensitive tool to estimate pelvic floor muscles before and after the exercise (3). The experimental group conducted a pelvic floor muscles training by Filipec-Jadanec method involving the activation of the output of the vagina, urethra and rectum through the slow and fast contraction of pelvic floor muscles, exercises of low and high intensity, and pelvic floor muscles exercise through the functional forms. The control group carried out the exercise by activating the gluteal, adductor and abductor muscles with and without tools. The experimental and control group carried out exercise 7 days a week, twice a day for 30 minutes for 7 weeks. **Results:** The results indicate improvement in strength of 87.2%, endurance of 85.7%, the number of repeated contractions of 82.5% and 83.4% of rapid contraction of pelvic floor muscles in the experimental group. For the control group, improvement was indicated of 31.4% strength, endurance of 27.3%, the number of repeated contractions of 25.2% and rapid contraction 22.8% of pelvic floor muscles. Revealed significant improvement in strength, endurance, number of repeated contraction and rapid contraction of pelvic floor muscles between the experimental and control groups ($p < 0.001$). **Conclusion:** There has been improvement in strength and endurance of pelvic floor muscles by Filipec-Jadnec method, which indicates the possibility of a wider clinical application of the above methods as a conservative form of treatment for fecal incontinence. Limitation of study is a small sample, so the above-mentioned results should be checked on a larger sample.

Key words: fecal incontinence, pelvic floor muscle training, strength, endurance.

Literatura/References:

1. Buhmann H, Nocito A (1994). Update on fecal incontinence. *Praxis* 103 (22): 1313–21.
2. Kroesen AJ (2013). Pelvic floor and anal incontinence. Conservative therapy. *Chirurg* 84 (1): 15–20.
3. Laycock J, Jerwood D (2001). Pelvic floor muscle assessment: The PERFECT scheme. *Physiotherapy* 87 (12): 631–42.

Predstavitev metode Mézières

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Teoretično in praktično bomo predstavili metodo Mézières, kot jo je učila in zapisala v le eni skripti fizioterapevtka Françoise Mézières okoli leta 1950. Za tiste čase je bila genialka na področju ortopedске fizioterapije, ker je videla ortopedski problem (npr. skolioze, kifoze itn.) širše, kot problem celih mišičnih verig, ki so povezane med seboj in zaradi prikrajšav vplivajo na celoten skelet.

Da lahko človeško telo dobro deluje, mora biti v ravnovesju in čim bolj simetrično. Harmonična in pravilna drža telesa določa pravilno funkcijo tako sklepov kot mišic in telo osvobaja. Funkcijo lahko obnovimo, če najprej popravimo držo telesa in ne obratno. Deformacije oziroma prilagoditvene nesimetričnosti (ramena naprej, lordoze, kifoze, kolena rotirana navznoter itn.) so skoraj vedno posledice skrajšane zadnje mišične verige, ki je sestavljena iz mišic od glave do pete. To posledično privede do izgube ravnovesja z drugimi mišičnimi verigami (s sprednjo mišično verigo od vratu spredaj čez trebuh do stopal in z verigami na rokah) ter s sklepnimi površinami, kar vodi v vnetja, obrabo, bolečine in degeneracijo.

Na delavnici bodo teoretično in praktično predstavljena štiri glavna načela te metode:

1. Številne hrbtne mišice se vedejo kot ena mišica.
2. Zadnja mišična veriga (od glave do pete) je večinoma prekratka.
3. Pri vseh aktivnostih na lokalni ravni (poprava ramen, kolkov, vratu itn.), če mišice podaljšujemo ali krajšamo, vplivamo na celo telo.
4. Napetosti, bolečine, podaljševanja in krajšanja mišic vodijo takoj v blokado diafragme v dihu. Diafragma nima le glavne vloge pri dihanju, temveč je pripeta na L2 na levi strani in na L2, L3 na desni strani hrbtenice in je v sinergiji z mišico psoas, ki dela anteriorno trakcijo na hrbtenico od Th12 do L5, zato je povezava z dihanjem nujen in glavni del terapije.

Glede na Mézièrjevo so mišične verige organizirane tako, da vplivajo na skelet. Če torej vplivamo na mišični sistem, posledično vplivamo tudi na skeletni sistem, zato pri praktičnem delu na pacientu podaljšujemo vse mišične verige hkrati: sprednji dve verigi, vzdolž roke in zadnjo mišično verigo. Če ne prihaja stalno do kompenzacij, na primer, če popravimo le lordozo križa, se bo pojavila kompenzacija tako, da se bo povečala lordoza v vratu in ne bo prišlo do podaljšanja celotne verige in do trajne spremembe. Med terapijo podaljšujemo mišične verige, tako da se čim bolj približamo pravilni drži, torej pravilnim fiziološkim krivinam v hrbtenici in pravilnim položajem sklepov preostalega dela telesa. Delo poteka hkrati na vseh štirih kinetičnih verigah, ker lokalno delo ne privede do trajnega izboljšanja. Terapija se izvaja pri izdihu, ker pri vdihu ali apneji pride do kontrakcije diafragme, ki se pripenja na lumbalni del hrbtenice in vleče v lordozo, kar pomeni v skrajšavo. Že po eni terapiji se vidno izboljša drža celega telesa v vseh ravninah.

Ključne besede: drža telesa, funkcija, mišične verige, ortopedске težave, bolečina.

Presentation of the Mézières method

We shall give a theoretical and practical presentation of the Mézières method as it was taught and written in a single manuscript by the physiotherapist Francoise Mézières around the year 1950. At that time, she was a genius in the field of orthopedic physiotherapy, because she looked upon an orthopedic problem (e.g. scoliosis, kyphosis, etc.) more broadly, as a problem of entire muscle chains, which are interconnected and, when shortened, affect the entire skeleton.

In order to function properly, the human body must be in balance and maximally symmetric. A harmonious and good posture determines the proper function of both the joints and muscles, and liberates the body. Function can be restored if we first correct our posture and not vice-versa. Deformations or adaptive asymmetries (shoulders forward, lordosis, kyphosis, knees rotating inward, etc.) are almost always the consequence of a shortened posterior muscle chain, which comprises the muscles from head to foot, and subsequently leads to a loss of balance with other muscle chains (front muscle chain from the front of the neck via the abdomen to the feet and chains on the hands) and joint surfaces, ultimately resulting in inflammations, wear, pain and degeneration.

At the workshop, we will give a theoretical and practical presentation of the four basic principles of this method:

1. Numerous dorsal muscles behave as a single muscle.
2. The posterior muscle chain (from head to foot) is, in most cases, too short.
3. All activities on the local level (correction of shoulders, hips, neck, etc.), whether the muscles are extended or shortened, affect the entire body.
4. Tensions, pain, elongations and shortening of the muscles immediately lead to a blocking of the diaphragm during inhalation. The diaphragm not only has the main role in breathing, but is attached to L2 on the left side and to L2, L3 on the right side of the spine, and is in synergy with the psoas muscle, which creates anterior traction to the spine from Th12 to L5. For this reason, the connection with breathing is a necessary and main part of the therapy.

According to Mézière, muscle chains are organized so that they influence the skeleton, which means that if we influence the muscle system, we will consequently influence the skeleton system as well. For this reason our practical work on a patient will be focused on elongating all muscle chains simultaneously: the two anterior chains, lengthwise along the hand and the posterior muscle chain otherwise the compensations will happen (e.g. if only lordosis of the lower back is corrected, this will be compensated by increased lordosis of the neck). During therapy we will elongate the muscle chains so as to maximally approach a good posture, which means proper physiological curves in the spine and proper position of the joints in other parts of the body. We shall perform our work simultaneously on all four kinetic chains, since working locally does not bring lasting improvement. Therapy is performed during exhalation, because the diaphragm will contract during inhalation or apnea, attaching itself to the lumbar part of the spine and pulling into lordosis, which means shortening. After a single therapy, the posture of the entire body visibly improves on all planes.

Key words: posture, function, muscle chains, orthopedic problems, pain.

Literatura/References:

1. Mézières F (1949). Révolution en gymnastique orthopédique: Causes et traitement des déviations vertébrales et algies d'origine musculaire - Amédée Legrand et compagnie.
2. Mézières F (1984). L'originalità del metodo mézières — "Centre Mézières", Parigi.
3. Il Manuale del Mézièrista (1996). Vol.1 – Godelieve Denys-Struys – Editore Marrapese –Roma.
4. Metodo Mézières «rivoluzione in fisioterapia» (2006). Storia, teoria e pratica dell'ideatrice della rieducazione posturale di Michaël Nisand – ed. Fisiocorsi.

Terapija s pomočjo psov pri nevroloških pacientih

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Uvod: Živali povečujejo človekovo motivacijo, ga spodbujajo k različnim dejavnostim in tako poskrbijo tudi za gibanje (1). Najpogosteje se za terapijo z živalmi uporablja pes, saj je med vsemi živalmi človeku najzvestejši spremljevalec, je učljiv, poslušen in mobilan. Za uporabo v terapevtske namene mora izpolnjevati merila, kot so zanesljivost, predvidljivost, vodljivost, prilagodljivost in ustreznost (2). Terapija s pomočjo psov (angl. animal-assisted therapy) se uporablja pri delu v različnih javnih zavodih in ustanovah v Sloveniji in tujini. Terapija s pomočjo psov je ciljno usmerjeno posredovanje, pri katerem so psi (skupaj z vodnikom), ki ustrezajo določenim merilom, pomemben del terapevtskega procesa, opravljajo pa ga v okviru svoje stroke za to usposobljeni strokovni delavci. Program je za doseganje terapevtskega cilja skrbno načrtovan. Izvajanje programa se sproti spremlja, zapisuje in vrednoti. Prilagojen je posameznemu uporabniku (3). Namen delavnice je praktično prikazati potek terapije s pomočjo psov in njen učinek na izboljšanje gibanja pri pacientih z nevrološko okvaro. **Metode:** Od leta 2007 poteka program Terapija s pomočjo psov na oddelku za rehabilitacijo pacientov po nezgodni poškodbi možganov, z multiplo sklerozo in drugimi nevrološkimi obolenji. Terapijo izvajajo trije ali štirje terapevtski pari društva Tačke pomagačke in pet strokovnih delavk URI - Soča: dve fizioterapevtki, dve delovni terapevtki, logopedinja in občasno tudi psiholog. Terapije potekajo enkrat na teden in trajajo eno uro. Delo je individualno in ga ob posameznem pacientu izvajata terapevtski par (pes in njegov vodnik) ter strokovni delavec. Med terapevtskim programom potekajo dejavnosti za spodbujanje grobe in fine motorike (npr. zavezovanje rutice), naloge za izboljšanje senzibilitete (npr. božanje psa), vaje za ravnotežje in koordinacijo gibanja (npr. hoja čez psa), vadba hoje (npr. vodenje psa na povodcu), sproščanje (npr. dajanje priboljškov psu), izvajanje različnih funkcionalnih dejavnosti (npr. nega psa, oblačenje) kot tudi aktivnosti za spodbujanje govora (npr. poimenovanje delov telesa, dajanje navodil) in kognicije (npr. pogovor o psu). Cilji so izboljšanje gibanja, budnosti, pozornosti, sporazumevanja, čustvenega stanja in motivacije. **Rezultati:** V osmih letih se je programa udeležilo 90 pacientov po nezgodni možganski poškodbi, 91 pacientov z multiplo sklerozo, 46 pacientov s Parkinsonovo boleznijo in 78 pacientov z drugimi nevrološkimi obolenji, skupno 305 pacientov. Nekateri pacienti so se terapij udeležili večkrat. Za ocenjevanje smo uporabili enostavne lestvice, s katerimi smo na podlagi opazovanja ocenili splošno odzivnost glede na njene vidike oziroma dimenzije: gibanje, budnost in pozornost, sporazumevanje ter čustveno in motivacijsko stanje (4). Akcijska pilotna raziskava, ki je potekala od maja 2007 do junija 2008 v okviru projekta za uvajanje terapije s pomočjo psov na nevrološki oddelek, je pokazala 93-odstotni pozitiven odziv na terapijo s pomočjo psov. **Zaključki:** Lahko zaključimo, da se je terapija s pomočjo psov izkazala za uspešno dopolnitev fizioterapevtskih postopkov v rehabilitaciji. Učinki so pozitivni, ob psih se pacientom poveča motivacija, zato so pri izvedbi aktivnosti med terapijo s pomočjo psov pogosto zelo uspešni, kar se posledično pozna tudi v rednih terapevtskih programih.

Ključne besede: pes terapevt, terapija s psi, nevrološka okvara, motorika, terapevtski cilj.

Dog-assisted therapy in neurological patients

Background: Animals increase person's motivation, prompting him or her to various activities, thereby also promoting movement (1). The most common animal therapists are dogs, since they are the human's most faithful companions; they are learnable, obedient and mobile. In order to become a therapist, a dog must fulfil a few requirements, such as reliability, predictability, controllability, adjustability and suitability (2). Animal-assisted therapy (AAT) is used in different public institutions in Slovenia as well as in foreign countries. Animal-assisted therapy is a targeted intervention, in which dogs (along with their handlers) that meet certain standards have an important part in the therapeutic process, which is carried out by professionally qualified therapists. The program is carefully designed for achieving therapeutic goals. The execution of the program is regularly closely observed, examined and evaluated, since the program has to be adapted for each patient individually (3). The purpose of the workshop is to practically demonstrate the course of animal-assisted therapy and its effect on the improvement of motor function on people with neurological impairment. **Methods:** The AAT program is used at the Department for rehabilitation of patients with traumatic brain injuries, multiple sclerosis and other neurological disorders. The therapy is performed by three to four therapeutic teams of the Tačke pomagačke association and by five professional therapists of URI-Soča: two physiotherapists, two occupational therapists, a speech therapist and sometimes also by a psychologist. Patients have therapies once a week for one hour. They are performed individually by a therapeutic team (a dog and his handler) and a professional therapist. During the therapeutic program activities for gross and fine motor functions are executed (e. g. tying up a bandana), exercises for improvement of sensibility (e. g. petting the dog), exercises for balance and movement coordination (e. g. walking over the dog), walk training (e. g. walking the dog on a leash), relaxation (e. g. giving treats to the dog), execution of different functional activities (e. g. caring for the dog, clothing it) as well as activities for improving the speech (e. g. naming the dog's body parts, giving it instructions) and cognition (e. g. conversing about dog). The goals are an improvement of the patients' motor functions, attentiveness, alertness, communication, and their emotional and motivational state. **Results:** In eight years, 90 patients after brain injury, 91 patients with multiple sclerosis, 46 patients with Mb. Parkinson's disease, 78 patients with other neurological diseases, altogether 305 patients attended the program. Some patients attended this therapy several times. For evaluation we used simple grading scales, with which we assessed their responses based on observation according to the aspects and dimensions of the observation: movement, alertness, attentiveness, communication, emotional and motivational state of the patient (4). The pilot research took place in the context of a project aimed to introduce AAT at the neurological department (May 2007–June 2008) and it showed a 93% positive response on the therapy. **Conclusions:** We can conclude that during project the practising of AAT has proven to be as a successful addition to therapeutic approaches in the field of physiotherapy in rehabilitation. The effects of AAT are positive, patients' motivation has increased in the company of dogs and these patients are therefore often very successful in executing activities and consequently also in usual therapeutic programs.

Key words: therapy dog, animal-assisted therapy, neurological impairments, motorics, therapeutic goals.

Literatura/References:

1. Bergler R, Hoff T (2010). Fascinantni izsledki raziskav: Živali zdravilno vplivajo na človeka. Dostopno na spletnem naslovu: <http://www.ekomagazin.si/Zdravje/Zdravje/Fascinantni-izsledki-raziskav-Zivali-zdravilno-vplivajo-na-cloveka.html> (citirano 15. 3. 2015).
2. Fine HA (2006). Animal-assisted therapy: theoretical foundations and guidelines for practice. San Diego, London: Academic Press, 123–6.
3. Društvo Tačke pomagačke. Dostopno na spletnem naslovu: <http://tackepomagacke.si/programi/terapija-s-pomocjo-psov> (citirano 18. 3. 2015).
4. Kovačič D (2008). Poskusni program rehabilitacije s pomočjo psov. Rehabilitacija, let. 7, št. 2: 23–9.

Uporaba Flexi-bara v fizioterapiji

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Uvod: Vibracijska palica Flexi-bar je multifunkcionalni in tridimenzionalni pripomoček, ki ga lahko vključimo v fizioterapevtski program na različnih področjih fizioterapije. Elastične in konstrukcijske značilnosti palice omogočajo vibriranje s frekvenco 5 Hz, s čimer vplivamo na stabilizacijske mišice trupa. (1) Oscilacijsko gibanje stimulira mehanoreceptorje, ki inhibirajo prevajanje nociceptivnih impulzov do hrbtenjače in možganskega debla. (2) Pri vibracijski vadbi se ob vsaki mišični kontrakciji aktivira do 100 odstotkov mišičnih vlaken, pri standardnih oblikah vadbe pa se odstotek aktiviranih mišičnih vlaken giblje nekje med 40 in 60 odstotki. (3) Vzrok je v skoraj nenehnem refleksnem krčenju in raztezanju mišic. Vadba z njim je enostavna, če upoštevamo postopnost in primernost pri izboru vaj. Primerna je za vse starostne skupine, uporabljamo jo lahko v različnih položajih telesa. **Metode:** Na delavnici bomo prikazali osnovne principe uporabe Flexi-bara. Naučili se bomo: pravilne tehnike nihanja z različnimi prijemi palice ter nihanja v različnih položajih telesa in pri različnih vajah ter pogledali njihovo uporabnost. Govorili bomo tudi o indikacijah in kontraindikacijah za vadbo. **Zaključki:** Uporaba vibracijskih palic v fizioterapevtske namene je smiselna in učinkovita.

Use of Flexi-bar in physiotherapy

Introduction: Flexi-bar is a vibrating, multifunctional, threedimensional accessory that can be included in different fields of physiotherapy and therapeutical programmes. Elastic and constructional features of the bar enable vibrating by frequency 5 Hz which determinates the activation of core muscles. (1) Oscilating movement stimulates mechanoreceptors that inhibit the translation of the nociceptive impulse to the spinal cord and brain stem. (2) By vibrating exercise each muscle contraction activates till 100% of muscle fibres while by standard exercise 40 to 60% of muscle fibres is activated. (3) The reason for that is almost constant reflex of contracting and stretching of the muscles. Flexi-bar training is simple considering gradualness and adequacy of the exercise. It is suitable for all ages and it can be used in different positions of the body. **Methodes:** In the workshop we will demonstrate basic principles of the use of the Flexi-bar. We will learn the correct technique of the oscillating by different grips of the bar in various positions of the body, exercises and their usefulness in physiotherapy. We will talk about indications and contraindications. **Conclusion:** The use of the oscillating bar is a reasonable and effective part of the physiotherapy treatment.

Literatura/References:

1. Mileva KN, Kadr M, Amin N, Bowtell J (2010). Acute effects of flexi-bar vs. sham-bar exercise on muscle electromiography activity and performance. *Journal of strength and conditioning research* 24 (3): 737–48.
2. Kisner C, Colby L.A. 2000. *Therapeutic Exercises: Foundations and Techniques*.
3. Cochrane, DJ and Stannard, SR. Acute whole-body vibration training increases vertical jump and flexibility performance in elite female hockey players (2005). *Br J Sports Med* 39: 860–5.

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