ISSN 1318-2102, E-ISSN 2536-2682
oktober 2017, letnik 25, suplement 1

FIZIOTERAPIJA

Združenje fizioterapevtov Slovenije
STROKOVNO ZDRUŽENJE
Slovenian Association of Physiotherapists
ČLAN WCPT - WCPT MEMBER
1000 Ljubljana, Linhartova 51
Slovenija

17. kongres fizioterapevtov Slovenije

Fizioterapija za vse

17. Congress of Slovenian Physiotherapists

Physiotherapy for everyone

Zbornik povzetkov/Book of abstracts

Portorož, 6.–7. oktober 2017
Portorož, 6 – 7 October, 2017

Področje in cilji

Fizioterapija je nacionalna znanstvena in strokovna revija, ki objavlja recenzirane prispevke z vseh področij fizioterapije (mišično-skeletna fizioterapija, nevrofizioterapija, kardio-respiratorna fizioterapija, fizioterapija za zdravje žensk, fizioterapija starejših in drugo), vključujoč vlogo fizioterapevtov v preventivni dejavnosti, akutnem zdravljenju in rehabilitaciji. Obsega tudi širša področja telesne dejavnosti in funkcioniranja ter zmanjšane zmožnosti in zdravja zaradi bolečine. Namenjena je fizioterapevtom, pa tudi drugim zdravstvenim delavcem in širši javnosti, ki jih zanimajo razvoj fizioterapije, učinkovitost fizioterapevtskih postopkov, standardizirana merilna orodja in klinične smernice na tem področju.

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.

Kataložni zapis o publikaciji (CIP) pripravili v Narodni in univerzitetni knjižnici v Ljubljani
COBISS.SI-ID=291704576
ISBN 978-961-91966-6-3 (pdf)

KAZALO/CONTENTS

Vabljena predavanja/Invited lectures

Plenarna predavanja/Plenary lectures

Predavanja/Oral presentations

Mišično-skeletna fizioterapija/Musculoskeletal physiotherapy

Nevrofizioterapija/Neurophysiotherapy

Splošne teme/General themes

Varovanje zdravja žensk/Women's health

Ravnotežje, glavna komponenta gibanja

izr. prof. dr. **Darja Rugelj**, viš. fiziot., univ. dipl. org.

Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana

Korespondenca/Correspondence: izr. prof. dr. Darja Rugelj; e-pošta: darja.rugelj@zf.uni-lj.si

V zadnjem času je veliko pozornosti raziskovalcev in terapevtov namenjene mehanizmom uravnavanja drže in ravnotežja. Največja motivacija za preučevanje ravnotežja so bili nenadni padci, ki so zlasti pogosti pri starejših osebah. Šele pred nedavnim pa je bilo več raziskovalnega dela posvečenega tudi osebam s kroničnimi nevrološkimi stanji, kot so na primer možganska kap, multipla skleroza in parkinsonova bolezen v povezavi z njihovo ogroženostjo za padce, povečuje pa se tudi raziskovanje ravnotežja pri visoko zmogljivih rekreativnih in vrhunskih športnikih. Kot fizioterapevte nas zanima predvsem, kako lahko te mehanizme najučinkoviteje uporabimo pri obravnavi oseb z motnjami ravnotežja.

Zakaj sta ravnotežje in drža tako pomembni komponenti spretnega gibanja? Pokončna drža in ravnotežje sta podlaga za sproščeno in učinkovito izvajanje zavestnega gibanja ter opravljanje vsakodnevnih dejavnosti, kot so na primer pripravljanje hrane, oblačenje, osebna higiena, nakupovanje, rekreativne dejavnosti itn. Ker na ravnotežje vplivata tudi vrsta gibalne naloge in okolje, v katerem se oseba giblje, razdelimo dejavnike, ki vplivajo na držo in ravnotežje, na intrinzične, za posameznika specifične dejavnike, kot so čutilni priliv, mišična zmogljivost, gibljivost ter kognitivni in čustveni dejavniki, ter ekstrinzične dejavnike oziroma dejavnike okolja, v katerem poteka gibanje. Za nemoteno usklajevanje ravnotežja so potrebne informacije, pridobljene iz vidnega, vestibularnega in somatosenzoričnega sistema, ki se obdelujejo in usklajujejo v osrednjem živčevju ter oblikujejo ustrezen odziv pri pripravi na gibanje, med gibanjem ali ob nenadni motnji. Pri tem je treba poudariti, da ravnotežje ni le kompleksna gibalna spretnost, temveč so pri uravnavanju drže in ravnotežja udeležene tudi spoznavne funkcije.

Za ocenjevanje ravnotežja obstaja veliko standardiziranih ocenjevalnih protokolov. Do leta 2015 jih je bilo opisanih kar 66. Večina teh ocenjevalnih protokolov oziroma testov oceni od tri do pet komponent ravnotežja izmed naslednjih devetih: stabilizacija položaja (telesa in udov), dinamična stabilizacija med izvajanjem gibanja, funkcijske meje stabilnosti, zmogljivost in koordinacija mišic, potrebna za držo in ravnotežje, procesi senzorične interakcije, zaznavanje vertikale, vnaprejšnje prilagoditve drže, ustrezen ravnotežni odziv na motnjo in vplivi spoznavnih procesov. Terapevtova izbira enega ali več testov je zato odvisna od namena vrednotenja ravnotežja in značilnosti preiskovancev.

Obravnava drže in/ali ravnotežja je posredno ali neposredno sestavni del vsake fizioterapevtske obravnave, saj so oslabitev in motnje ravnotežja posledica različnih poškodb, bolezni in stanj. Zaradi poškodb je ravnotežje oslabljeno tudi pri vrhunskih športnikih, pri osebah, ki so utrpele različne poškodbe in bolezni gibalnega aparata, bolezni osrednjega ali perifernega živčevja, ter pri starejših odraslih, pri katerih zaradi staranja upada delovanje sistemov, ki uravnavajo držo in ravnotežje. Lahko pa je izboljšanje ravnotežja tudi temeljni cilj obravnave. V tem primeru uporabimo v ravnotežje usmerjeno vadbo. Ta naj bo sestavljena tako, da naslovi čim več komponent ravnotežja. Pri tem je treba upoštevati, da ravnotežje ni samostojna funkcija, temveč je povezana z različnimi gibalnimi in kognitivnimi nalogami, ki potencialno tekmujejo za človekovo pozornost, zato mora biti v ravnotežje usmerjena vadba načrtovana tako, da je funkcijska in čim bolj specifična. Iz teorije motoričnega učenja je namreč znano, da je s tako vadbo pridobivanje funkcijskih sposobnosti najhitrejše in je njihov prenos v vsakodnevno uporabo najučinkovitejši.

Balance, the key component of movement

Recently researchers and therapists have devoted more and more resources to study the mechanisms of posture and balance. An important motivation for this increase of research are unexpected falls, that are particularly frequent in older adults. However, an increased amount of research has also been recently devoted to the balance of persons with chronic neurological conditions such as stroke, multiple sclerosis and Parkinson's disease, mostly related to the increased incidence of falls. Additionally, the topic of balance in high-performance recreational and top athletes has also been addressed. As physiotherapists, we are primarily interested in how these mechanisms can be best used for the treatment of balance of persons with various disabilities.

Why are posture and balance so important components of voluntary movement? An upright posture and balance are the basis for efficient movement and thus for most of everyday activities such as preparing food, dressing, personal hygiene, shopping, recreational activities and other activities of daily life. Since balance is also influenced by the type of movement task and the environment in which a person moves, factors that influence posture and balance are divided into intrinsic, i.e., the individual specific factors of the body, such as sensory flow, muscle performance, range of movement, cognitive and emotional factors; and extrinsic factors, i.e., the factors of the environment in which the movement takes place. For the coordination of balance, the information obtained from the visual, vestibular and somatosensory systems are processed and coordinated in the central nervous system, and serve as the basis for the appropriate reaction whether in preparation for movement, during the movement or in the event of a sudden destabilization. Additionally, it should be emphasized that balance is not only a complex motor skill, but has also a cognitive component that can interfere with posture and balance.

As of year 2015, at least 66 standardized protocols for the evaluation of posture and balance were described. Most of these tests evaluate three to five balance components from the following nine ones: static stability (body and limbs), dynamic stability, functional stability limits, underlying motor systems, sensory integration processes, verticality, anticipatory and reactive postural control and the effects of cognitive processes. The therapist's choice of one or more of the particular tests depends on the purpose of the evaluation and on the characteristics of the evaluated subjects.

The treatment of posture and/or balance is directly or indirectly an integral part of any physiotherapeutic treatment. Impairment of balance is the result of various injuries, diseases and conditions. Due to injuries, the balance may be also impaired in top athletes, in people who have suffered various injuries and diseases of the motor apparatus, diseases of the central and peripheral nervous system and, of course, in older adults, due to aging of the systems that regulate posture and balance. However, balance can also be the primary goal of treatment. There are the so-called balance-specific exercises. They are designed to take into account as many balance components as possible. Here it is important to bear in mind that balance is not an independent function – it is associated with various motor and cognitive tasks, which potentially compete for person’s attention. Therefore, the balance-specific exercises should be designed to be functional and as specific as possible. From the theory of motor learning it is known that with such training the acquisition of functional abilities is the fastest and their transfer to daily life the most efficient.

Direct Access Physiotherapy: Challenges and Benefits of the UK Model

Bradley Scanes, MSc Bsc (Hons) PGcert

Bradley Scanes Consultancy Limited, London, Velika Britanija

Korespondenca/Correspondence: Bradley Scanes, MSc Bsc (Hons) PGcert; e-pošta: brad@bscanesconsult.com

General practice doctors (GP) and/or orthopaedic specialists were once seen as the gatekeepers of musculoskeletal medicine. However physiotherapists are well placed and well skilled to assess and advise patients with musculoskeletal disorders without the need for a referral. Their training beyond simply the musculoskeletal field ensures they are a safe and specialist option to work as first-contact practitioners. Research shows they are an expert professional group (1) and have the same high safety record as general practice doctors, and are very cost effective.

Since 1977 physiotherapists in the UK have been able to act as first-contact practitioners and over the last 14 years, the physiotherapy's role has changed with the emergence of extended scope practitioners and first-contact practitioners, becoming a powerful resource in helping to shift the health paradigm from secondary to primary care, promoting patient choice and self management within an evidence based framework.

It used to be that patients with a musculoskeletal issue would present themselves to a GP and be managed there, but they would be referred to physiotherapy and/or orthopaedics for investigations. It is estimated that musculoskeletal issues account for 20% of GP appointments and are the most common cause of repeat appointments (2, 3, 4). However, now this GP time can be reduced, and the patient in question can receive the above from a physiotherapist, alongside some specialist advice, improving their journey.

This presentation aims to assess the challenges and benefits of providing a direct access model and evaluate some key research and case studies running such a service.

Literatura/References:

1. Childs JD, Whitman JM, Sizer PS, et al. A description of physical therapists' knowledge in managing musculoskeletal conditions. BMC Musculoskeletal Disorders. 2005; 6: 32. http:// bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/1471-2474-6-32.
2. Arthritis Research UK National Primary Care Centre. What do general practitioners see? Musculoskeletal Matters. Bulletin no. 1. Keele: Keele University; 2009. https://www.keele.ac.uk/ media/keeleuniversity/ri/primarycare/bulletins/MusculoskeletalMatters1.pdf.
3. Jordan K, Clarke AM, Symmons DP, et al. Measuring disease prevalence: a comparison of musculoskeletal disease using four general practice consultation databases. Br J Gen Pract. 2007; 57 (534): 7–14.
4. Royal College of General Practitioners Birmingham Research Unit. Weekly returns service annual prevalence report 2007. London: Royal College of General Practitioners; 2007.

Dynamic Neuromuscular Stabilization approach for low back pain, dysfunction and optimal performance

Alena Kobesova, PhD, MD, Assoc. Prof.; **Pavel Kolar**, PhD, PT

Department of rehabilitation and sports medicine, 2nd Faculty of medicine, Charles University, University hospital motol, Prague, Czech republic

Korespondenca/Correspondence: Alena Kobesova, PhD, MD, Assoc. Prof.; e-pošta: alenamudr@me.com

Dynamic Neuromuscular Stabilization (DNS) is a new rehabilitation strategy based on the principles of developmental kinesiology and the neurophysiological aspects of a maturing postural-locomotor system. The maturation of the postnatal central nervous system (CNS) and muscle function are related to anatomical maturation (morphological development). Postural activity occurs automatically in the course of maturation of the CNS via coordinated activity of muscles. Postural ontogenesis defines ideal posture from a developmental perspective. Optimal muscle coordination is ideal for joint loading and defines ideal motor stereotypes. The process is genetically determined and begins automatically during CNS maturation. At the age of 4.5 months, stabilization of the spine, pelvis and the chest in the sagittal plane is completed. Completion of basic sagittal stabilization is followed by the development of extremity movement patterns (i.e., supporting and stepping forward/grasping functions) coupled with trunk rotation. As such, the quality of trunk stabilization is essential for any phasic (dynamic) movement since each movement is preceded by stabilization of body segments to provide balance, efficient coordination and stability for its participating elements. DNS diagnosis is based on comparing the patient's stabilizing pattern to the developmental stabilization pattern of a healthy infant. The treatment approach emphasizes training of these ideal patterns as defined by developmental kinesiology. The brain must be properly stimulated and trained to automatically activate optimal movement patterns that are necessary for co-activation of the stabilizers. The ultimate strategy is to teach the brain to maintain central control and stability of the movement restored during therapy. This can be achieved by activation of the stabilizers when placing the patient in the developmental positions. DNS approach requires the patient's participation and compliance. Perception, i.e., the conscious feeling of the movement, is critical. The patient must differentiate between the correct "centrated movement" and the incorrect "decentrated movement" and be able to correct any "decentrated" segments. This ability depends on adequate body awareness. Daily exercise practice is a prerequisite for long lasting effects of the DNS approach to treat pain, prevent repetitive strain injury and enhance sports performance.

Mehanizmi delovanja fizioterapevtskih metod za zdravljenje mišične inhibicije in oslabelosti pri okvarah sklepov

doc. dr. **Alan Kacin**, dipl. fiziot.

Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana

Korespondenca/Correspondence: doc. dr. Alan Kacin, dipl. fiziot.; e-pošta: alan.kacin@zf.uni-lj.si

Oslabelost skeletnih mišic je neizbežna posledica poškodbe, bolezni ali operacije sklepov. Glavna dejavnika mišične oslabelosti sta 1) z mirovanjem povzročena mišična atrofija in 2) artrogena mišična inhibicija (AMI), ki nastane zaradi bolečine, vnetja in otekline ter okvare sklepnih mehanoreceptorjev (13). Pri ljudeh z artrozo kolka se izometrična mišična jakost adduktorjev kolka zmanjša za 25 % in abduktorjev kolka za 31 %. Podobno se izometrična in izokinetična jakost zmanjšata za 18 do 22 %, ekstenzorna mišična skupina pa ni izrazito prizadeta (1). Podoben, a še bolj izrazit vzorec zmanjšane jakosti se pojavi tudi po vstavitvi totalne endoproteze kolka (5). Deleži, ki jih posamezni dejavniki prispevajo k nastanku oslabelosti posameznih mišičnih skupin, ostajajo neznanka, jasno pa je, da pri okvarah kolka in kolena artrogena mišična inhibicija najbolj prizadene mišico kvadriceps femoris. Po vstavitvi totalne endoproteze kolena je kar 85 % upada jakosti te mišice na račun zmanjšane sposobnosti hotene aktivacije mišice, ki je posledica pretežno nebolečinskih dejavnikov (10). Podobno je artrogena mišična inhibicija, zlasti okvara gama zanke, najpomembnejši dejavnik kronične oslabelosti mišice kvadriceps femoris po kirurški rekonstrukciji sprednje križne vezi (9). Ta naj bi bila bilateralna, saj se oslabelost pojavlja tudi na nepoškodovanem udu (14, 16). Zanimivo je, da pri tej populaciji pacientov artrogena mišična inhibicija ne prizadene mišic fleksorjev kolena (8). Nekatere novejše raziskave sicer postavljajo pomen artrogene mišične inhibicije pri oslabelosti kvadricepsa femorisa pod vprašaj, saj so pokazale, da mišična atrofija pojasni večino zmanjšane mišične jakosti (4, 14). Mehanizmi delovanja fizioterapevtskih metod na mišično oslabelost so različni, zato je pomembno poznavanje glavnega vzroka oslabelosti pri vsakem posameznem pacientu. Če je glavni vzrok oslabelosti živčna inhibicija iz perifernih struktur, je učinkovita kombinacija hotenih kontrakcij in hkratne živčno-mišične električne stimulacije (3). Priliv inhibitornih dražljajev lahko dodatno zmanjšamo s krioterapijo ali TENS okvarjenega sklepa med mišično aktivnostjo (12). Če je glavni vzrok oslabelosti inhibicija zgornjega motoričnega nevrona, lahko aktivacijo mišice izboljšamo s transkranialno magnetno stimulacijo motorične skorje (15), vendar je njena širša uporaba zaradi zahtevnosti postopka omejena. Nabor fizioterapevtskih metod za spodbujanje mišične rasti je precej majhen zaradi prisotnosti artrogene mišične inhibicije in potrebe po razbremenjevanju okvarjenega sklepa. Poleg živčno-mišične električne stimulacije sta se za obetavni novi metodi izkazali tudi vibracijska vadba (2) in vadba proti majhnemu uporu z delno ovirano mišično prekrvavitvijo (ishemična vadba) (7, 11). Nedavna raziskava je pokazala, da lahko s kratkotrajno predoperativno pripravo z ishemično vadbo preprečimo upad vzdržljivosti mišice kvadriceps femoris po rekonstrukciji ACL (6). Za potrjevanje učinkovitosti in varnosti tovrstnih novih metod pri različnih patoloških stanjih gibal so potrebne nadaljnje raziskave.

Mechanisms of physiotherapeutic modalities used for treating muscle inhibition and weakness induced by joint impairments

Skeletal muscle weakness is inevitable negative effect of injury, disease or surgery of joints. Key factors of muscle deconditioning are 1) disuse muscle atrophy and 2) arthrogenic muscle inhibition (AMI). The AMI is driven by pain, inflammation and swelling, as well as damage of joint mechanoreceptors (13). Hip isometric adductor and abductor strength has been shown to be 25% and 31% lower in subjects with hip osteoarthrosis, respectively. Similarly, the hip isometric and isokinetic flexion strength was shown to be 18-22% lower, whereas hip extension strength does not seem to be affected by osteoarthrosis (1). A similar pattern has also been observed after total hip arthroplasty, with addition of substantial hip and knee extensors strength reduction (5). The relative contributions of various factors attributing to muscle weakness in different muscle groups remain unknown, but it is clear that Quadriceps Femoris (QF) muscle is the most affected by AMI from both hip and knee joints. As much as 85% of QF strength deterioration during the first 4 weeks after total knee arthroplasty has been shown to be brought about by inhibition of voluntary contraction, predominantly driven by non-painful stimuli (10). The AMI, especially the gamma loop dysfunction, has been also suggested to be the primary mechanism of long-term deficits in QF muscle strength in ACL reconstructed patients (9). The inhibition has been shown to be bilateral, as involved and uninvolved limb were shown to be affected (14, 16). Interestingly, the AMI has been demonstrated to be absent in hamstring muscles in this population (8). The importance of AMI in postoperative QF weakness has been recently put to question by several studies demonstrating that the major part of QF strength deficit can be accounted for by muscle atrophy rather than AMI (4, 14). Physiotherapeutic modalities targeting muscle weakness work through various physiological pathways; their efficiency thus depends on the primary cause of muscle weakness in a given individual. In case where peripheral inhibitory component is predominant, neuromuscular electric stimulation used in conjunction with voluntary contraction proved efficient (3). The inhibitory neural inflow from the affected joint can be attenuated prior to muscle activation by application of cryotherapy or TENS over the affected joint (12). If AMI is primarily driven by inhibition of upper motor neurons, a transcranial magnetic stimulation of motor cortex has been shown effective (15), however technical limitations hinder its more widespread clinical use. To enhance muscle growth, the range of effective modalities is substantially narrowed due to the AMI and limited mechanical loading of the affected joint. In addition to the neuromuscular electric stimulation, also vibration exercise (2) and low-load resistance exercise with blood flow restriction (ischemic exercise) (7, 11) have shown large potential for treating disuse atrophy. A recent study has demonstrated that short-term precondition with ischemic exercise can abolish loss of QF endurance after ACL reconstruction (6). Efficiency and safety of these modalities in various pathologic conditions need to be scrutinized in future studies.

Literatura/References:

1. Arokoski MH, Arokoski JPA, Haara M, Kankaanpää M, Vesterinen M, Niemitukia LH, Helminen HJ (2002). Hip muscle strength and muscle cross sectional area in men with and without hip osteoarthritis. The Journal of Rheumatology 29: 2185–95.
2. Belavy D, Miokovic T, Armbrecht G, Rittweger J, Felsenberg D (2009). Resistive vibration exercise reduces lower limb muscle atrophy during 56-day bed-rest. Journal of Musculoskeletal & Neuronal Interactions 9: 225–5.
3. Fitzgerald GK, Piva SR, Irrgang JJ (2003). A modified neuromuscular electrical stimulation protocol for quadriceps strength training following anterior cruciate ligament reconstruction. J OrthopSports PhysTher 33: 492–501.
4. Grapar Žargi T, Drobnič M, Vauhnik R, Koder J, Kacin A (2017). Predictive factors of quadriceps femoris muscle atrophy during first 12 weeks following ACL reconstruction. Knee, 24 (2): 319–28.
5. Jensen C, Aagaard P, Overgaard S (2011). Recovery in mechanical muscle strength following resurfacing vs standard total hip arthroplasty – a randomised clinical trial. Osteoarthritis and Cartilage 19: 1108–16.

6. Kacin A, Grapar Žargi T, Stražar K, Drobnič M (2016). Preconditioning with ischemic exercise preserves quadriceps femoris muscle endurance performance following ACL reconstruction. In: 21st Annual Congress of the European College of Sport Science21st Annual Congress of the European College of Sport Science, edited by Baca A. Vienna, Austria: ECSS, 92–3.
7. Kacin A, Strazar K (2011). Frequent low-load ischemic resistance exercise to failure enhances muscle oxygen delivery and endurance capacity. Scand J Med Sci Sports 21: e231–41.
8. Konishi Y, Fukubayashi T (2010). Relationship between muscle volume and muscle torque of the hamstrings after anterior cruciate ligament reconstruction. Journal of Science and Medicine in Sport 13: 101–5.
9. Konishi Y, Fukubayashi T, Takeshita D (2002). Mechanism of quadriceps femoris muscle weakness in patients with anterior cruciate ligament reconstruction. Scandinavian Journal of Medicine & Science in Sports 12: 371–5.
10. Mizner RL, Petterson SC, Stevens JE, Vandenborne K, Snyder-Mackler L (2005). Early quadriceps strength loss after total knee arthroplasty - The contributions of muscle atrophy and failure of voluntary muscle activation. Journal of Bone and Joint Surgery-American 87A: 1047–53.
11. Nielsen J, Aagaard P, Bech R, Nygaard T, Hvid L, Wernbom M, Suetta C, Frandsen U (2012). Proliferation of myogenic stem cells in human skeletal muscle in response to low-load resistance training with blood flow restriction. Journal of Physiology-London 590: 4351–61.
12. Pietrosimone BG, Hart JM, Saliba SA, Hertel J, Ingersoll CD (2009). Immediate Effects of Transcutaneous Electrical Nerve Stimulation and Focal Knee Joint Cooling on Quadriceps Activation. Medicine and Science in Sports and Exercise 41: 1175–81.
13. Rice DA, McNair PJ (2010). Quadriceps Arthrogenic Muscle Inhibition: Neural Mechanisms and Treatment Perspectives. Seminars in Arthritis and Rheumatism 40: 250–66.
14. Thomas AC, Wojtys EM, Brandon C, Palmieri-Smith RM (2016). Muscle atrophy contributes to quadriceps weakness after ACL reconstruction. Journal of Science and Medicine in Sport: 19 (1): 7–11.
15. Urbach D, Berth A, Awiszus F (2005). Effect of transcranial magnetic stimulation on voluntary activation in patients with quadriceps weakness. Muscle & Nerve 32: 164–9.
16. Williams GN, Buchanan TS, Barrance PJ, Axe MJ, Snyder-Mackler L (2005). Quadriceps weakness, atrophy, and activation failure in predicted noncopers after anterior cruciate ligament injury. American Journal of Sports Medicine 33: 402–7.

Zanesljivost mobilne aplikacije za merjenje obsega gibljivosti sklepov

Tjaž Brezovar, dipl. fiziot., dipl. inž. rad. tehnol.; doc. dr. **Miroljub Jakovljević**, viš. fiziot., univ. dipl. org.; doc. dr. **Renata Vauhnik**, dipl. fiziot.

Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana

Korespondenca/Correspondence: Tjaž Brezovar, dipl. fiziot., dipl. inž. rad. tehnol.; e-pošta: tjaz.brezovar@gmail.com

Uvod: Goniometrične meritve se uporabljajo za določanje točnega položaja sklepa in celotnega obsega giba v sklepu (5). Obstajajo različni načini merjenja obsega gibljivosti sklepov, najpogosteje pa se za ugotavljanje obsega gibljivosti kolenskega sklepa uporablja univerzalni goniometer. Zadnja leta se uveljavljajo načini merjenja, ki delujejo na podlagi analize digitalne fotografije, vendar te metode zahtevajo zapleten postopek, ki pa je z razvojem pametnih telefonov postal enostavnejši (1). Aplikacija DrGoniometer (DrG) na pametnem telefonu deluje kot virtualni goniometer, omogočala naj bi enostavnejše in hitrejše meritve obsega sklepne gibljivosti (2). Nove aplikacije je treba preveriti, predvsem njihovo zanesljivost in veljavnost (4). **Metode:** V raziskavo je bilo vključenih 31 preiskovank, starih od 18 do 25 let, brez predhodnih poškodb in obolenj merjenega kolenskega sklepa. Meritve so bile opravljene dvakrat, z vmesnim premorom 48 ur. Preiskovanka je ležala na hrbtu, na preiskovalni mizi, visoki 70 centimetrov. Pasivni gib je izvedla druga preiskovalka. Merilo se je po protokolu Jakovljević in Hlebš (3). Za statistično analizo je bil uporabljen intraklasni korelacijski koeficient (ICC) s 95-odstotnim intervalom zaupanja in minimalno zaznano spremembo. **Rezultati**: Zanesljivost preiskovalca pri mobilni aplikaciji je bila odlična tako pri merjenju pasivnega obsega fleksije ICC = 0,932 (95-odstotni interval zaupanja: 0,856–0,968) kot ekstenzije ICC = 0,910 (95-odstotni interval zaupanja: 0,812–0,957), $p < 0,001$. Minimalna zaznana sprememba pri merjenju pasivnega obsega ekstenzije je znašala 3,2° in pasivnega obsega fleksije 5,1°. **Zaključki:** Meritve obsegov gibljivosti sklepov z mobilno aplikacijo DrG so se izkazale kot odlično zanesljive tako pri merjenju ekstenzije kot pri merjenju fleksije v kolenskem sklepu. Podobna raziskava, v kateri so za merilni instrument prav tako uporabili aplikacijo DrG, navaja rezultate zanesljivosti preiskovalca pri merjenju obsega fleksije kolenskega sklepa ICC = 0,958 (2), ki so povsem primerljivi z našimi rezultati. Kljub zanesljivim rezultatom te raziskave sta za uporabo v klinični praksi potrebna dodatna standardizacija postopkov in sledenje določenemu protokolu, saj v splošnem za to tehniko ni definiran. Pomanjkljivost raziskave je, da je bila izvedena na zdravih posameznikih, na katerih je bila postavitev virtualnega goniometra lažje izvedljiva, kot bi bila v primeru čezmerno težkih bolnikov ali bolnikov s kostnimi deformacijami. Primerno bi bilo, da se izvedejo dodatne raziskave, ki bi vključevale tudi paciente in ne le zdrave posameznike.

Ključne besede: sklepna gibljivost, mobilna aplikacija, zanesljivost preiskovalca.

Reliability of mobile application for measuring joint range of motion

Background: Goniometric measurements are used to define precise joint position and joint range of motion (5). There are many different possibilities of range of motion measurements, but the classic handheld goniometer is the most common to measure knee range of motion. In the previous years, a new goniometry technique, which functions on the basis of digital photography analysis, has been established and the difficult process has also been simplified by the smart-phone revolution (1). The smart-phone application DrGoniometer (DrG) works on smartphones as a virtual goniometer, which offers easier and faster measurements of joint range of motion (2). However, the reliability and validity of these smart-phone applications must be verified (4). **Methods:** The study was conducted on a sample of 31 healthy female student volunteers, 18–25 years old, with no history of knee injuries or disease. The measurements were conducted twice within 48 hours. During the measurement, the subject was lying in a supine position on a table, 70 cm from the ground. The passive movement was carried out by the second physiotherapist. The protocol of Jakovljević and Hlebš was used (3). Agreement between two sets of measurements was assessed using intraclass correlation coefficient (ICC) with 95% confidence interval. Minimal detectable change was also calculated. **Results**: Intrarater reliability for smart-phone application showed excellent reliability when measuring passive flexion ICC=0.932 (95% confidence interval: 0.856–0.968) and passive extension ICC=0.910 (95% confidence interval: 0.812–0.957), $p<0.001$. Minimal detectable change values were 3.2° for extension measurements and 5.1° for flexion measurements. **Conclusion:** Smart-phone application DrG measurements of knee ROM show excellent intrarater reliability for both passive extension and passive flexion. A similar study from 2013 (2) suggests reliability of DrG when measuring knee ROM (ICC=0.958), which is comparable with the results of this study. Despite the good reliability of DrG in this study, it is necessary to determine a standard protocol for clinical use. A limitation of this study is that the participants were only healthy subjects, which made it easier to place a virtual goniometer than it would be in the case of overweight patients or patients with limb deformations. It would be good to conduct more research with patients, not only healthy subjects.

Key words: range of motion, smart-phone application, intrarater reliability.

Literatura/References:

1. Ferriero G, Sartorio F, Foti C, Primavera D, Brigatti E, Vercelli S (2011). Reliability of a new application for smartphone (DrG) for elbow angle measurement. Am J Phys Med Rehabil 3 (12): 1153–4.
2. Ferriero G, Vercelli S, Sartorio F in sod. (2013). Reliability of a smartphone-based goniometer for knee joint goniometry. Int J Rehabil Res 36 (2): 146–51.
3. Jakovljević M, Hlebš S (2011). Meritve gibljivosti sklepov, obsegov in dolžin udov. Ljubljana: Univerza v Ljubljani, Zdravstvena fakulteta, 13–48.
4. Milani P, Coccetta CA, Rabini A, Sciarra T, Massazza G, Ferriero G (2014). Mobile smartphone applications for body position measurement in rehabilitation: a review of goniometric tools. Am J Phys Med Rehabil 6 (11): 1038–43.
5. Norkin CC, White DJ (2009). Measurement of joint motion: a guide to goniometry, 4th edition. Philadelphia: F.A. Davis, 3–44.

Učinki kurkumina kot dodatka k fizioterapiji pri osebah z artrozo – pregled literature

Robert Šarman, dipl. fiziot.[1]; doc. dr. **Renata Vauhnik**, dipl. fiziot.[2]

[1]Fizioterapija Mana, Slovenska Bistrica; [2]Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana

Korespondenca/Correspondence: Robert Šarman, dipl. fiziot.; e-pošta: robisarman@gmail.com

Uvod: Artroza je eden glavnih vzrokov za omejeno fizično zmogljivost in slabšo kakovost življenja ljudi. Za artrozo ni zdravila, cilji zdravljenja so zmanjšanje bolečine, ohranjanje ali izboljševanje sklepne gibljivosti ter povečanje mišične zmogljivosti. Pri farmakološkem zdravljenju artroze se najpogosteje uporabljajo nesteroidna protivnetna zdravila, ki pa pogosto povzročajo neželene stranske učinke, zato so raziskave usmerjene v iskanje alternativnih, predvsem naravnih, netoksičnih spojin. Številne molekularne in nekaj kliničnih raziskav potrjujejo pozitivne antiinflamatorne, antioksidativne in antikatabolne učinke kurkumina, ki ga lahko uporabimo kot dodatek pri zdravljenju artroze (1, 2, 3, 4, 5). **Metode dela:** Iskanje znanstvene literature je potekalo v podatkovni bazi PubMed, in sicer z naslednjimi ključnimi besedami: osteoarthritis and curcumin ter osteoarthritis and curcumin and exercise. Iskanje je bilo omejeno na prosto dostopne članke oziroma raziskave v angleškem jeziku v obdobju med letoma 2000 in 2016 ter na raziskave, ki so vključevale preiskovance z artrozo. **Rezultati:** Glede na vključitvena merila je bilo vključenih šest raziskav, ki so vključevale učinke kurkumina z dodatki (npr. glukozamin, hondroitin itn.) ali brez njih pri pacientih z artrozo kolena. Rezultati obravnavanih raziskav so pokazali, da je kurkumin lahko učinkovito in varno zdravilo pri bolnikih z artrozo za zmanjševanje bolečine in posledično izboljšanje funkcije. **Zaključki:** Izziv preiskovalcev je slaba absorbcija in biološka razpoložljivost kurkumina, zato je bilo v literaturi opisanih že nekaj poskusov izdelave preparata z izboljšanimi navedenimi lastnostmi, vendar pa so potrebne še nadaljnje dobro načrtovane randomizirane kontrolirane raziskave s preverjanjem dolgotrajnih učinkov. Na enak način je treba določiti še minimalni dnevni odmerek z maksimalnim terapevtskim učinkom.

Ključne besede: artroza, kurkumin, vadba.

Effects of curcumin in addition to the physiotherapy in patients with osteoarthritis – literature review

Background: Osteoarthritis (OA) is one of the major causes of physical disability and it influences the quality of life. There's no cure for OA, the goals of treatments are reducing the pain, maintaining or improving range of motion and improving muscle capacity. With regard to pharmacological treatments non-steroidal anti-inflammatory drugs (NSAID) are the most often used treatment for OA, but they frequently cause adverse events, so alternative remedies, especially natural non-toxic compounds are under investigation. Many preclinical and only a few clinical studies showed positive anti-inflammatory, anti-oxidative and anti-catabolic effects of curcumin that can be used as an accessory therapy in OA treatment (1, 2, 3, 4, 5). **Methods**: Literature search was done using PubMed database and was limited to free accessible studies in English language on OA patients in the period 2000 – 2016. Key words used in English were: osteoarthritis and curcumin and osteoarthritis and curcumin and exercises. **Results:** Six studies on curcumin with or without associated compounds (i.e., glukozamine, chondroitine etc.) in knee OA patients were reviewed according to the inclusion criteria. Results showed that curcumin is a potential effective and safe treatment for OA patients to decrease pain and consequently improve function. **Conclusions:** Poor absorption and bioavailability of curcumin remains the main challenge for investigators. Several attempts have been described to improve the above mentioned properties of curcumin, but further randomized controlled clinical trials with long-term follow-up should be conducted. Minimal daily dose with maximal therapeutical effect should be also determined in the same manner.

Key words: osteoarthritis, curcumin, exercise.

Literatura/References:

1. Belcaro G, Cesarone MR, Dugall M, Pellegrini L, Ledda A, Grossi MG, Togni S, Appendino G (2010). Efficacy and safety of Meriva®, a curcumin-phosphatidylcholine complex, during extended administration in osteoarthritis patients. Altern Med Rev. 15 (4): 337–44.
2. Belcaro G, Dugall M, Luzzi R, Ledda A, Pellegrini L, Cesarone MR, Hosoi M, Errichi M. (2014). Meriva®+Glucosamine versus Condroitin+Glucosamine in patients with knee osteoarthritis: an observational study. Eur Rev Med Pharmacol Sci. 18 (24): 3959–63.
3. Nakagawa Y, Mukai S, Yamada S, Matsuoka M, Tarumi E, Hashimoto T, Tamura C, Imaizumi A, Nishihira J, Nakamura T. (2014).Short-term effects of highly-bioavailable curcumin for treating knee osteoarthritis: a randomized, double-blind, placebo-controlled prospective study. J Orthop Sci. 19 (6): 933–9.
4. Panahi Y, Rahimnia AR, Sharafi M, Alishiri G, Saburi A, Sahebkar A. (2014). Curcuminoid treatment for knee osteoarthritis: a randomized double-blind placebo-controlled trial. Phytother Res. 28 (11): 1625–31.
5. Sterzi S, Giordani L, Morrone M, Lena E, Magrone G, Scarpini C, Milighetti S, Pellicciari L, Bravi M, Panni I, Ljoka C, Bressi F, Foti C. (2016). The efficacy and safety of a combination of glucosamine hydrochloride, chondroitin sulfate and bio-curcumin with exercise in the treatment of knee osteoarthritis: a randomized, double-blind, placebo-controlled study. Eur J Phys Rehabil Med. 52 (3): 321–30.

Zdravljenje težkih hemofiličnih artropatij kolenskega sklepa

Petra Dovč, dipl. fiziot., univ. dipl. org.

Univerzitetni klinični center Ljubljana, Ortopedska klinika, Ljubljana

Korespondenca/Correspondence: Petra Dovč; e-pošta: petra.dovc@kclj.si

Uvod: Pri osebah s hemofilijo je kolenski sklep zaradi pogostih krvavitev vanj najpogosteje prizadet. (1) Prihaja do hudih artropatij, ki prizadenejo predvsem funkcijo in povzročajo stalno bolečino. Vstavitev totalne kolenske endoproteze močno vpliva na izboljšanje obsega gibljivosti ter na zmanjšanje omejitev. (2) Namen raziskave sta bili pred- in pooperativna ocena rezultatov lestvic KOOS (Knee Injury and Osteoartrithis Outcome Score) in KSS (Knee Society Score) pri primarnih in revizijskih vpetih totalnih kolenskih endoprotezah na Ortopedski kliniki v letih od 2010 do 2015. **Metode**: Raziskava vključuje 14 totalnih kolenskih endoprotez, opravljenih med letoma 2010 in 2015, pri 12 osebah moškega spola s hemofilijo. V desetih primerih je bila vstavljena primarna, pri štirih pa revizijska vpeta totalna kolenska endoproteza. Povprečna starost oseb ob operativnem posegu je bila 48 let (od 26 do 64 let), povprečen čas od operativnega posega pa 28 mesecev (od 4 do 56 mesecev). Raziskavo sva izvedla ortoped in fizioterapevtka, tako da sva vsak naredila svoj strokovni del. Rezultate sva nato obdelala in primerjala predoperativni in pooperativni rezultat opravljenih lestvic KOOS in KSS. Lestvica KOOS obsega pet sklopov: 1. bolečina, 2. simptomi, 3. vsakodnevna opravila, 4. šport in rekreacija ter 5. kakovost življenja. Lestvica KSS je sestavljena iz dveh delov: 1. ocena kolenskega sklepa (bolečina, fleksijska kontraktura, ekstenzijska kontraktura, obseg fleksije, osna deformacija, stabilnost) in 2. ocena funkcije (prehojena razdalja, hoja po stopnicah, uporaba pripomočkov za hojo). Pri dveh izmed štirinajst posegov oseba na svojo željo ni bila vključena v pred- in pooperativno rehabilitacijo, temveč je bila deležna le bolnišnične rehabilitacije. Vse obravnave so bile individualne in so vključevale metode fizikalne terapije, kinezioterapije in manualne terapije. **Rezultati**: Rezultati so odlični, saj se je na lestvici od 0 do 100 povprečna vrednost lestvice KOOS zvišala z 41 na 86 točk, povprečna vrednost lestvice KSS pa s 40 na 78 točk. **Zaključki**: Vstavitev totalne kolenske endoproteze pri osebah s hemofilijo pomembno vpliva na izboljšanje funkcije osebe in ji tako močno spremeni kakovost življenja.

Ključne besede: hemofilija, vpeta totalna kolenska endoproteza, funkcija, kakovost življenja.

Treatment of severe haemophilic arthropathy of the knee joint

Introduction: People with haemophilia frequently suffer from bleeding into a knee joint, a joint that is most susceptible to their diagnosis. (1) People suffer from arthropathies which affect function and cause constant pain. Total knee arthroplasty (TKA) has a major impact on improving the range of motion and reducing restrictions.(2) The purpose of this study is preoperative and postoperative evaluation of KOOS (Knee Injury and Osteoartrithis Outcome Score) and KSS (Knee Society Score) score results in primary and revision hinged TKA at the Ljubljana Orthopaedic Clinic from 2010 to 2015. **Methods**: This study includes 14 hinged TKA carried out between 2010 and 2015 with 12 male subjects with haemophilia. In ten cases a primary TKA was performed and in four cases a revision TKA. The average age of patients at the time of surgery was 48 years (from 26 to 64 years). The average time from surgery was 28 months (from 4 to 56 months). The research was conducted with an orthopaedic surgeon and a physiotherapist. We then processed results and compared preoperative and postoperative outcome of KOOS and KSS scales. KOOS scale comprises of five parts (1. Pain, 2. Symptoms, 3. Function in daily living, 4. Function in sports and recreation, 5. Knee related quality of life). KSS scale is composed of two parts; 1. Knee score (pain, flexion contracture, extension lag, total range of flexion, alignment, stability) and 2. Function (walking, stairs, walking aids used). In two of the 14 interventions a patient, at his own request, did not want to be included in the preoperative and postoperative outpatient rehabilitation, but has received only inpatient rehabilitation. All treatments were individual and included methods of physical therapy, kinesiotherapy and manual therapy. **Results**: Results are excellent. Average value of the KOOS scale increased from 41 points preoperatively, to 86 points postoperatively on a scale from 0 to 100. The average value of KSS increased from 40 preoperatively, to 78 points postoperatively. **Conclusions**: TKA in patients with haemophilia has a significant impact on improving the function and thus significantly changes the quality of life.

Key words: haemophilia, hinged total knee arthroplasty, function, quality of life.

Literatura/References:

1. Norian JM, Ries MD, Karp S, Hambleton J. Total knee arthroplasty in hemophilic arthropathy. J Bone Joint Surg Am. 2002; 84 (7): 1138–41.
2. Kamath AF, Horneff JG, Forsyth A, Nikci V. Total knee arthroplasty in hemophiliacs: gains in range of motion realized beyond twelve months postoperatively. Clin Orthop Surg. 2012; 4 (2): 121–8.

Objektivni in subjektivni rezultati po rekonstrukciji sprednje križne vezi ob uporabi presadka kit fleksorjev

Nataša Šipka, dipl. fiziot.; **Katarina Skaza**, dipl. fiziot.

Terme Zreče, Zreče

Korespondenca/Correspondence: Nataša Šipka, dipl. fiziot.; e-pošta: sipkanatasa@gmail.com

Uvod: Po rekonstrukciji kolenskega sklepa s kitami fleksorjev ter po intenzivni rehabilitaciji pred operacijo in po njej se bolniki lahko v kratkem času vrnejo na predpoškodbeno raven funkcionalnih aktivnosti (1). Obstaja več načinov testiranj, s katerimi ocenimo uspešnost operacije in rehabilitacije. Ne glede na rezultate objektivnih testiranj pa je najpomembnejše subjektivno mnenje bolnika, ki mu je bila narejena rekonstrukcija. V raziskavi smo merili in primerjali rezultate zdrave in operirane noge ter medsebojne povezave med objektivnimi in subjektivnimi meritvami šest mesecev po operaciji sprednje križne vezi. **Metode dela**: Sodelovalo je 65 zdravih bolnikov po operativni rekonstrukciji sprednje križne vezi s fleksorji kolenskega sklepa, s pridruženo poškodbo meniskusa in/ali hrustanca ali brez nje, brez radioloških sprememb in brez predhodnih operacij operirane ali nasprotne noge. Meritve so bili izvedene šest mesecev po artroskopiji kolenskega sklepa. Moč mišic kolenskega sklepa je bila merjena na izokinetičnem dinamometru Biodex 4 pro, ravnotežje je bilo merjeno s sistemom Biodex balance, objektivna stabilnost pa z artrometrom KT-1000. Od funkcionalnih testov smo uporabili enonožni skok v daljino – hop test. Za subjektivno oceno kolenskega sklepa smo uporabili Lysholomov vprašalnik in Tegnerjevo lestvico aktivnosti. **Rezultati:** Pri primerjavi rezultatov subjektivnega vprašalnika z večino objektivnih testov nismo našli statistično značilne razlike ($p > 0,05$). Statistično značilno razliko smo ugotovili le pri hop testu, pri katerem je korelacijski koeficient znašal 0,285, kar kaže na rahlo pozitivno povezanost. Pri primerjavi rezultatov zdrave in operirane noge smo ugotovili, da je razlika statistično značilna ($p < 0,05$). Izjema je bila le razlika pri testu ravnotežja ($p = 0,922$). **Zaključki**: Rezultati po rekonstrukciji sprednje križne vezi s kitami fleksorjev kolenskega sklepa po šestih mesecih niso primerljivi z rezultati nasprotne, zdrave noge. Povezav med objektivnimi in subjektivnimi testi ni, razen pri testu ravnotežja. Ta trditev je mogoče posledica dejstva, da slabih rezultatov pri subjektivni oceni ni bilo.

Ključne besede: sprednja križna vez, izokinetika, KT-1000, rekonstrukcija, subjektivni vprašalniki.

Objective and subjective results after anterior cruciate ligament reconstruction using hamstring tendons

Background: When the reconstruction with flexors tendons is made and patients have intensive pre- and post-surgery rehabilitation, they can return to the pre-injury level of functional activity in short term (1). Rehabilitation process and physiotherapy require insight into the subjective consequences as perceived by the patients in addition to the assessment of impairments by clinician-based measures. We collected subjective and objective predictors of functional knee joint performance in ACL reconstructed patient 6 months after operation. We compared the results of the operated and non-operated knee and subjective assessment with normative values. **Methods:** Sixty-five healthy subjects after unilateral ACL reconstruction with flexor tendons, with or without meniscal or/and chondral lesions, without radiographically seen abnormality, and without any operations on the legs before reconstruction, were included in this study. For follow-up measurements 6 months after ACL reconstruction we used the following measurement tools: isokinetic strength of the knee joint measured by the isokinetic dynamometer Biodex 4 pro, dynamic postural stability of the subject measured with the Biodex Stability System, and objective anterior-posterior knee laxity measurements performed with the KT-1000 arthrometer. One-legged hop test was used to assess functional performance. For subjective assessment we used Lysholm and Tegner questionnaire. **Results:** Statistically significant differences at functional performance measures were found between operated and non-operated leg ($P<0.05$), except for Balance results ($P=0.922$). Mean score of Lysholm questionnaire (5) was 93.8 points, their classification was found to correlate to the total score of normative values of Lysholm scale. The mean score for Tegner questionnaire (6) was 6. 55.4% patients have already returned to the pre-injury level of functional activity. **Conclusion:** Objective results of ACL reconstructed knees with flexors tendons at 6 months after surgery were very good and comparable to those of the opposite, healthy knees. The effectiveness of good rehabilitation and physiotherapy approach confirms higher scores of subjective scales.

Key words: anterior cruciate ligament, isokinetic testing, KT-1000, reconstruction, questionnaire.

Literatura/References:

1. Sajovic M, Strahovnik A, Dernovsek MZ, Skaza K (2011). Quality of life and clinical outcome comparison of semitendinosus and gracilis tendon versus patellar tendon autografts for anterior cruciate ligament reconstruction: an 11-year follow-up of a randomized controlled trial. Am J Sports Med; 39: 2161–9.
2. Carter TR, Edinger S (1999). Isokinetic evaluation of anterior cruciate ligament reconstruction: hamstring versus patellar tendon. Arthroscopy: The Journal of Arthroscopic and Related Surgery; 2 (15): 169–72.
3. Shi Dong-liang and Yao Zhen-jun (2011). Knee function after anterior cruciate ligament reconstruction with patellar or hamstring tendon: a meta-analysis. Chin Med J; 124 (23): 4056–62.
4. Mattacola GC, Perrin HD (2002). Strength, functional outcome, and postural stability after anterior cruciate ligament reconstruction. J Athl Train Jul-Sep; 37 (3): 262–8.
5. Kocher SK, Steadman JR, Briggs KK, Sterett WI, Hawkins RJ (2004). Relationships between objective assessment of ligament stability and subjective assessment of symptoms and function after anterior cruciate ligament reconstruction.

Kako poškodba spodnjega uda vpliva na ravnotežje pri športnikih, ki trenirajo atletiko

Marko Macuh, dipl. fiziot., MSc (UK)

Sheffield Hallam University, Faculty of health and well-being, City Campus, Howard street, Sheffield S1 1WB, UK

Korespondenca/Correspondence: Marko Macuh, dipl. fiziot, MSc; e-pošta: marko.macuh@gmail.com

Uvod: Poškodbe spodnjih udov vplivajo na kontrolo drže športnika. Za namen hitrega in enostavno dostopnega, kliničnega ocenjevanja ravnotežja je mogoča uporaba BESS (Balance Error Scoring System) in SEBT (Star Excursion Balance Test). Za oba testa literatura navaja, da sta veljavna in zanesljiva merilna pripomočka za odkrivanje poškodb spodnjih udov in posameznikov z večjim tveganjem (1, 3). Športniki, ki trenirajo atletiko, so bolj nagnjeni k poškodbam spodnjega uda in vračanju k aktivnosti z deficiti v ravnotežju (4). Testiranje statičnega in dinamičnega ravnotežja ter telesne kontrole bi lahko razkrilo poslabšanje ravnotežja pri skupini poškodovanih atletov oziroma pokazalo na razlike med poškodovanim in nepoškodovanim udom skupine poškodovanih atletov. **Metode:** V raziskavi je sodelovalo 30 atletov iz univerzitetne ekipe Sheffield Hallam University (VB), ki so bili na podlagi vprašalnika o zgodovini poškodb razdeljeni v skupini poškodovani oziroma nepoškodovani. Udeležence raziskave so med njihovim treningom testirali s prilagojenima različicama testov SEBT (3) in BESS (2). Ocenila sta jih neodvisna kvalificirana fizioterapevta. Dobljeni podatki so bili normalizirani glede na dolžino spodnjega uda in analizirani s programom SPSS. **Rezultati:** Rezultati analize niso pokazali na katero izmed značilnih razlik med poškodovanimi in nepoškodovanimi udeleženci tako za skupno vrednost SEBT (87,68 ± 8,1 proti 88,62 ± 8,9 odstotka; p = 0,776) in skupno vrednost BESS (24,1 ± 8,9 proti 21,3 ± 9,7 napake; p = 0,452). Prav tako nadaljnja analiza ni razkrila značilnih razlik med poškodovanim in nepoškodovanim udom znotraj skupine poškodovani. **Sklep:** Rezultati raziskave niso pokazali značilnih razlik med skupinama poškodovani in nepoškodovani pri skupini univerzitetnih atletov z uporabo SEBT in BESS in ne potrjujejo rezultatov iz literature, ki navaja razlike v sposobnosti ohranjanja ravnotežja kot posledice poškodbe. Prihodnje raziskave bi morale natančneje raziskati vpliv določene poškodbe spodnjega uda na kakovost ohranjanja ravnotežja pri vrhunskih atletih.

Ključne besede: ravnotežje, ohranjanje drže, poškodba spodnjega uda, SEBT, BESS, atleti.

How does the lower limb injury affect balance in track and field college athletes

Background: Lower limb injury affects postural control of an athlete. For the purpose of quick and easy assessable clinical assessment of balance BESS (Balance Error Scoring System) and SEBT (Star Excursion Balance Test) can be used. Both of the tests have been previously demonstrated as valid and reliable measurement tools for identifying lower limb injuries and participants at risk (1, 3). Track and field (T&F) athletes are likely to sustain lower limb injuries and tend to return to activity with balance deficits (4). Assessing static and dynamic postural control could reveal decreased balance of the injured group and reveal differences between the limbs in the injured group. **Methods:** For the purpose of the study 30 participants were recruited from Sheffield Hallam University T&F team and assigned to the Injured or Non-injured group according to the Questionnaire of Injury of history. Participants performed modified versions of SEBT (3) and BESS (2) test during their training session and were assessed by two independent qualified physiotherapists. The data was normalized to limb length and analysed with SPSS program. **Results:** Results of the analysis have not demonstrated any significant difference between injured and non-injured participants for total SEBT (87.68±8.1 vs. 88.62±8.9%; p=0.776) and total BESS (24.1±8.9 vs. 21.3±9.7 errors; p=0.452). Further analysis also has not showed any significant difference between injured and non-injured limb of the Injured group for both of the tests. **Conclusion:** Though research failed to demonstrate any significant differences between Injured and Non-injured group of college T&F athletes using SEBT and BESS, previous literature demonstrated that postural balance is affected by the injury. Future research should specifically look into effect of specific lower limb injury on postural balance using elite T&F athletes.

Key words: balance, postural control, lower limb injury, SEBT, BESS, athletes.

Literatura/References:

1. Bell D, Guskiewicz K, Clark M. et al. (2011). Systematic Review of the Balance Error Scoring System. Sports Health: A Multidisciplinary Approach, 3 (3), 287–96.
2. Docherty C, Valovich McLeod T, Shultz S (2006). Postural Control Deficits in Participants with Functional Ankle Instability as Measured by the Balance Error Scoring System. Clinic J Sport Med, 16 (3), 203–8.
3. Plisky PJ, Rauh MJ, Kaminski TW et al. (2006). Star Excursion Balance Test as a predictor of lower extremity injury in high school basketball players. J Orthop Sports Phys Ther, 36 (12), 911–9.
4. Steib S, Zech A, Hentschke C et al. (2013). Fatigue-induced alterations of static and dynamic postural control in athletes with a history of ankle sprain. J Athl Train, 48 (2), 203–8.

Varnost in učinkovitost vadbe hoje s premičnimi eksoskeleti pri pacientih z okvaro hrbtenjače – pregled literature

Janez Špoljar, dipl. fiziot.

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Janez Špoljar, dipl. fiziot.; e-pošta: janez.spoljar@ir-rs.si

Uvod: Eksoskelet je mehanska naprava, sestavljena iz motoriziranih ortoz, ki ju namestimo na delno ali popolnoma ohromela spodnja uda. Premični eksoskelet omogoča pacientu s popolno ali nepopolno okvaro hrbtenjače vadbo hoje po ravnem s spremstvom fizioterapevta. V primerjavi z vadbo hoje z opornicama za koleno, gleženj in stopalo je hoja s pomočjo eksoskeleta za pacienta s popolno okvaro telesno manj zahtevna (1). Pri pacientih z nepopolno okvaro se eksoskelet uveljavlja kot rehabilitacijski pripomoček (2). **Metode:** V podatkovni bazi PubMed smo iskali sistematične preglede literature, ki so ugotavljali varnost in učinkovitost vadbe hoje po ravnem s katerim koli motoriziranim premičnim eksoskeletom pri pacientih z okvaro hrbtenjače. Omejili smo se na literaturo v angleškem jeziku, objavljeno do konca leta 2016. **Rezultati:** V pregled smo vključili štiri sistematične preglede literature. Miller in sodelavci (3) so vključili 14 raziskav, v katerih so analizirali varnost in učinkovitost vadbe hoje s štirimi različnimi eksoskeleti. Louie in sodelavci (1) so v sistematični pregled vključili 15 raziskav, v katerih so analizirali različne vidike uporabe sedmih eksoskeletov. Federici in sodelavci (2) so v kvalitativno analizo vključili 27 raziskav, v katerih so raziskovali varnost in učinkovitost 14 različnih eksoskeletov. Lajeunessejeva in sodelavci (4) so analizirali sedem raziskav, v katerih so raziskovali možnosti uporabe in učinkovitost vadbe s tremi različnimi eksoskeleti. **Zaključki:** Novejše generacije eksoskeletov so za vadbo hoje z nadzorom fizioterapevta varne za uporabo (3). Hitrost hoje pri pacientih s popolno okvaro je višja od hitrosti hoje z drugimi pripomočki (1), vendar ostajajo pacienti za premičnost dolgoročno vezani na voziček (4). Večja učinkovitost vadbe hoje z eksoskeletom v primerjavi z drugimi fizioterapevtskimi postopki za izboljšanje hoje pri pacientih z nepopolno okvaro ni dokazana (2). Potrebne so randomizirane kontrolirane raziskave, ki bi primerjale učinkovitost vadbe z eksoskeleti z drugimi uveljavljenimi postopki za vadbo hoje. Poleg tega bi bilo treba analizirati stroškovno učinkovitost vadbe z eksoskeleti.

Ključne besede: robotika, premičnost, fizioterapija, rehabilitacija, nevrološka okvara.

Safety and effectiveness of gait training with mobile exoskeletons in patients with spinal cord injury – literature review

Background: Exoskeleton is a mechanical device, with built-in powered orthoses, which are mounted on paretic or plegic lower limbs. Mobile exoskeleton enables a patient with complete or incomplete spinal cord injury to walk overground with a physiotherapist accompanying them. In comparison to walking with knee-ankle-foot orthosis, walking with exoskeleton is less physically demanding for a complete spinal cord injured patient (1). In patients with incomplete injury exoskeleton is becoming recognizable as a rehabilitation tool (2). **Methods:** We searched systematic reviews about safety and effectiveness of overground gait training with any powered mobile exoskeleton in patients with spinal cord injury within PubMed database. We limited the search to papers in English published by the end of 2016. **Results:** Four systematic reviews were included in the review. Miller et al. (2016) included 14 studies, in which they analyzed safety and effectiveness of gait training with four different exoskeletons (3). Louie et al. (2015) included 15 studies, in which different aspects of seven different exoskeletons were analyzed (1). Federici et al. (2015) included 27 studies in quantitative analysis in which safety and effectiveness of 14 different exoskeletons was researched (2). Lajeunesse et al. (2015) analyzed seven studies, which studied possibility of usage and effectiveness of training with three different exoskeletons (4). **Conclusions:** Newer generations of exoskeletons are safe for gait training under supervision of physiotherapist (3). Gait velocity in patients with complete injury is higher than with other devices (1), but in the long term patients remain mobile only in the wheelchair (4). In patients with incomplete injury effectiveness of gait training with exoskeletons in comparison to other physiotherapeutic procedures for improving gait is not proven (2). Randomized controlled trials are needed to compare effectiveness of exoskeleton gait training with other established gait training procedures. Cost effectiveness of gait training with exoskeletons should also be analyzed.

Key words: robotics, mobility, physiotherapy, rehabilitation, neurological impairment.

Literatura/References:

1. Louie DR, Eng JJ, Lam T (2015). Gait speed using powered robotic exoskeletons after spinal cord injury: a systematic review and correlation study. J Neuroeng Rehabil 12: 82. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4604762/ <15. 2. 2017>.
2. Federici S, Meloni F, Bracalenti M, De Filippis ML (2015). The effectiveness of powered, active lower limb exoskeletons in neurorehabilitation: a systematic review. NeuroRehabilitation 37 (2015): 321–40.
3. Miller LE, Zimmermann AK, Herbert WG (2016). Clinical effectiveness and safety of powered exoskeleton-assisted walking in patients with spinal cord injury: systematic review with meta-analysis. Med Devices (Auckl) 2016: 9. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4809334/ <14. 2. 2017>.
4. Lajeunesse V, Vincent C, Routhier F, Careau E, Michaud F (2015). Exoskeletons` design and usefulness evidence according to a systematic review of lower limb exoskeletons used for functional mobility by people with spinal cord injury. Disabil Rehabil Assist Technol 11 (7): 535–47.

Izidi testa hoje na deset metrov in šestminutnega testa hoje pri pacientih z nepopolno okvaro hrbtenjače – retrospektivna študija

Maja Marn Radoš, dipl. fiziot.; **Tea Drev**, dipl. fiziot.; **Janez Špoljar**, dipl. fiziot.

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Maja Marn Radoš, dipl. fiziot.; e-pošta: maja.rados@ir-rs.si

Uvod: Test hoje na deset metrov in šestminutni test hoje sta pri pacientih z nepopolno okvaro hrbtenjače pogosto uporabljena testa za oceno hoje. Barbeau in sodelavci (2007) so poročali, da hitrost hoje vsaj 0,8 m/s nakazuje na samostojno in funkcionalno hojo (1). Z mednarodno standardizirano lestvico ameriškega združenja za paciente z okvaro hrbtenjače (American spinal injury association impairment scale – ASIA) s stopnjama C in D ocenjujemo nepopolno okvaro. Povprečna hitrost hoje pacientov, uvrščenih v ASIA D, je bila od 0,73 m/s do 0,87 m/s (2) oziroma 1,37 m/s pri pacientih, ki so bili vsaj šest mesecev po okvari (3). Povprečna prehojena razdalja na šestminutnem testu hoje je bila 382,4 metra (3). Namen študije je bil ugotoviti hitrost sproščene hoje in prehojeno razdaljo v šestih minutah pri pacientih z nepopolno okvaro hrbtenjače ob koncu rehabilitacijske obravnave glede na ASIA stopnjo okvare. **Metode:** V študijo smo vključili 106 pacientov z nepopolno okvaro hrbtenjače (44 ASIA C, 62 ASIA D), ki so zaključili rehabilitacijo na Univerzitetnem rehabilitacijskem inštitutu Republike Slovenije - Soča od začetka leta 2014 do konca leta 2016. Pacienti s stopnjo okvare ASIA C so bili povprečno stari 56,9 leta (SO 17,1) in 4,3 meseca (SO 1,7) po okvari. Pacienti s stopnjo okvare ASIA D so bili povprečno stari 61,9 leta (SO 16,4) in 3,2 meseca (SO 1,2) po okvari. Pridružena nevrološka ali ortopedska bolezen in/ali poškodba je bila izključitveno merilo. Podatke smo zbirali iz medicinske dokumentacije in fizioterapevtskih testov hoje na deset metrov in iz šestminutnega testa hoje. Opisne statistike smo analizirali s programom Office Excel 2013. **Rezultati:** Povprečna hitrost sproščene hoje je bila za paciente s stopnjo okvare ASIA C 0,43 m/s (SO 0,32), povprečna prehojena razdalja je bila 139,7 metra (SO 107,9). Povprečna hitrost sproščene hoje je bila za paciente s stopnjo okvare ASIA D 0,98 m/s (SO 0,48), povprečna prehojena razdalja je bila 312,7 metra (SO 152,1). **Zaključek:** Hitrost hoje pacientov s stopnjo okvare ASIA D je bila primerljiva z ugotovitvami drugih raziskovalcev (2, 3). Prehojena razdalja na šestminutnem testu hoje je bila v našem primeru krajša, kot so jo ugotavljali drugi raziskovalci (3). Povprečnih vrednosti pacientov s stopnjo okvare ASIA C ne moremo primerjati z drugimi raziskovalci, ker teh podatkov v raziskavah ni. Hitrost hoje in dolžina prehojene razdalje sta bili pričakovano višji pri pacientih s stopnjo okvare ASIA D v primerjavi z ASIA C.

Ključne besede: okvara hrbtenjače, ASIA C, ASIA D, časovno merjeni testi hoje.

Outcomes of 10-meter walk test and 6-minute walk test in patients with incomplete spinal cord injury – retrospective study

Background: 10-meter walk test and 6-minute walk test are the most frequently used tests for assessing walking ability in patients with incomplete spinal cord injury. Barbeau et al. (1) reported that walking speed over 0.8 m/s was associated with functional walking without assistance (1). With the American spinal injury association impairment scale (ASIA) incomplete spinal cord injury is assessed with ASIA C and D. Average gait speed for ASIA D graded patients was from 0.73 m/s to 0.87 m/s (2). Patients who were at least six months after injury had walking speed of 1.37 m/s (3). Average walking distance at 6-minute walk test was 382.4 meters (3). The purpose of the study was to determine walking speed and walking distance in six minutes in patients with incomplete spinal cord injury at the end of rehabilitation process according to ASIA scale. **Methods:** 106 patients with incomplete spinal cord injury were included in the study. 44 were graded as ASIA C and 62 as ASIA D. All ended rehabilitation process at University rehabilitation institute of Republic of Slovenia - Soča from the beginning of 2014 till the end of 2016. Mean age of patients graded with ASIA C was 56.9 years (SD 17.1) and they were 4.3 months (SD 1.7) after injury. Mean age of patients graded with ASIA D was 61.9 years (SD 16.4) and they were 3.2 months (SD 1.2) after injury. Other neurological or traumatic disease or injury was exclusion criteria. Data were collected from medical documentation and physiotherapy 10-meter walk test and 6-minute walk test. Descriptive statistics were analyzed with Office Excel 2013. **Results**: Mean walking speed for patients graded with ASIA C was 0.43 m/s (SD 0.32), mean walking distance was 139.7 meters (SD 107.9). Mean walking speed for patients graded with ASIA D was 0.98 m/s (SD 0.48), mean walking distance was 312.7 meters (SD 152.1). **Conclusions:** Walking speed of patients graded with ASIA D was comparable with findings of other researchers (2, 3). Walking distance at 6-minute walk test was in our case shorter than the mean distance of other researchers (3). Mean walking parameters for patients graded with ASIA C cannot be compared with other researchers because there are no such data. Walking speed and distance were better in persons graded with ASIA D than ASIA C as it was expected.

Key words: spinal cord injury, ASIA C, ASIA D, timed walking tests.

Literatura/References:

1. Barbeau H, Elashoff R, Deforge D, Ditunno J, Saulino M, Dobkin BH (2007). Comparison of speeds used for the 15.2-meter and 6-minute walks over the year after an incomplete spinal cord injury: the SCILT Trial. Neurorehabil Neural Repair 21 (4): 302–6.
2. Lemay JF, Nadeau S (2010). Standing balance assessment in ASIA D paraplegic and tetraplegic participants: concurrent validity of the Berg balance scale. Spinal Cord 48 (3): 245–50.
3. Olmos LE, Freixes O, Gatti MA, Cozzo DA, Fernandez SA, Vila CJ, Agrati PE, Rubel IF (2008). Comparison of gait performance on different environmental settings for patients with chronic spinal cord injury. Spinal Cord 46 (5): 331–4.

Razvrstitev funkcijske premičnosti: ugotavljanje veljavnosti konstrukta pri pacientih po možganski kapi

Edita Behrić, dipl. fiziot.

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Edita Behrić, dipl. fiziot.; e-pošta: behric.edita@gmail.com

Uvod: Za ocenjevanje sposobnosti hoje je bilo v slovenskem jeziku priporočenih oziroma prevedenih že več merilnih orodij. Razvrstitev funkcijske premičnosti (angl. functional ambulation classification − FAC) je hitra in enostavna 6-stopenjska lestvica, ki razvršča paciente glede na njihovo sposobnost za hojo. Pri tem ocenjuje samostojnost oziroma količino potrebne pomoči ali nadzora drugih oseb (1). Na slabšo premičnost pacientov po možganski kapi odločilno vplivajo motnje ravnotežja, ki so tako eden najpomembnejših napovednih dejavnikov sposobnosti hoje (2, 3). Ravnotežje pri pacientih po možganski kapi ocenjujemo z različnimi merilnimi orodji. Bergova lestvica za oceno ravnotežja obsega 14 gibalnih nalog, ki predstavljajo elemente splošne premičnosti pacienta (4). Namen raziskave je bil preveriti veljavnost konstrukta pri pacientih po možganski kapi. **Metode:** V raziskavo je bilo vključenih 12 pacientov, ki so bili na rehabilitaciji na URI - Soča. Raziskavo je odobrila komisija za medicinsko etiko 1. februarja 2016. Vzorec je bil izbran priložnostno, tako da so bili vključeni pacienti z različnimi sposobnostmi hoje, s čimer je bila vnaprej zagotovljena enakomerna porazdelitev po kategorijah lestvice FAC. Ob sprejemu smo pri preiskovancu ocenili sposobnost hoje z lestvico FAC, z Bergovo lestvico pa smo ocenili ravnotežje. Za ugotavljanje povezanosti med oceno FAC in seštevkom točk Bergove lestvice je bil izračunan Spearmanov korelacijski koeficient (r_o). **Rezultati:** Med FAC in Bergovo lestvico za oceno ravnotežja smo ugotovili zelo visoko povezanost ($r_o = 0{,}989$; $p < 0{,}01$). **Zaključki:** Rezultati raziskave kažejo na odlično veljavnost konstrukta FAC, zato jo priporočamo kot dopolnitev že uveljavljenih merilnih orodij za ocenjevanje sposobnosti hoje pri pacientih po možganski kapi.

Ključne besede: FAC, Bergova lestvica, ravnotežje, hoja, možganska kap.

Functional ambulation classification: determining the validity of the construct in patients after stroke

Background: A lot of measuring tools for evaluating the ability of walking have been recommended and translated in Slovene language. Functional ambulation classification (FAC) is a fast and simple 6-point scale, which classifies patients according to their walking ability. It assesses independency and/or level of human support or supervision the patient requires to walk (1). Balance disorders have a decisive impact on poor mobility of patients after stroke, and are also one of the most important prognostic factors for walking ability (2, 3). There are a lot of measuring tools used for assessing balance in patients after stroke. Berg balance scale comprises 14 motor tasks, which represent general mobility of the patient (4). The purpose of this study was to verify the validity of the construct in patients after stroke. **Methods:** The study included 12 patients who had been in rehabilitation at URI - Soča. The study was approved by Medical Ethics Committee on February 1, 2016. The sample was selected conveniently, so that the included patients had different abilities of walking. Thereby the uniform distribution by category of FAC scale was ensured in advance. At admission we evaluated the patient´s ability of walking using FAC scale, and the balance using Berg balance scale. To determine the correlation between the FAC score and the Berg balance scale score, we used Spearman correlation coefficient (r_o). **Results:** We found very high correlation between the FAC scale and the Berg balance scale ($r_o = 0.989$; $p < 0.01$). **Conclusions**: The results show excellent validity of FAC construct. Its use is recommended in addition to the other standardised measurement tools for assessment of walking ability in patients after stroke.

Key words: FAC, berg balance scale, balance, walking, stroke.

Literatura/References:

1. Puh U, Behrić E, Zatler S, Rudolf M, Kržišnik M (2016). Razvrstitev funkcijske premičnosti: zanesljivost posameznega preiskovalca in med preiskovalci pri pacientih po možganski kapi. Fizioterapija 24 (2): 1–12.
2. Michael KM, Allen JK, Macko RF (2005). Reduced ambulatory activity after stroke: the role of balance, gait and cardiovascular fitness. Arch Phys Med Rehabil 86: 1552–56.
3. NG S (2010). Balance ability, not muscle strength and exercise endurance determines the performance of hemiparetic subjects on the timed-sit-to-stand test. Am J Phys Med Rehabil 89 (6): 497–504.
4. Rugelj D, Palma P (2013). Bergova lestvica za oceno ravnotežja. Fizioterapija 21 (1): 15–21.

Vpliv kombinacije dveh nevrofizioterapevtskih pristopov na mišično moč in vzdržljivost oseb z Downovim sindromom

pred. mag. **Tine Kovačič**, dipl. fiziot.[1]; **Franjo Kropej**, dipl. fiziot.[2]; doc. dr. **Miha Kovačič**[3]

[1]Alma Mater Europaea – Evropski center Maribor, Maribor; [2]Center za varstvo in delo Golovec, Celje; [3]Štore Steel d.o.o, Štore

Korespondenca/Correspondence: pred. mag. Tine Kovačič, dipl. fiziot.; e-pošta: tine.kovacic2@triera.net

Uvod: Downov Sindrom je motnja, ki jo sestavljajo številne prirojene anomalije zaradi odvečnega 21. kromosoma (1). Nedavne študije na populaciji oseb z Downovim sindromom kažejo, da se večina od njih spoprijema s pomembno in raznoliko paleto zdravstvenih težav, telesno nedejavnostjo, zaostankom v grobi gibalni funkciji, ligamentozno laksnostjo, hipotonijo in slabšo mišično močjo ter vzdržljivostjo, nestabilnostjo sklepov, prav tako pa je zelo malo znanega o količini in kakovosti prejetih fizioterapevtskih storitev (2–4). Naraščajoča zahteva po celostnem pristopu pri večdisciplinarni habilitaciji otrok, mladostnikov in odraslih z Downovim sindromom potrebuje raziskovalni protokol, ki bi znanstveno ocenil kratkoročni vpliv razvojnonevrološke obravnave v kombinaciji s proprioceptivno živčno-mišično facilitacijo na izboljšanje mišične moči in vzdržljivosti pri tej populaciji. **Metode:** Izvedli smo pilotsko študijo z uporabo protokola randomizirane klinične študije. Uporabili smo veljavne in zanesljive funkcijske teste zdravstvenega programa specialne olimpijade Zabavni fitnes (5) za oceno mišične jakosti mišic ekstenzorjev kolka in kolena, abdominalnih mišic, troglave nadlahtne mišice, mišic ramenskega obroča in lopatic, mišic dlani in podlahti. V pilotsko študijo je bilo vključenih 16 otrok, mladostnikov in odraslih z Downovim sindromom, naključno razvrščenih v eksperimentalno (N = 8) in kontrolno skupino (N = 8). Tako eksperimentalna kot kontrolna skupina sta v štirimesečnem kombiniranem nevrofizioterapevtskem programu prejeli razvojnonevrološko obravnavo dvakrat na teden po dve uri, eksperimentalna skupina pa je bila poleg razvojnonevrološke obravnave deležna še proprioceptivne živčno-mišične facilitacije. **Rezultati:** Osebe z Downovim sindromom v eksperimentalni in kontrolni skupini se v začetnih meritvah mišične moči in vzdržljivosti niso bistveno razlikovale ($p > 0,05$). Po koncu štirimesečnega fizioterapevtskega programa je prišlo do statistično pomembnih razlik v rezultatih povprečnih vrednosti pri vseh štirih funkcijskih testih za oceno mišične jakosti med eksperimentalno in kontrolno skupino ($p < 0,05$), in sicer v prid slednji. Analiza rezultatov v eksperimentalni skupini je prav tako pokazala, da je prišlo do statistično pomembnega izboljšanja, razen pri oceni mišične jakosti dominantne roke ($p > 0,05$). **Zaključki:** Rezultati pilotske študije kažejo, da bi razvojnonevrološka obravnava v kombinaciji s proprioceptivno živčno-mišično facilitacijo lahko bila uporabna v programu za izboljšanje mišične moči in vzdržljivosti teh oseb. Ker je to v Sloveniji ena prvih pilotskih študij, ki preučuje vpliv razvojnonevrološke obravnave v kombinaciji s proprioceptivno živčno-mišično facilitacijo na izboljšanje mišične moči in vzdržljivosti pri osebah z Downovim sindromom, so kakršne koli končne ugotovitve prezgodnje, saj so v nadaljevanju potrebne večje randomizirane klinične študije, ki bodo upoštevale kratkoročne in dolgoročne vplive kombinacije nevrofizioterapevtskih konceptov na večjem vzorcu oseb z Downovim sindromom.

Ključne besede: otroci, mladostniki, odrasli z Downovim sindromom, mišična moč, mišična vzdržljivost, proprioceptivna živčno-mišična facilitacija, RNO.

Impact of combination of two neurophysiotherapy approaches on muscle strength and endurance in persons with Down Syndrome

Background: Down's syndrome (DS) is a disorder consisting of many congenital abnormalities due to excess 21st chromosome (1). A recent research in population of persons with DS indicates that most of them face a significant and diverse range of health challenges, physical inactivity, delay in gross motor function, ligamentous laxity, hypotonia, decreased muscle strength and endurance, and that little is known about the quantity and quality of physiotherapy services received (2–4). Growing demand for integrated multi-disciplinary approach in habilitation of children, adolescents and adults with Down syndrome requires a research protocol to scientifically assess the impact of neurodevelopmental treatment (NDT) in combination with proprioceptive neuromuscular facilitation (PNF) approach on improvement in muscle strength and endurance in population with DS. **Methods:** We made a pilot study using a randomized clinical study protocol. Valid and reliable functional tests from Special Olympics Healthy Athletes program Fun fitness (5) were applied to assess muscle strength and endurance for hip and knee extensors muscles, abdominal muscles, triceps, shoulder and scapular muscles, hand and forearm muscles. In a pilot study, involving 16 children, adolescents, adults with DS, who were randomized into an experimental (N = 8) and control group (N = 8). Both, the experimental and the control group received in the 4-month period NDT 2 times per week (60 minutes per session), the experimental group of persons with DS additionally received PNF session 2 times per week (30 minutes per session). **Results:** The two groups of people with DS did not differ in baseline scores for muscle strength and endurance ($p>0.05$). After 4 months of neurophysiotherapy program there were statistically significant differences ($p<0.05$) in all results of 4 functional tests for muscle strength and endurance between the experimental and the control group in favour of the experimental group. After within-group statistics, we acknowledged a statically significant improvement in the experimental group ($p<0.05$) in all 4 functional tests, except with the results for hand grip test for dominant hand ($p>0.05$). **Conclusions:** Results from our pilot study suggest that NDT in combination with PNF can be a useful combination of two neurophysiotherapy approaches in order to improve muscle strength and endurance in people with DS. Since this is one of the first pilot studies in Slovenia, which examines the impact of NDT and PNF to improve muscle strength and endurance in individuals with DS, any final conclusions are premature. Additional research is needed for major randomized clinical studies that will consider the short-term and long-term effects of combination of the two neurophysiotherapy approaches.

Key words: children, adolescents, adults with Down syndrome, muscle strength, muscle endurance, PNF, NDT.

Literatura/References:

1. Cunningham C. Downov sindrom: Priročnik za starše in skrbnike. Ljubljana: Zavod Republike Slovenije za šolstvo 2016; 11.
2. Gupta S, Rao BK (2011). Effect of strength and balance training in children with down's syndrome: A randomized controlled trial. Clin Rehab 25 (5): 425–32.
3. Mendonca GV, Pereira FD, Fernhall B (2011). Effects of combined aerobic and resistance exercise training in adults with and without Down syndrome. Arch Phys Med Rehabil 92 (1): 37–45.
4. Winders PC (2001). The Goal and Opportunity of Physical Therapy for Children with Down Syndrome. Down Syndrome: Health Issues 6 (2); 1–5. http://www.ds-health.com/physther.htm <28. 2. 2017>.
5. Bainbridge D, Gleason J, Tilley V (2013). Special Olympics Fun Fitness: Learn how to Organize, Promote and Present. Special Olympics International. Fun Fitness Manual. USA.

Izboljšanje obsega gibljivosti in zmožnosti gibanja otrok s cerebralno paralizo po vadbi hoje na lokomatu

Irena Pišek, dipl. fiziot.[1]; **Neža Majdič**, dr. med.[1]; **Zala Novak**, dr. med.[1]; dr. **Katja Groleger Sršen**, dr. med.[1,2]

[1]Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana; [2]Univerza v Ljubljani, Medicinska fakulteta, Ljubljana

Korespondenca/Correspondence: Irena Pišek, dipl. fiziot.; e-pošta: irena.pisek@ir-rs.si

Uvod: Za cerebralno paralizo (CP) so značilne težave pri nadzoru drže in gibanja, na podlagi katerih lahko otroke s CP razvrstimo v eno izmed petih stopenj sistema razvrščanja otrok s CP na podlagi funkcij grobe motorike (angl. Gross Motor Function Classification System – GMFCS) (1). Ena izmed možnosti za vadbo hoje pri otrocih s CP je vadba na robotski napravi Lokomat. Rezultati raziskav kažejo, da ima omenjena vadba pozitivne učinke na izboljšanje pasivne gibljivosti spodnjih udov (2), ravnotežje (3) ter stojo in hojo (4). V raziskavi smo želeli ugotoviti, kakšen vpliv ima vadba hoje na lokomatu na pasivni obseg gibljivosti sklepov spodnjih udov, zmožnost vstajanja in hitrost hoje pri otrocih z različnimi stopnjami GMFCS. **Metode:** V retrospektivno analizo rezultatov smo vključili priročni vzorec vseh otrok s cerebralno paralizo (stopnje GMFCS I–IV), ki so od leta 2010 do 2016 na lokomatu opravili več kot deset treningov (n = 66; 45 fantov; 21 deklet; povprečna starost 11 let). Pri vseh teh otrocih smo pred koncem vadbe in po njem opravili meritve pasivne gibljivosti sklepov spodnjih udov, pri tistih, ki so bili zmožni hoje, pa smo izvedli še test vstani in pojdi ter test hoje na deset metrov. Za obravnavane spremenljivke smo izračunali opisne statistike. Za primerjavo srednjih vrednosti spremenljivk smo uporabili parni test t. Za primerjavo absolutnih izboljšanj gibljivosti in testov hoje med skupinami otrok z različnimi stopnjami na podlagi sistema razvrščanja otrok s CP (angl. GMFCS) smo uporabili enosmerno analizo variance (ANOVA), za vse parne primerjave pa Tukeyjev test. Mejo statistične značilnosti smo postavili pri p = 0,05. **Rezultati:** Po končani vadbi hoje na lokomatu smo pri vseh otrocih s CP ugotovili statistično značilno izboljšanje gibljivosti vseh sklepov spodnjih udov ($p < 0,001$). Ko smo primerjali rezultate pasivne gibljivosti sklepov spodnjih udov, pri otrocih s CP v različnih stopnjah na podlagi sistema razvrščanja otrok s CP ni bilo statistično pomembnih razlik. Ugotovili smo statistično značilno izboljšanje rezultatov testa vstani in pojdi ($p = 0,002$), ne pa tudi izboljšanja rezultatov hoje na deset metrov ($p = 0,219$). Do statistično značilnega izboljšanja rezultatov obeh omenjenih testov je prišlo pri otrocih s CP s stopnjo GMFCS IV na podlagi sistema razvrščanja otrok s CP (angl. GMFCS) ($p < 0,02$). **Zaključki:** Rezultati analize so pokazali, da je vadba hoje na lokomatu pripomogla k izboljšanju pasivne gibljivosti spodnjih udov pri vseh vključenih otrocih s CP, ne glede na stopnjo razvrščanja otrok s CP. Vadba je pripomogla tudi k zmožnosti vstajanja, hitrost hoje pa se ni bistveno izboljšala.

Ključne besede: cerebralna paraliza, otroci, lokomat, hoja, obseg gibljivosti.

Improvement of range of movement and movement ability in children with cerebral palsy after gait training on lokomat

Background: Cerebral palsy (CP) is characterized, among other features, by difficulties in posture and movement control. Based on the level of gross motor function, children with CP are classified into one of five levels of Gross Motor Function Classification System (GMFCS) (1). One of the possibilities for improvement of gait in children with CP is robot assisted gait training on Lokomat. Such an exercise has been reported to have a positive effect on the passive mobility of the lower limbs (2), balance (3), and ability to stand up and walk (4). In this study we wanted to determine what an impact the exercise on Lokomat could have on the passive range of motion (ROM) in the joints of lower limbs, the ability of getting up and walking speed in children with varying levels of GMFCS. **Methods:** In a retrospective analysis we have included the sample of all children with CP (GMFCS levels I-IV), who were in the period from 2010 to 2016 engaged in Lokomat training and had more than 10 training sessions (n = 66; 45 males, 21 females; mean age 11 years). All children were tested before and after the completion of the program. We performed measurements of passive ROM of the lower limbs, for children that were able to walk, we performed also Up&Go test and 10 m walk test. For all variables we calculated descriptive statistics. To compare the mean values of the variables we used the paired t-test. For a comparison of the absolute improvement in mobility and walking tests between groups of children with different levels of GMFCS we used one-way analysis of variance (ANOVA), for all pairwise comparisons we used Tukey's test. The limit of statistical significance was set at $p = 0.05$. **Results:** There was a statistically significant improvement in ROM in all joints of the lower limbs ($p < 0.001$) in all children after the Lokomat program. For children in various levels of GMFCS, there were no statistically significant differences between changes in ROM. There was a statistically significant improvement for Up&Go test ($p = 0.002$), while there was no statistically significant improvement in 10 m walk test ($p = 0.219$). The statistically significant improvement of Up&Go and 10 m walk test was in children in GMFCS level IV ($p < 0.02$). **Conclusions:** The results showed that Lokomat training had significant positive effect on the improvement of the passive ROM in lower limbs for all children, regardless of the level of GMFCS. Lokomat training has also improved the ability of standing up and go, while there were no statistically significant improvements in walking speed.

Key words: cerebral palsy, children, Lokomat, walking, range of movement.

Literatura/References:

1. Palisano R, Rosenbaum P, Walter S, et al (1997). Development and reliability of a system to classify gross motor function in children with cerebral palsy. Dev Med Child Neurol 39: 214–23.
2. Vrečar I, Majdič N, Jemec Štukl I, Damjan H, Groleger Sršen K (2013). Spremembe pasivne gibljivosti sklepov spodnjih udov pri otrocih s cerebralno paralizo po intenzivni vadbi na lokomatu. Rehabilitacija 12 (3): 38–45.
3. Družbicki M, Wojciech R, Szczepanik M, Dudek J, Snela S (2010). Assesment of the impact of ortotic gait training on balance in children with cerebral palsy. Acta of bioengieneering and biomechanics 12 (2): 53–8.
4. Meyer-Heim A, Ammann-Reiffer C, Schmartz A, Schafer J, Sennhauser F H, Heinen F, Knecht B, Dabrowski E, Borggraefe I (2013). Improvement of walking abilities after robotic-assisted locomotion training in children with cerebral palsy. Arch Dis Child 94: 615–20.

Učinki vadbe za spretnost in koordinacijo roke v navideznem okolju bolnikov s parkinsonovo boleznijo

Mateja Vesel, dipl. fiziot.; **Tatjana Krizmanič**, dipl. fiziot.; **Irena Dolinšek**, dipl. fiziot.; **Dejana Zajc**, dipl. del. ter., spec.; **Alma Hukić**, dipl. del. ter.; prof. dr. **Imre Cikajlo**, univ. dipl. inž. el.; mag. **Karmen Peterlin Potisk**, dr. med., spec. nevrologije

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Mateja Vesel, dipl. fiziot.; e-pošta: vesel.mateja5@gmail.com

Uvod: Parkinsonova bolezen je počasi napredujoča degenerativna bolezen ekstrapiramidnega sistema, za katero vzrok ni znan. Klinični znaki so rigidnost, bradikinezija, tremor in posturalna nestabilnost (1). Parkinsonova bolezen značilno vpliva na bolnikovo opravljanje vsakodnevnih aktivnosti, njegovo funkcioniranje, sodelovanje in kakovost njegovega življenja v vseh fazah bolezni in pri različni starosti bolnikov. Namen raziskave je bil preveriti učinek računalniške igre 10 kock na spretnost in koordinacijo rok bolnikov. **Metode dela**: Pred vključitvijo v raziskavo so bolniki prostovoljno dali pisno privolitev za sodelovanje. Vključitvena merila raziskave so bila, da ima sodelujoči diagnosticirano parkinsonovo bolezen, ima težave s funkcijo zgornjih udov, težave pri opravljanju vsakodnevnih aktivnosti in da je po lestvici Hoehn and Yahr umeščen v drugo ali tretjo stopnjo. V okviru fizioterapije so bolniki opravljali funkcionalno nalogo prestavljanja navideznih kock z razmetanega kupa v predviden zabojnik v navideznem okolju (2). Gibanje roke, zapestja in prstov je spremljala kamera (LeapMotion, Inc), kar se je odražalo v navideznem okolju. Programska oprema je bila nameščena na prenosnem računalniku, sliko pa smo prikazali na velikem (42") zaslonu. Pred začetkom fizioterapije in po koncu so bili bolniki ocenjeni s funkcijskimi testi, in sicer s funkcijskim testom roke po Jebsenu, s testom devetih zatičev ter testom škatle in kock (3). Bolnike smo ocenili še z enotno lestvico za parkinsonovo bolezen – motorični del. Podatke smo obdelali s programsko opremo Matlab in MS Excel. **Rezultati:** Vključenih je bilo 28 bolnikov, 12 moških in 16 žensk. Povprečna starost bolnikov je bila 67 let (razpon od 49 do 80 let). Bolniki so opravili vsaj 10 vadb v največ 3 tednih. Vsaka vadba je trajala 30 minut in je vsebovala 5 ponovitev nalog. Vsaka posamezna naloga je trajala 2 minuti. Pri bolnikih se je po fizioterapiji pri funkcijskem testu za funkcijo roke po Jebsenu skrajšal čas pri pisanju pisma (s 24,3 ± 15,1 s na 20,9 ±12,5 s), pri žetonih (s 6,3 ± 2,1 s na 5,5 ± 1,5 s) in pri simuliranem hranjenju (z 9,6 ± 4,6 s na 8,7 ± 2,3 s). Pri drugih kategorijah funkcijskega testa za roko po Jebsenu ni bilo izboljšanja. Izboljšali so se rezultati pri testu devetih zatičev (z 28,4 ± 6,9 na 27,1 ± 8 s). Bolniki so pri testu škatle in kock preložili več kock (s 46,7 ± 9,7 na 50,2 ± 10,3). Pri bolnikih se je izboljšal rezultat pri kliničnem testu enotne lestvice za parkinsonovo bolezen – motorični del (s 30,7 ± 9,9 na 28,9 ± 10,6) kljub visoki standardni deviaciji. **Zaključki:** Rezultati študije primera nakazujejo, da bi bila lahko vadba za spretnost in koordinacijo roke v navideznem okolju bolnikov s PB primerno dopolnilo rehabilitacije pri zmanjšani funkciji zgornjih udov.

Raziskava je del mednarodnega projekta Horizont 2020 PD_manager 2015–2018.

Ključne besede: Parkinsonova bolezen, navidezno okolje, vadba, zgornji ud.

Effects of exercise for skill and coordination of hands in a virtual environment of patients with Parkinson's disease

Introduction: Parkinson's disease (PD) is a slowly progressive degenerative disease of the extrapyramidal system, for which the cause is unknown. Clinical signs are rigidity, bradykinesia, tremor and postural instability (1). Parkinson's disease typically affects the patient's daily activities, its functioning, participation and quality of life in all stages of the disease and patients at different ages. The purpose of the research was to examine the effect of the computer game "10 cubes" on the skill and coordination of hands of patients. **Methods**: Before inclusion in the study, the patients voluntarily gave written consent for participation. Inclusion criteria were that the participants are diagnosed with Parkinson's disease, have problems with the function of the upper limbs, difficulties with performing daily activities and that they are placed in level 2 or 3 at Hoehn and Yahr scale. In the context of physiotherapy, the patients performed the task of shifting functional virtual cubes from the pile of methane in the container provided in a virtual environment (2). The movement of the hands, wrists and fingers was monitored by the camera (LeapMotion, Inc.), which was reflected in the virtual environment. The software was installed on the notebook and the image was shown on a large (42 ") screen. Before and after the physiotherapy, the patients were evaluated with functional tests: Jebsen Hand Function Test, Nine Hole Peg Test, and Box and Blocks Test (3). The patients were also assessed by The Unified Parkinson's Disease Rating Scale (UPDRS), motor part. Data were analyzed with the software Matlab and Excel. **Results:** In the study 28 patients, 12 men and 16 women, were included. The average age of patients was 67 years (range 49–80 years). The patients had received at least 10 training sessions in more than 3 weeks, each workout lasting 30 minutes that included 5 repetitions of tasks, each individual task lasted 2 minutes. In patients after physiotherapy in Jebsen Hand Function Test, the time shortened for writing a letter (from 24.3 ± 15.1 s to 20.9 ± 12.5 s), at chips (from 6.3 ± 2.1 s 5 5 ± 1.5 s), as well as with simulated feeding (from 9.6 ± 4.6 s to 8.7 ± 2.3 s). In other categories of Jebsen Hand Function Test, there was no improvement. We have improved the results of Nine Hole Peg Test (from 28.4 ± 6.9 to 27.1 ± 8 s). In Box and Blocks Test, the patients transferred more blocks (from 46.7 ± 9.7 to 50.2 ± 10.3). The patients improved their results in the clinical test The Unified Parkinson's Disease Rating Scale (UPDRS), the motor part (from 30. 7 ± 9.9 to 28.9 ± 10.6) despite high standard deviation. **Result**: Results of the case study suggests that there may be training for skill and coordination of hands in the virtual environment of patients with PD appropriate to supplement rehabilitation of reduced function of the upper limbs.

Key words: Parkinson's disease, a virtual environment, exercise, upper limb.

Literatura/References:

1. Melnik ME (1995). Basal ganglia disorders. In: Umphred DA ed. Neurological rehabilitation. 3rd ed. St. Louis: Mosby: 606–36.
2. Cikajlo I, Zajc D, Dolinšek I, Krizmanič T, Dekić A, Vesel M, Peterlin-Potisk K (2016). Precise hand movement telerehabilitation with virtual cubes for patients with Parkinson's disease. Proceedings of the REHAB 2016, 4th Workshop on ICTS for improving patients' rehabilitation research techniques, Lisbon, Portugal.
3. Platz T, Pinkowski C, et.al (2005). Reliability and validity of arm function assessment with standardized guidelines for the Fugl-Meyer Test, Action Research Arm Test and Box and Block Test: a multicenter study. Clin Rehabil 19 (4): 404–11.

Vloga fizioterapevta pri pripravi in izvajanju storitve telerehabilitacije na domu pri pacientih po možganski kapi in primerjava z navodili za vaje v pisni obliki

Marko Rudolf, dipl. fiziot.

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Marko Rudolf, dipl. fiziot.; e-pošta: marko.rudolf@ir-rs.si

Uvod: Rehabilitacijski programi za obravnavo pacientov po možganski kapi so časovno omejeni. Telerehabilitacija predstavlja možnost za strokovno vodeno vadbo v daljšem obdobju (1). Johansson s sod. (2) je s sistematičnim pregledom ugotovil pozitivne učinke telerehabilitacije, vendar je še premalo dokazov, ki bi podprli njeni učinkovitost in ekonomičnost. **Metode:** S pilotsko raziskavo, ki je potekala 15 mesecev, smo želeli preveriti učinkovitost nadaljnje vadbe v domačem okolju po odpustu iz rehabilitacijske ustanove s telerehabilitacijo, v okviru katere so pacienti dostopali do video gradiva in bili prek videokonference (Skype) v rednih stikih s fizioterapevtom in delovnim terapevtom. Deset pacientov po preboleli možganski kapi je bilo naključno razdeljenih v testno skupino s telerehabilitacijo (povprečna starost 70 let, SO – 10 let, čas po kapi 8,2 meseca, SO – 3,2 meseca) in primerjalno skupino (povprečna starost 63 let, SO – 10 let, čas po kapi 5,1 meseca, SO – 1,5 meseca), ki je prejela navodila za vaje v pisni in slikovni obliki brez nadzora terapevta. Fizioterapevtova vloga pri testni skupini je vključevala pripravo video vsebin, ki so prikazovale nameščanje pacienta v postelji in izvajanje nekaj osnovnih vaj z glavo, rameni, zgornjimi udi in trupom ter vaj za sproščanje in boljše občutenje okvarjenega zgornjega uda. Pri primerjalni skupini pa so bile podobne vsebine predstavljene z vajami iz programa Physio Tools. Pred odpustom je fizioterapevt pacientom iz primerjalne skupine in njihovim svojcem dal navodila za izvajanje vaj. Svojci pacientov iz testne skupine so bili pred odpustom poučeni o uporabi računalniške tablice in dostopu do izbranih videoposnetkov vaj z navodili terapevta na spletnem portalu. Pacienti iz obeh skupin naj bi vaje redno in vsak dan izvajali tri mesece. Fizioterapevt in delovni terapevt sta s pacienti in njihovimi svojci enkrat na teden opravila razgovor in spremljala pacientov napredek. Med pogovori je fizioterapevt poleg vprašanj, ki so bila povezana z video vsebinami, svetoval še o drugih tematikah, ki so zanimale pacienta oziroma njegove svojce, na primer o uporabi različnih pripomočkov, ograje, ortoz, bolečinah, njihovih vzrokih in obvladovanju, skupaj z delovnim terapevtom tudi o funkcionalni preureditvi stanovanja. Raziskavo je odobrila etična komisija URI - Soča. Pacienti in njihovi svojci so dali pisni pristanek za sodelovanje v raziskavi. **Rezultati:** Obe skupini sta ob koncu trimesečnega obdobja vadbe napredovali v funkciji zgornjega uda (testna skupina: Fugl-Meyer od 30,6 do 34,4 točke; primerjalna skupina: od 17,6 do 24,2 točke) ter pri skupni oceni motoričnih funkcij pacientov po možganski kapi (testna skupina: MAS skupno od 14,4 do 19,0 točk; primerjalna skupina: od 11,0 do 15,0 točk). Pri primerjalni skupini je bilo v ospredju pomanjkanje dodatnih informacij. **Zaključek:** Na podlagi izida pilotske raziskave (1, 3) ocenjujemo, da je telerehabilitacija za paciente dodatna motivacija, za njihove svojce pa edukacija ter kot taka uporabna in učinkovita oblika nadaljevanja rehabilitacije v pacientovem domačem okolju.

Ključne besede: možganska kap, telerehabilitacija, fizioterapija, vadba v domačem okolju.

The role of physiotherapist in preparing and conducting telerehabilitation at home in patients after stroke, and evaluation of efficiency

Introduction: The duration of rehabilitation programs for patients after cerebral stroke is limited. Telerehabilitation enables professionally conducted treatment over a longer period (1). A systematic survey by Johansson et al. revealed positive effects of telerehabilitation, however, the evidence has been too scarce to prove its efficiency and cost-effectiveness (2). **Methods**: A pilot study was conducted for fifteen months, to test the efficiency of continuous training in the patient's home after discharge from rehabilitation institution, in which the subjects had access to video materials and kept regular contacts with the physical therapist and the occupational therapist by means of telerehabilitation (Skype). Ten patients after cerebral stroke were randomly divided into test group (mean age: 70 years, SD: 10 years, post stroke duration: 8.2 months, SD: 3.2 months) and control group (mean age: 63 years, SD: 10 years, post stroke duration: 5.1 months, SD: 1.5 months). The role of the physical therapist in the control group included the preparation of video materials demonstrating positioning of the patient in bed and performing several basic exercises with head, shoulders, upper limbs and trunk as well as exercises for relaxing and improved sensation of the impaired upper limb. In the control group, similar exercises were demonstrated by the program Physio Tools. The patients and their relatives in the control group received instructions on the exercises from the physical therapist before their discharge. The relatives of the patients in the test group received team instructions on the use of a tablet and access to selected videos of the training with instructions by the physical therapist on the website. The patients from both groups were asked to perform the exercises daily for three months. The physical therapist and the occupational therapist met with the patients and their relatives via Skype videoconference and followed the patient's progress. The physical therapist advised patients and relatives on video materials and other topics (such as the use of different technical aids, rails, orthoses, pain, the cause of pain and pain management, and together with the occupational therapist on the functional home adaptations). The study was approved by the Ethical Commission of URI - Soča. All subjects and their relatives gave written consent to participate in the research. **Results**: At the end of the three-month period, both groups improved upper limb functioning (test group: Fugl-Meyer: 30.6 to 34.4 points; control group: 17.6 to 24.2 points) and the total assessment of motor functions (MAS) (test group: total MAS: 14.4 to 19.0 points; control group: 11.0 to 15.0 points). Shortage of additional information was reported by the control group. **Conclusion**: Based on the results of the pilot study (1, 3), telerehabilitation can be evaluated as additional motivation to patients and educational resource to their relatives and as such useful and efficient continuation of rehabilitation in the patient's home.

Key words: cerebral stroke, telerehabilitation, physical therapy, home training.

Literatura/References:

1. Goljar N, Javh M, Rudolf M, Bizovičar N, Rudel D, Oberžan D, Burger H (2016). Storitev telerehabilitacije na domu za osebe po preboleli možganski kapi. Rehabilitacija; 16 (3): 63–69.
2. Johansson T, Wild C (2011). Telerehabilitation in stroke care – a systematic review. Journal of telemedicine and telecare 17; 1–6.
3. Bizovičar N, Rudolf M, Javh M, Goljar N, Rudel D, Oberžan D, Burger H (2016). Učinki vadbe na domu ob pomoči vaj v pisni in video obliki pri bolnikih po možganski kapi. Rehabilitacija; 16 (3): 26–32.

Uvajanje programa funkcionalni dan v rehabilitacijo pacientov po možganski kapi

Marko Rudolf, dipl. fiziot.; **Irena Stanonik**, dipl. fiziot.

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Marko Rudolf, dipl. fiziot.; e-pošta: marko.rudolf@ir-rs.si

Uvod: Izvajanje v funkcijo usmerjene vadbe je osnova motoričnega učenja, ki predlaga vadbo tistih aktivnosti, ki ustrezajo pacientovim ciljem in potrebam (1). Za čim boljši končni izid rehabilitacije je pomembno timsko in interdisciplinarno delo. French in sodelavci so na podlagi sistematičnega pregleda randomiziranih kontroliranih poskusov poročali o dokazih za večjo učinkovitost ponavljajoče se, v funkcijo usmerjene vadbe v primerjavi z običajno terapevtsko obravnavo ali s placebom pri izboljšanju funkcije spodnjega uda in s tem povezanih dejavnosti vsakodnevnega življenja, vpliv na izboljšanje funkcije pacientovega zgornjega uda pa se ni bistveno razlikoval (2). **Metode:** Na URI - Soča na oddelku za paciente po možganski kapi je delo multidisciplinarnega tima že zelo usklajeno, obravnavo pa se je želelo nadgraditi še s skupinsko, v funkcijo usmerjeno vadbo, s tako imenovanim funkcionalnim dnevom. Program poteka eno leto in se redno izvaja vsako drugo sredo. Priprava se začne nekaj dni prej, ko se na organizacijskih sestankih uskladijo vse podrobnosti. Pacienti se razdelijo v štiri skupine glede na njihovo stopnjo samostojnosti pri izvajanju rehabilitacijskih programov: prva skupina so pacienti, ki potrebujejo popolno pomoč in vodenje, pri drugi skupini sta potrebna delna pomoč in vodenje pacientov, pri tretji skupini je potreben nadzor, četrta skupina pa so pacienti, ki so samostojni. Pacienti, ki imajo težave z govorom ali na psihosocialnem področju, so v okviru funkcionalnega dne poleg obravnave v eni izmed zgoraj naštetih skupin vključeni tudi v logopedsko ali psihosocialno skupino. V posamezni skupini je od dva do šest pacientov in glede na velikost skupine ustrezno število terapevtov iz različnih poklicnih skupin. Glede na njegovo zmogljivost oziroma sposobnosti ima posamezen pacient približno od ene ure in pol do treh ur programa. Obravnava poteka v notranjih prostorih ali v zunanjem okolju. Navadno se pri vseh skupinah na začetku izvedejo vaje za ogrevanje (sede na vozičkih, stoje ob opori ali samostojno), temu sledi vadba različnih funkcijskih dejavnosti, ki so prilagojene sposobnostim posamezne skupine, navadno v obliki krožne vadbe. Stopnja zahtevnosti se prilagaja glede na posameznikove sposobnosti (npr. obešanje perila, pometanje, zalivanje rož, preoblačenje posteljnine; vadba fine motorike – zapenjanje gumbov, privijanje vijakov; vadba aktivnosti v kuhinji – kuhanje kave, peka piškotov itn.). Skupina samostojnih pacientov pogosto izvaja funkcijske dejavnosti zunaj rehabilitacijske ustanove (izpolnjevanje položnic na pošti, nakupovanje sestavin za pripravo kosila v bližnji trgovini itn.) ali pa vadijo vzdržljivost, ravnotežje, hojo in različne kognitivne naloge znotraj inštituta (hodniki, bife, knjižnica). **Zaključek:** Funkcijska vadba se je na podlagi izvedene ankete med pacienti in opažanj terapevtov izkazala kot izvedljiv in učinkovit prispevek k ponovnemu učenju dejavnosti, ki jih pacient v domačem okolju res potrebuje.

Ključne besede: možganska kap, timska obravnava, vadba funkcijskih aktivnosti.

Introducing the program »Functional Day« into rehabilitation of patients after cerebral stroke

Introduction: Task-specific and context-specific training are well accepted principles in motor learning, which suggests that training should target the goals that are relevant for the needs of patients (1). Successful rehabilitation outcome requires teamwork and interdisciplinary approach. The report by French et al. conducted on the basis of a systematic survey of randomized controlled trials proved higher efficiency of repetitive, task-oriented training compared to »common treatment« or placebo in the improvement of lower limb function and related activities of daily living, while the effect on the improvement of the upper limb function was not significantly different (2). **Methods**: At the department for patients after cerebral stroke at URI - Soča, the activities of a multidisciplinary team have been well developed. The treatment has been upgraded with group task-oriented training – the so called »Functional Day«. The program is conducted every other Wednesday for one year. The preparation for the »Functional Day« starts a few days ahead with organizational meetings. The patients are divided into four groups depending on their level of independence in performing rehabilitation programs: the first group (patients needing complete assistance and guidance), the second group (partial assistance and guidance is needed), the third group (need of supervision) and the fourth group (independent patients). Patients with speech problems or problems in the psychosocial area are included into speech therapy or a psychosocial group beside their treatment in one of the above-mentioned four groups. Each group includes 2 to 6 patients and the adequate/required number of therapists of different professional backgrounds. Depending on their abilities, each patient has approximately one and a half hours to three hours of the training. The groups conduct their training within the institute or in the external environment. Usually, the training in all the groups starts with warm-up exercises (sitting on a wheelchair, standing with support or independently), followed by the training of different functional activities individually adapted to suit patients in the group – usually performed in the form of circuit training. The level of intensity is individually adjusted to the patient's abilities (e.g. hanging up laundry, sweeping the floor, watering flowers, changing bedding; fine motor skills training – buttoning, tightening screws; kitchen activities training – making coffee, baking pastries). The group of independent patients often performs different functional activities outside the rehabilitation institute (paying bills at the post office, buying the ingredients for lunch in a nearby grocery store) or trains endurance, balance, gait and different cognitive activities inside the institute (hallways, cafe, library). **Conclusion**: Based on a questionnaire filled by the patients and observations of the therapists, the functional training proves to be a realizable and efficient method for re-learning the activities that patients actually need to perform in their home environment.

Key words: cerebral stroke, team treatment, training of functional activities.

Literatura/References:

1. Langhorne P, Bernhardt J, Kwakkel G. Stroke rehabilitation. Lancet 2011; 377: 1693–702.
2. French B, Thomas LH, Leathley MJ, Sutton CJ (2007). Repetitive task training for improving functional ability after stroke. Cochrane Database Syst Rev; Issue 4. Art.No.: CD006073.

Primerjava uporabe motorizirane naprave za vadbo dinamičnega ravnotežja med hojo in standardne fizioterapevtske metode pri pacientih po možganski kapi

Tina Freitag, dipl. fiziot.; asist. dr. **Nataša Bizovičar**, dr. med.; prof. dr. **Zlatko Matjaćić**, dr. med.; doc. dr. **Nika Goljar**, dr. med.

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Tina Freitag, dipl. fiziot.; e-pošta: tina.freitag@gmail.com

Uvod: Pri pacientih po možganski kapi je funkcija hoje eden izmed najpomembnejših dejavnikov, ki vplivajo na kakovost življenja (1). Razvit je bil prototip naprave za urjenje dinamičnega ravnotežja med hojo, imenovane E-go (2). V literaturi je še vedno premalo dostopnih podatkov glede vadbe hoje z robotskimi napravami (3). **Namen:** Namen raziskave je bil oceniti uporabnost naprave pri pacientih po možganski kapi. **Metode:** V navzkrižno kontrolirano randomizirano raziskavo je bilo vključenih 19 pacientov po možganski kapi, ki so bili sprejeti na rehabilitacijo in so dosegli rezultat 0 ali 1 pri lestvici za razvrstitev funkcijske premičnosti (angl. Functional Ambulation Category – FAC). Prva skupina (9 pacientov; starost 52,4 ± 8,1; čas od kapi 88,3 ± 53,0 dni) je vadila hojo prve tri tedne z napravo E-go in nato tri tedne z običajno fizioterapevtsko obravnavo. Druga skupina (10 pacientov, starost 59,9 ± 9,8; čas od kapi 120,6 ± 120,0 dni) je vadila v obratnem vrstnem redu. Pacienti so bili ocenjeni na začetku, po treh tednih in po 6 tednih z lestvico za oceno uravnavanja drže pri pacientih po možganski kapi in s testom hoje na 10 metrov. Fizioterapevt je ob koncu izpolnil vprašalnik, ki se je nanašal na uporabnost naprave. Pacienti so svoje zadovoljstvo z vadbo v napravi ocenili s pomočjo 4-stopenjske lestvice. Raziskavo je odobila Komisija za medicinsko etiko URI-Soča. **Rezultati**: Pri obeh skupinah se je po vadbi izboljšala hitrost hoje ($p = 0.002$) in na lestvici PASS ($p = 0.001$). Med skupinama ni bilo zaznati statistično pomembnih razlik med tremi ocenjevanji hitrost hoje in PASS. Fizioterapevti so poročali o nižji stopnji telesnega napora pri vadbi z E-go, kot brez naprave, vendar je bila prisotna statistično pomembna razlika le pri drugi skupini ($p = 0.023$). Večina je ugotovila, da je nadzor hoje v napravi E-go manj fizično naporen, v primerjavi z običajno fizioterapevtsko obravnavo, napravo bi ponovno uporabili pri pacientih s podobnim funkcijskim stanjem. Pozitivno so jo ocenili tako pacienti, kot fizioterapevti. **Zaključek:** Vadba v napravi E-go ima verjetno pozitivne učinke na hitrost hoje in uravnavanje drže pri pacientih po možganski kapi.

Delo je nastalo v okviru raziskovalnega projekta in financirano s strani ARRS (Javna agencija za raziskovalno dejavnost Republike Slovenije), številka projekta L2-5471.

Ključne besede: motorizirana naprava za vadbo dinamičnega ravnotežja med hojo, hoja, ravnotežje, možganska kap.

Comparison of the use of a motorized assistive device for balance training during walking and standard physiotherapy methods in patients after stroke

Background: Gait ability is for stroke patients among their main goals in rehabilitation and it has an important impact on their quality of life. We have previously developed a prototype of therapist controlled motor driven device for balance training during overground walking (currently available under commercial name E-go). There is still lack of the information in the literature about overground walking training with robotic devices. **Purpose**: The aim of this study was to explore the usability of this device in patients with severe hemiparesis after stroke. **Methods:** Cross-over randomized controlled study included 19 patients after stroke admitted to inpatient rehabilitation with Functional Ambulation Category score 0 or 1. First group (9 patients; age 52.4 ± 8.1; time from stroke 88.3 ± 53.0 days) trained walking during the first 3 weeks with the E-go device followed by the 3 weeks of training within conventional physiotherapy programmes. Second group (10 patient; age 59.9 ± 9.8; time from stroke 120.6 ± 120.0 days) trained the other way round. Patients were assessed 3 times (at the beginning, after 3 weeks and after 6 weeks) measuring walking speed and Postural assessment scale for Stroke (PASS), physiotherapists completed the questionnaire about the walking control of the patient during training, usability of this device in PT perspective and patient's satisfaction with the E-go device. **Results:** Both groups improved from baseline to post-training in walking speed ($p=0.002$) and PASS ($p = 0.000$) during time. There was no significant difference between the groups in each of the 3 assessment time intervals (walking speed: $p1= 0.489$, $p2 = 0.287$, $p3 = 0.518$; PASS: $p1 = 0.458$, $p2 = 0.691$, $p3 = 0.869$). PT reported lower level of physical effort while training with the E-go compared to the training without the device, this difference reached statistical significance only for the second group ($p = 0.023$). Most of the physiotherapists concluded that control of walking during training with the E-go was easier compared with conventional training. They would also use the E-go for the patients with similar functional state. Patients and physiotherapists satisfaction with the usage of the device was mostly good. The device was also positively accepted from the patient's and therapist's side. **Conclusion:** E-go training has a probable positive effect on the walking speed and postural control after stroke.

Funding acknowledgements: Slovenian Research Agency, project number L2-5471.
Ethics approval: This study was approved by the Ethics Committee of the University rehabilitation institute, Slovenia.

Key words: motorized assistive device for balance training during walking, 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. Bizovicar N, Matjacic Z, Stanonik I, Goljar N (2017). Overground gait training using a motorized device in patients with severe disabilities after stroke. Int J Rehabil Res 40(1):46-52.
3. Matjačić Z, Olenšek A, Oblak J, Cikajlo I, Novak P, Jere K (2012). Adaptive dynamic balance training during overgrund walking with assistive device. In: 2012 4th IEEE RAS&EMBS International Conference on Biomedical Robotics and Biomechatronics, June 24-27, 2012, Roma, Italy. BioRob Roma. IEEE, cop. 2012, 1066–70.

Vpliv kompleksnega fizioterapevtskega programa na grobo gibalno funkcijo in obseg gibljivosti pri deklici s cerebralno paralizo po selektivni dorzalni rizotomiji

Sonja Ulčar Ivančič, dipl. fiziot[1]; pred. mag. **Tine Kovačič**, dipl. fiziot.[2]

[1]Center za izobraževanje, rehabilitacijo in usposabljanje Kamnik – CIRIUS Kamnik, Kamnik; [2]Alma Mater Europaea - Evropski Center Maribor, Maribor

Korespondenca/Correspondence: Sonja Ulčar Ivančič, dipl. fiziot.; e-pošta: sonja.ulcar@kks-kamnik.si

Uvod: Cerebralna paraliza je medicinski izraz za neprogresivno možgansko motnjo, ki je posledica poškodbe ali razvojne anomalije ploda v času nosečnosti oziroma v zgodnjem obdobju otrokovega življenja (Damjan in Groleger Sršen, 2010). Najpogostejša oblika je spastična cerebralna paraliza, ki povzroča togost v rokah, nogah in trupu. Ker spastičnost vpliva na slabši nadzor gibanja, prilagoditvene spremembe v dolžini mišic in v nekaterih primerih skeletne deformacije, je njena pravočasna oziroma zgodnja obravnava še toliko pomembnejša. Edini poseg, ki trajno odpravlja spastičnost, je v tujini precej razširjena selektivna dorzalna rizotomija. **Metoda:** V študijo primera smo vključili deklico s cerebralno paralizo, pri kateri je bila selektivna dorzalna rizotomija opravljena v Otroški bolnišnici St. Louis v Združenih državah Amerike. Opravili smo oceno grobe gibalne funkcije z lestvico grobe gibalne funkcije (angl. GMFM-88) ter meritve obsega gibljivosti v kolenskem in skočnem sklepu z goniometrijo. Ocenjevanje smo opravljali na vsake 6 mesecev v obdobju 2 let in pol. V tem času je bila deklica vključena v predpisani intenzivni pooperativni program fizioterapije, ki je vključeval fizioterapevtske obravnave od 4- do 5-krat na teden v obdobju prvih 6 mesecev, vsaj 3- do 4-krat na teden v naslednjih 6 mesecih in najmanj 2- do 3-krat na teden v obdobju od 1 do 2,5 leta po selektivni dorzalni rizotomiji. Poleg osnovne razvojnonevrološke obravnave je bila deklica vključena v intenzivno terapijo Therasuit, plavanje po Halliwickovem konceptu, hipoterapijo, delovno terapijo in napredno biomehansko rehabilitacijo. Hkrati je uporabljala različne medicinsko tehnične pripomočke, kot so ortoze za gleženj in stopalo, terapevtsko kolo, tekoči trak za vadbo hoje in funkcionalno elektro stimulacijo peronealnega živca. **Rezultati:** Poseg je v kombinaciji s kompleksno rehabilitacijsko obravnavo pri deklici s cerebralno paralizo učinkovito vplival tako na povečanje obsega gibljivosti poplitealnega kota v kolenskem sklepu (iz 130˚ pred selektivno dorzalno rizotomijo na 160˚ po fizioterapevtski obravnavi) in obsega gibljivosti v zgornjem skočnem sklepu (dorzalna fleksija se je iz 5˚ pred selektivno dorzalno rizotomijo izboljšala na 20˚ po fizioterapevtski obravnavi) kot na izboljšanje grobe gibalne funkcije, merjene z lestvico GMFM-88. Pri analizi rezultatov skupnega seštevka ciljnih področij A, B, C in D lestvice GMFM-88 je razviden 20-odstoten napredek pri deklici v obravnavanem obdobju. Pri ležanju in obračanju po vzdolžni osi, pri sedenju, plazenju in klečanju je dosegla 100-odstotni rezultat, pri stoji je izboljšala rezultat za 39, pri hoji, teku in skakanju pa za dobrih 52 odstotkov. **Zaključki:** Opazna razlika v grobi gibalni funkciji in obsegu gibljivosti pred operativnim posegom in po njem s spremljajočo intenzivno fizioterapevtsko obravnavo dopušča sklepanje o dolgoročni učinkovitosti tako operativnega postopka kot predpisane rehabilitacijske obravnave.

Ključne besede: cerebralna paraliza, selektivna dorzalna rizotomija, groba gibalna funkcija, obseg gibljivosti, fizioterapija otrok s cerebralno paralizo.

Impact of complex physiotherapy program on gross motor function and range of motion in girl with cerebral palsy after selective dorsal rhizotomy

Background: Cerebral palsy (CP) is a medicine term for non-progressive brain disorder resulting from injury or malformation of a fetus during pregnancy or in the early stage of a child's life. The most common type of cerebral palsy is spastic CP, which causes stiffness in the arms, legs and body. Because spasticity affects poor control of the movement, adjustment changes in muscle length and in some cases skeletal deformities, early intervention is even more important. The only procedure that permanently eliminates spasticity is abroad fairly widespread selective dorsal rhizotomy (SDR). **Method:** In our case study, we have included a girl with CP that underwent SDR in the St. Louis Children's Hospital in the United States. Gross motor function in girl with CP was assessed with Gross Motor Function Measure-88 (GMFM-88), passive knee extension (popliteal angle) and passive ankle dorsiflexion were measured with the help of goniometer. Measurements were made every 6 months in period of two and half years. In between the girl with CP was involved in an intensive postoperative physiotherapy program, physiotherapy sessions 4-5 times per week in the first 6 months after SDR, then 3-4 times per week in the following 6 months and finally, minimum 2-3 times per week in 1-2.5 years after SDR. The girl received basic neurodevelopmental treatment (NDT) and adjunct therapies such as Therasuit therapy, swimming by the Halliwick concept, hippotherapy, occupational therapy and advanced biomechanical rehabilitation (ABR). Beside that she also used different assistive technology, orthotic devices and splints such as ankle foot orthosis, therapeutic bike, body weight supported treadmill training, and functional electrostimulation of peroneal nerve. **Results:** SDR intervention in combination with a complex rehabilitation program effectively influenced hamstring flexibility (popliteal angle from 130˚ before SDR to 160˚ after PTS), passive ankle dorsiflexion (from 5˚ before SDR to 20˚ after PTS), and gross motor function measured with GMFM-88 in the case study of the girl with CP. When analyzing the total overall score of GMFM-88 there was important 20% improvement in all 5 dimensions (A, B, C, D, E). The dimension of lying and rolling along the longitudinal axis, of sitting, crawling and kneeling has reached total 100% score (after SDR and PTS), while the dimension of walking, running and jumping improved for 38% score, and the dimension of standing improved for 52%. **Conclusions:** A noticeable difference in the gross motor function and the extent of flexibility before and after surgery SDR with adjunct intensive therapy program allows conclusions about the long-term effectiveness of SDR with the prescribed rehabilitation program.

Key words: cerebral palsy, selective dorsal rhizotomy, gross motor function measurement, range of motion, physical therapy in children with CP.

Literatura/References:

1. Brouwer B, Ashby P (1991). Altered corticospinal projections to lower limb motoneurons in subjects with cerebral palsy. Brain 114 (3): 1395–407.
2. Damjan H, Groleger Sršen K (2010). Z dokazi podprta habilitacija otrok s cerebralno paralizo, Rehabilitacija 9 (1): 138–50.
3. St. Louis Children's Hospital. About Selective Dorsal Rhizotomy (SDR). 2016. http://www.stlouischildrens.org/our-services/center-cerebral-palsy-spasticity/about-selective-dorsal-rhizotomy-sdr <28. 2. 2017>.

Sočasna veljavnost funkcijskega testa zgornjega uda in Wolfovega testa motoričnih funkcij pri pacientih po možganski kapi – predhodni izsledki

Jan Pipan, dipl. fiziot.[1]; doc. dr. **Nika Goljar**, dr. med.[2]; **Slavi Kotnik**, dipl. del. ter.[2]; doc. dr. **Urška Puh**, dipl. fiziot.[1]

[1]Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana; [2]Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Jan Pipan, dipl. fiziot.; e-pošta: pipan.jan@gmail.com

Uvod: Funkcijski test zgornjega uda (angl. Action Research Arm Test − ARAT) in Wolfov test motoričnih funkcij (angl. Wolf Motor Function Test − WMFT) sta zanesljivi in veljavni ocenjevalni orodji funkcijskih sposobnosti zgornjega uda pri pacientih po možganski kapi (1−3). ARAT vključuje 19 nalog za zgornji ud, razdeljen je v 4 podskupine za oceno grobih prijemov, cilindričnih prijemov, pincetnih prijemov in grobih gibov (1). WMFT vključuje 17 nalog za oceno mišične moči in funkcionalnih gibov zgornjega uda (2). Hkratno veljavnost ARAT in WMFT so že potrdili v predhodnih študijah (4). Namen prispevka je predstaviti delne izsledke primerjave ARAT in slovenskega prevoda WMFT. **Metode:** V raziskavo je bil do zdaj vključen priložnostni vzorec 20 pacientov (9 moških, 11 žensk), starih v povprečju 57,6 (SO 9,6) leta, v obdobju od 5 do 53 tednov po možganski kapi. Enako število pacientov je imelo desnostransko (10) in levostransko (10) hemiparezo. Ocenjevanje z ARAT in WMFT smo v naključnem vrstnem redu izvedli isti dan. Skupne ocene in ocene posameznih podskupin ARAT smo primerjali z ocenami lestvice funkcijskih zmožnosti (angl. Functional Ability Scale – FAS) WMFT ter z medianami časov izvedbe nalog WMFT. Za izračun povezanosti smo uporabili Spearmanov koeficient korelacije. Raziskavo je odobrila komisija za medicinsko etiko URI - Soča. **Rezultati:** Pacienti so pri ARAT v povprečju dosegli 36,4 (SO 16,8) točke (od 57), po FAS WMFT v povprečju 51,4 (SD 17) točke (od 75), mediana časov izvedbe WMFT pa je bila 2,95 s (IQR 2,2–6,1). Med skupnimi ocenami ARAT in FAS WMFT je bila povezanost zelo dobra (ro = 0,94; $p < 0,01$) z medianami časov izvedbe nalog WMFT pa smo ugotovili dobro negativno povezanost (ro = –0,69; $p < 0,01$). Ugotovili smo zelo dobro povezanost med ocenami vseh podskupin ARAT in FAS WMFT (ro = 0,75–0,94; $p < 0,01$) ter zmerno do dobro negativno povezanost z medianami časov izvedbe nalog WMFT (ro = od –0,46 do –0,73; $p < 0,05$). **Zaključki:** Izsledki kažejo na dobro oziroma zelo dobro povezanost med skupnimi ocenami ARAT in WMFT, kar kaže na njuno hkratno veljavnost. V procesu rehabilitacije pacientov po možganski kapi priporočamo uporabo enega izmed obeh kliničnih testov.

Ključne besede: možganska kap, zgornji ud, WMFT, ARAT, ocenjevalna orodja.

Concurrent validity of Action Research Arm Test and Wolf Motor Function Test in patients after stroke – preliminary results

Background: Action Research Arm Test (ARAT) and Wolf Motor Function Test (WMFT) are valid and reliable upper extremity outcome measures for patients after stroke (1–3). ARAT consists of 19 tasks, which are categorized into 4 subscales – grasp, grip, pinch and gross movements (1). WMFT consists of 17 tasks with which muscle strength and functional movement of the upper extremity (2) are assessed. Good concurrent validity between ARAT and WMFT (4) has already been reported. The aim is to present the preliminary data of the study in which comparison between ARAT and Slovene translation of WMFT is performed. **Methods:** A convenience sample of 20 patients (9 male, 11 female), with the mean age of 57.6 (SD 9.6), 5 to 53 weeks after stroke was included in the study. Same number of patients had left-sided (10) and right-sided (10) hemiparesis. ARAT and WMFT were performed in random order on the same day. Spearman's rank correlation coefficients were calculated between ARAT total score and scores of its subtests with WMFT Functional Ability Scale (FAS) total score, and with median performance time of WMFT tasks. The research was approved by the Ethics Committee of URI - Soča. **Results:** The average ARAT total score was 36.4 (SD 16.8) points (of 57), the average FAS WMFT total score 51.4 (SD 17) points (of 75), and median performance time of WMFT was 2.95 s (IQR 2.2–6.1). Correlation between total scores of ARAT and WMFT FAS was very high (*rho* = 0.94; $p<0.01$), and high with median performance time of WMFT tasks (*rho* = –0.69; $p<0.01$). Correlations between scores of all ARAT subscales and WMFT FAS total score were very high (*rho* = 0.75–0.94; $p<0.01$), and moderate to good with median performance time of WMFT (*rho*= from –0.46 to –0.73; $p<0.05$). **Conclusions:** Evidence shows high or very high correlations between ARAT and WMFT total score, which indicates concurrent validity between the two outcome measures. It is recommended to use one of both in rehabilitation of patients after stroke.

Key words: stroke, upper extremity, WMFT, ARAT, outcome measures.

Literatura/References:

1. Yozbatiran N, Der-Yeghiaian L, Cramer SC (2008). A standardized approach to performing the Action Research Arm Test. Neurorehabil Neural Repair 22: 78–90.
2. Morris DM, Uswatte G, Crago JE, Cook EW, 3rd, Taub E (2001). The reliability of the wolf motor function test for assessing upper extremity function after stroke. Arch Phys Med Rehabil 82 (6): 750–5.
3. Wolf SL, Catlin PA, Ellis M, Archer AL, Morgan B, Piacentino A (2001). Assessing Wolf motor function test as outcome measure for research in patients after stroke. Stroke 32 (7): 1635–9.
4. Nijland R, van Wegen E, Verbunt J, van Wijk R, van Kordelaar J, Kwakkel G (2010). A comparison of two validated tests for upper limb function after stroke: The Wolf Motor Function Test and the Action Research Arm Test. J Rehabil Med 42 (7): 694–6.

Mehansko asistirano izkašljevanje pri pacientih z okvaro hrbtenjače – pregled literature

Tina Žnidar, dipl. fiziot.

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Tina Žnidar, dipl. fiziot.; e-pošta: tina.znidar@ir-rs.si

Uvod: V akutni fazi po okvari hrbtenjače so respiratorni zapleti glavni vzrok obolevnosti in umrljivosti z incidenco od 36 do 83 odstotkov. Najpogostejši zapleti so oslabitev dihalnih funkcij, zadrževanje sluzi v dihalnih poteh in avtonomna disfunkcija. Stopnja respiratorne odpovedi je povezana z višino okvare hrbtenjače (2). Respiratorna fizioterapija pri pacientih s poškodbo hrbtenjače vključuje posturalno drenažo, perkusijo in vibracijo, tehnike asistiranega izkašljevanja (manualno asistirano izkašljevanje in mehansko asistirano izkašljevanje), vadbo dihalnih mišic ter neinvazivno ventilacijo (6). Mehansko asistirano izkašljevanje je kombinacija vdiha s pozitivnim tlakom, čemur sledi aktivni izdih z negativnim tlakom (3). Pacienti lahko izkašljevalnik uporabljajo, ko alternativne metode izkašljevanja zaradi starosti, slabega sodelovanja in oslabljene bulbarne simptomatike ne pridejo v poštev (4). **Metode:** Strokovno literaturo smo iskali v podatkovnih zbirkah PubMed, PEDro in CINAHL. Iskanje smo omejili na članke v angleškem jeziku, ki so bili objavljeni med letoma 2004 in 2016. Vključili smo randomizirane kontrolirane poskuse, raziskave brez kontrolne skupine in preglede literature, ki so opisovali uporabo ter učinke mehanskega asistiranega izkašljevanja pri pacientih z okvaro hrbtenjače. **Rezultati:** Raziskave so pokazale manjšo potrebo po invazivni mehanski ventilaciji ob uporabi izkašljevanja pri odraslih (7). Pokazale so tudi znatno izboljšanje forsirane vitalne kapacitete v prvi sekundi (FEV1), forsirane vitalne kapacitete (FVC) in maksimalnega ekspiratornega pretoka (PEF) pri pacientih, ki so imeli poleg respiratorne fizioterapije še terapijo mehanskega asistiranega izkašljevanja (1). Poročajo, da lahko uporaba izkašljevalnika med hospitalizacijo zmanjša število bronhoskopij in respiratornih zapletov ter skrajša čas odstavitve mehanske podpore dihanja (3). V raziskavah so dokazali tudi varnost, učinkovitost in toleranco naprave pri pediatričnih bolnikih (5). **Zaključek:** Okvare hrbtenjače pogosto privedejo do restriktivnih sprememb dihal in neučinkovitega kašlja, kar lahko povzroči zadrževanje sluzi v dihalih, kronično vnetje in okužbe, zmanjšano pljučno komplianco in odpoved dihanja. Po ugotovitvah pregledanih raziskav se predvsem pri pacientih z visoko okvaro hrbtenjače priporoča uporaba mehansko asistiranega izkašljevanja, saj je glavni cilj respiratorne fizioterapije pri teh pacientih vzdrževanje čistih dihalnih poti.

Ključne besede: poškodba hrbtenjače, respiratorna fizioterapija, izkašljevalnik, asistirano izkašljevanje, čiščenje dihalnih poti.

Mechanical insufflation-exsufflation for patients with spinal cord injury – literature review

Background: Respiratory complications are the main cause of morbidity and mortality in the acute phase of spinal cord injury, with an incidence of 36% to 83%. Respiratory dysfunction that leads to respiratory complications may be related to vital capacity impairment, retention of secretions and autonomic dysfunction. The degree of respiratory failure associated with traumatic injuries of the spinal cord depends on the level of the spinal lesion (2). Conservative management of respiratory dysfunctions includes postural drainage, percussion and vibration, assisted coughing techniques (manually assisted coughing, mechanically assisted coughing – mechanical insufflation-exsufflation), respiratory muscle training, and non-invasive ventilatory support (6). Mechanical insufflation-exsufflation consists of insufflation of the lungs with positive pressure, followed by an active negative pressure exsufflation that creates a peak and sustained flow high enough to provide adequate shear and velocity to loosen and move secretions toward the mouth for suctioning or expectoration (3). Patients can use it when unable to use alternative methods of airway clearance, because of age, lack of cooperation or poor bulbar function (4). **Methods:** Search for foreign scientific literature was conducted via internet with electronic databases PubMed, PEDro and CINAHL. Literature search was limited to English language as well as articles between 2004 and 2016. We included clinical trials, randomised clinical trials and reviews. Their aim was to determine the effect and usage of mechanical insufflation-exsufflation for patients with spinal cord injury. **Results:** The results of the studies showed that invasive ventilatory support was less commonly needed in adults when mechanical insufflation-exsufflation was used (7). There were also significant increases in forced vital capacity volume in the first second (FEV1), forced vital capacity (FVC), and peak expiratory flow (PEF) in patients who received mechanical insufflation-exsufflation therapy besides manual respiratory physiotherapy (1). The studies report that usage of mechanical insufflation-exsufflation during intensive and postintensive care may reduce the number of bronchoscopies, the number of respiratory complications and weaning time (3). Studies retrospectively determined the safety, effectiveness and tolerance of in-exsufflation device in paediatric patients (5). **Conclusion:** Spinal cord injuries often lead to restrictive respiratory changes and impaired cough, which cause retaining secretion, chronic inflammation and infection, increased airway resistance, decreased pulmonary compliance and respiratory failure. The mechanical in-exsufflator has proven to be a useful adjunct for airway clearance in patients with neuromuscular disease and traumatic central nervous system injury.

Key words: spinal cord injury, respiratory physiotherapy, assisted cough, mechanical insufflation-exsufflation, airway clearance.

Literatura/References:

1. Arcuri JF, Abarshi E, Preston NJ et al (2016). Benefits of intervention for respiratory secretion management in adult palliative care patients. BMC Palliative Care 15: 74.
2. Bach JR, Bakshiyev R, Hon A (2012). Noninvasive Respiratory Management for Patients with Spinal Cord Injury and Neuromuscular Disease. Tanaffos11 (1): 7–11.
3. Crew JD, Svicev JN, Burns SP (2010). Mechanical Insufflation-Exsufflation Device Prescription for Outpatients with Tetraplegia. J Spinal Cord Med; 33 (2): 128–34.
4. Homnick DN (2007). Mechanical Insufflation-Exsufflation for Airway Mucus Clearance. Respiratory care; 52 (10): 1296–305.
5. Miske LJ, Hickey EM, Kolb SM, Weiner DJ, Panitch HB (2004). Use of the mechanical in-exsufflator in pediatric patients with neuromuscular disease and impaired cough. Chest; 125 (4): 1406–12.
6. Vazquez RG, Sedes PR, Farina MM, Marques AM, Velasco EF (2013). Respiratory Management in the Patient with Spinal Cord Injury. Hindawi: 12.
7. Vianello A, Corrado A, Arcaro G, et al. (2005). Mechanical insufflation-exsufflation improves outcomes for neuromuscular disease patients with respiratory tract infections. Am J Phys. Med Rehabil; 84 (2): 83–8.

Vpliv telesne dejavnosti na kognicijo starostnikov

Blanka Koščak Tivadar, mag. vzg. in men. v zdr., dipl. fiziot.

Mediko d.o.o., Ljubljana, Višnja gora

Korespondenca/Correspondence: Blanka Koščak Tivadar, mag. vzg. in men. v zdr., dipl. fiziot.; e-pošta: blanka@mediko.si

Uvod: Starostnim spremembam so podvrženi osrednje živčevje in kognitivne sposobnosti, ki omogočajo avtonomijo in socialno vključenost ter določajo kakovost staranja. Za spremembe so najbolj dovzetni pozornost, kratkoročni in dolgoročni spomin ter centralni izvršitelj. Spremenijo se hitrost obravnave informacij, mišljenje in spomin, opazen je upad sive možganovine v senzornem delu hipokampusa in spremenjeno je delovanje nevrotransmiterjev v dopaminergičnem sistemu. Kognitivne sposobnosti se s starostjo spreminjajo in naglo upadajo med 60. in 70. letom. S telesno dejavnostjo je upad mogoče zmanjšati ali celo spodbuditi možgane k nastajanju novih celic, zato je pomembno za kakovostno življenje starostnikov preučiti, kakšna in kako intenzivna telesna dejavnost je najprimernejša. **Metode:** Pregled objavljenih preglednih člankov in raziskav od leta 2001 do 2016 s ključnimi besedami, starost, staranje, telesna dejavnost, telesne sposobnosti, kognitivne sposobnosti in spomin. **Rezultati**: Upad telesne dejavnosti vpliva na spremenjeno delovanje nevrotransmiterjev v dopaminergičnem sistemu, zaradi česar je mogoče predvidevati težave z delovnim spominom in učenjem (1). Telesna dejavnost upočasni kognitivni upad in deluje preventivno. Zadostuje že povečanje telesne dejavnosti za 10 odstotkov (2). Nevroplastičnost možganov in nevrogenezo je mogoče dokazati s povečanim številom nevrotrofinov (BDNF). Telesna dejavnost pozitivno vpliva tudi na delovni spomin in pozornost, govorni spomin in centralni izvršitelj, zvišuje raven BDFN in vpliva na povečanje hipokampusa ter sive možganovine (3). Za vzdrževanje kognitivnih sposobnosti in nevrogeneze je primerna vadba za vzdržljivost (4), ki zagotavlja tudi boljšo srčno-žilno zmogljivost (5) in pozitivno vpliva na angiogenezo. Nizkointenzivna aerobna vadba pozitivno vpliva na vidno prostorsko zaznavo in pozornost, zmerna telesna dejavnost na splošno kognitivno sposobnost, delovni spomin in pozornost ter govorni spomin. Večina strokovnjakov priporoča intenzivno do zmerno vadbo, čeprav večja intenzivnost namenja več pozornosti telesni dejavnosti in manj kognitivnim procesom. **Zaključki**: Učinki vadbe na kognitivno delovanje starostnikov naj bi bili posledica izboljšane prekrvavitve in preskrbe možganov s kisikom, zaradi česar naj bi se tvorilo več nevronov in ohranjal možganski volumen. Redna telesna dejavnost zmanjšuje upad kognitivnih sposobnosti in omogoča »uspešno staranje«. Nerešeno ostaja vprašanje optimalne intenzivnosti aerobne telesne dejavnosti.

Ključne besede: starost, staranje, telesna dejavnost, kognitivne sposobnosti, spomin.

Impact of physical activity on cognition of elderly

Background: Age-related changes are subjected to the central nervous system and cognitive abilities, which allow autonomy and social inclusion, and determine the quality of aging. Most affected by age-related changes are attention, short-term and long-term memory and central executive. The changes are associated with the changes in the speed of processing the information, thinking and memory, the substantial decrease in grey matter in the sensory part of the hippocampus and the changes in functioning of the neurotransmitters in the dopaminergic system. Cognitive abilities change with the age and decrease rapidly at the age between 60 and 70. The decline can be reduced or the brain can even be stimulated to generate new cells through physical activity (PA), so it is important for the quality of life of older people to consider what PA should be like and how intense it should be. **Methods:** Review of scientific articles and sample surveys, published between 2001 and 2016, was carried out, that was based on the key words: age, aging, physical activity, physical abilities, cognitive abilities and memory. **Results:** The decline of PA has an impact on modified functioning of the neurotransmitters in the dopaminergic system, which makes it possible to anticipate problems with the help of working memory and learning (1). PA slows down the cognitive decline and has a positive impact on prevention. Increasing PA for 10% is already sufficient (2). Neuroplasticity and neurogenesis of the brain can be demonstrated by the increased number of neurotrophins (BDNF). PA has positive effect on working memory and attention, verbal memory and attention, as well as central executive, it raises BDFN level and has an impact on the increase in the hippocampus and grey matter (3). To maintain cognitive function and neurogenesis a suitable endurance training (4) is necessary, which also provides better cardiovascular fitness (5) and has positive effect on angiogenesis. Low-intensity aerobic exercise has positive effect on the visual spatial perception and attention, moderate PA on general cognitive ability, working memory and attention, as well as verbal memory and attention. Most experts recommend vigorous or moderate exercise even though higher intensity requires more attention to PA and less of it to cognitive processes. **Conclusion**: The effects of PA on cognitive functions of the elderly should be the result of improved blood circulation and oxygenation of the brain, which is expected to form more neurons and thereby maintain the brain volume. Regular PA reduces the decline of cognitive abilities and enables »successful ageing«. The question of proper intensity of PA remains unsolved.

Key words: age, ageing, physical activity, cognitive abilities, memory.

Literatura/References:

1. Benedict C, Brooks SJ, Kulberg J, Nordenskjöld R, Burgos J, Le Grevès M, Kilander L, Larsson EM, Johansson L, Ahlström H, Lind L, Schiöth, HB (2013). Association between physical activity and brain health in older adults. Neurobiol Aging 34 (1): 83–90.
2. Barnes DE, Yaffe K (2011). The project effect of risk factor reduction on Alzheimer`s disease prevalence. Lancet Neurol. 10 (9): 819–28.
3. Erickson KI, Leckie RL, Weinstein AM (2014). Physical activity, fitness, and gray matter volume. Neurobiol Aging 35 (2): 20–8.
4. Chodzko-Zalko WJ, Proctor DN, Flatarone Singh M, Minson CT, Nigg CR, Salem GJ, Skinner JS. (2009). American College of Sports Medicine position stand. Exercise and physical activity for older adults. Med Sci Sports Exerc. 41 (7): 1510–30.
5. Fisher G, Brown AW, Bohan Brown MM, Alcorn A, Noles C, Winwood L, Allison DB. (2015). High intensity interval- vs moderate Intensity-training for improving cardiometabolic in overweight or obese males: a randomised contolled trial. Plos One 10 (10).

Fizioterapija v okviru osnovnega zdravstvenega varstva leta 2016. Do kdaj tako?

Alenka Jerič Jaklič, dipl. fiziot.

Fizioterapija Alenka Jerič Jaklič, Logatec

Korespondenca/Correspondence: Alenka Jerič Jaklič, dipl. fiziot.; e-pošta: fth.ajj@siol.net

Uvod: Dostopnost do fizioterapevtskih storitev v osnovnem zdravstvenem varstvu se ne izboljšuje. Zavod za zdravstveno zavarovanje Slovenije (ZZZS) je leta 2016 korigiral mrežo fizioterapevtske dejavnosti za 26,3 fizioterapevtskega tima (1) s hkratnim dvigom normativa za izvedbo storitev na posameznega fizioterapevta za 21,54 uteži (3,79 odstotka). Slednje je ob vse večjih potrebah po fizioterapiji naložilo dodatno breme na pleča izvajalcev. Gotovo pa ni rešilo nezadovoljstva uporabnikov, ki jim nerazumno dolge čakalne dobe ne omogočajo hitrejšega okrevanja in s tem boljše kakovosti življenja. **Metode:** V analizi je vključeno realizirano število storitev 152 izvajalcev, razdeljenih v deset območnih enot, s katerimi je imel Zavod za zdravstveno zavarovanje Slovenije leta 2016 sklenjeno pogodbo o izvajanju fizioterapevtskih storitev na področju osnovnega zdravstvenega varstva (2). Porazdelitev programov in njihova realizacija, tako s presežki kot tudi z nedoseganji programa, sta prikazana za skupine izvajalcev zdravstvenih domov, bolnišnic, zdravilišč, koncesionarjev in dveh socialnih zavodov. Prikazani sta število obravnavanih zavarovanih oseb in število čakajočih na nacionalni ravni konec leta 2016. **Rezultati:** ZZZS je z izvajalci sklenil program v velikosti 313. 680,28 uteži, kar je predstavljalo finančna sredstva za delo 531,95 fizioterapevtskega tima (3). 136 izvajalcev je program skupaj preseglo za 30.881,96 uteži (9,8 %). 16 (10,5 %) izvajalcev pogodbenega programa ni realiziralo v skupni velikosti 0,2 % letnega programa ali 590,21 uteži. Največji presežek v izvedbi storitev so dosegli zdravstveni domovi, v katerih je bil program za delo 240,58 fizioterapevtskega tima presežen za 20.000,82 uteži in je predstavljal kar 64,8 % celotnega presežka. Sledijo jim koncesionarji s 4347,25 uteži (14,1 %) in bolnišnice s 3888,01 uteži (12,6 %). Zdravilišča s programom dela za 140,36 fizioterapevtskega tima tega presežejo za 2552,26 uteži (8,3 %), socialna zavoda pa za 93,62 uteži (0,3 %). Ker Zavod za zdravstveno zavarovanje Slovenije plačuje programe le v pogodbenem obsegu, predstavlja znesek vseh neplačanih storitev v deležu obveznega zdravstvenega zavarovanja več kot 1.500.000 evrov. Izvajalci so skupaj obravnavali 162.754 zavarovanih oseb. Kljub presežku v realizaciji storitev je konec leta v seznamu Nacionalnega inštituta za javno zdravje na fizioterapijo čakalo 33.187 zavarovanih oseb (4). Slednje je predstavljalo največje število čakajočih oseb v državi. **Zaključek:** Rezultati kažejo, da se kriza na področju izvajanja fizioterapije v osnovnem zdravstvenem varstvu poglablja. V dobro tako uporabnikov kot tudi izvajalcev storitev bi se morali odgovorni dejavno vključiti v snovanje nove mreže na področju fizioterapije v osnovnem zdravstvenem varstvu. Da bi dosegli dostopnost fizioterapevtske obravnave brez čakalnih vrst, bi potrebovali dodatnih 178 fizioterapevtskih programov, porazdeljenih po območnih enotah glede na število zavarovanih oseb. Tako bi omogočili fizioterapevtom osnovnega zdravstvenega varstva normalne delovne pogoje in hkrati povečali učinkovitost izvedenih storitev v korist uporabnikov.

Ključne besede: fizioterapija, izvajalci, uteži, presežek, zavarovane osebe.

Physiotherapy in the framework of basic health care in 2016. How much longer this way?

Introduction: The availability of physiotherapeutic treatment in basic health care is not getting better. In 2016 Health Insurance Institute of Slovenia (Zavod za zdravstveno zavarovanje Slovenije – ZZZS) corrected the network of physiotherapeutic activity by adding 26.3 physiotherapeutic teams' work (1) and raising simultaneously the norm for individual physiotherapists by 21.54 weightings (3.79%). Considering the increasing needs for physiotherapeutic treatments this means additional burdening for the practitioners. On the other hand, it is certainly not a solution for the discontented beneficiaries for whom the unreasonably long waiting times represent a serious impediment to faster recovery and better quality of life. **Methods:** The analysis comprises the number of realized treatments of 152 practitioners of physiotherapy divided into ten regional units who had valid contracts with ZZZS in 2016 for physiotherapeutic activity in the field of basic health care (2). The distribution of programs, their realization, with surpluses as well as deficits, is presented for groups of practitioners with community health centers, hospitals, health resorts, licensees and two social institutions. The number of treated insured persons is presented as well as the number of those on the waiting lists on national level at the end of 2016. **Results:** ZZZS contracted with practitioners a program amounting to 313,680.28 weightings, which meant financial means for the work of 531.95 physiotherapeutic teams (3). 136 practitioners together exceeded the program by 30,881.96 weightings (9.8%). 16 (10.5%) practitioners did not realize the contractual program in altogether 0.2% of the annual program or 590.21 weightings. The highest surplus in the realized treatments was attained by community health centers where the working program for 240.58 physiotherapeutic teams was exceeded by 20,000.82 weightings and represented no less than 64.8% of the total surplus. Following are licensees with 4,347.25 weightings (14.1%) and hospitals with 3,888.01 weightings (12.6%). Health resorts with a working program for 140.36 physiotherapeutic teams exceed it by 2,552.26 weightings (8.3%), and the two social institutions by 93.62 weightings (0.3%). Since ZZZS finances programs only within the limits of the contracts, the amount of all unpaid treatments in the share of obligatory health insurance is more than 1,500,000 EUR. The practitioners treated altogether 162,754 insured persons. Despite the surplus in the realization of treatments the waiting list of the National Institute of Public Health for physiotherapy comprised at the end of the year 33,187 insured persons (4). This is the largest number of waiting persons in the country. **Conclusion:** According to the results the crisis in the field of physiotherapeutic treatments in basic health care is getting worse. For the benefit of both the clients and the practitioners those responsible should be more actively involved in the formation of a new framework in the field of physiotherapy in basic health care. In order to make physiotherapeutic treatment accessible without waiting lists we should have additional 178 programs, distributed among regional units according to their numbers of insured persons. This would provide physiotherapists in basic health care with normal working conditions and at the same time improve the efficiency of the realized treatments for the clients' good.

Key words: physiotherapy, practitioners, weightings, surplus, insured persons.

Literatura/References:

1. Aneks št. 1 k Splošnemu dogovoru za pogodbeno leto 2015 http://www.zzzs.si/ZZZS/info/egradiva.nsf/o/EA9727176319A542C1257F32002BED63?OpenDocument <22. 1. 2017>.
2. Splošni dogovor za pogodbeno leto 2016 http://www.zzzs.si/ZZZS/info/egradiva.nsf/o/827714AA6BBB87D2C1257FD40041FCC2?OpenDocument <22. 2. 2017>.
3. Zavod za zdravstveno zavarovanje Slovenije http://www.zzzs.si/Izvajalci <22. 1. 2017>.
4. Nacionalni inštitut za javno zdravje http://www.nijz.si/sites/www.nijz.si/files/publikacije-datoteke/porocilo_nacas_1.1.2017.pdf <22. 2. 2017>.

Fizioterapija pri promociji zdravja na delovnem mestu v podjetjih predelovalne industrije v okviru projekta Zdravi na kvadrat 2

Andrea Backović Juričan, viš. fiziot., dipl. del. ter., univ. dipl. org.[1]; **Alenka Dovč**, univ. dipl. soc.[2]; **Brigita Zupančič Tisovec**, dipl. fiziot., spec.[1]; **Manica Remec**, dipl. fiziot., Master in promozione della salute ed educazione sanitaria, EUMAHP[1]

[1]Nacionalni inštitut za javno zdravje, Ljubljana; [2]Gospodarska zbornica Slovenije, Združenje kemijske industrije, Ljubljana

Korespondenca/Correspondence: Andrea Backović Juričan; e-pošta: andrea.backovic-jurican@nijz.si

Uvod: Fizioterapevtska dejavnost se izvaja v različnih okoljih, kar vključuje tudi delovna mesta oziroma podjetja (1). Fizioterapija se ukvarja z opredeljevanjem in izboljševanjem kakovosti posameznikovega življenja ter njegove zmožnosti za gibanje na področjih promocije zdravja, zdravljenja, habilitacije in rehabilitacije (1). Po Zakonu o varnosti in zdravju pri delu je delodajalec dolžan načrtovati in izvajati promocijo zdravja na delovnem mestu (2). Vse več zdravstvenih težav je povezanih z nezdravim življenjskim slogom, delovno mesto pa je lahko idealna priložnost za pozitivne spremembe. Namen projekta Zdravi na kvadrat 2, ki poteka pri GZS-Združenju kemijske industrije in ga je finančno podprl ZZZS, je dolgoročno prispevati k boljšemu zdravju zaposlenih in zmanjšanju odsotnosti z dela ter k povečanju usposobljenosti odgovornih oseb za promocijo zdravja na delovnem mestu v podjetjih (3). **Metode dela:** Projekt Zdravi na kvadrat 2 je nadaljevanje prvega, ki je potekal od leta 2013 do 2015. S projektom razvijamo celosten praktičen pristop promocije zdravja na delovnem mestu s povezovanjem podjetij in deležnikov na lokalni ravni, ki podpirajo razvoj zdravega življenjskega sloga (3). Področja delovanja so psihosocialna tveganja, ergonomija, prehrana in gibanje zaposlenih. V projekt Zdravi na kvadrat 2 je vključenih 58 podjetij predelovalne industrije. Za natančno oceno stanja in potreb smo za delodajalce in delavce uporabili dva namenska anketna vprašalnika in ju posredovali podjetjem v izpolnitev aprila 2016 (3). **Rezultati:** Spomladi 2016 je v raziskavi stanja in potreb na področju promocije zdravja na delovnem mestu sodelovalo 19 podjetij in 860 delavcev (od tega 55 % moških). Vprašalniki so bili posredovani v 58 podjetij predelovalne industrije, kar pomeni skoraj 33 % odzivnost. Med drugim smo ugotovili, da je imelo v zadnjih 30 dnevih največ v raziskavi sodelujočih delavcev zdravstvene težave zaradi mišično-skeletnih bolečin (križ: 61 %; vrat/ramena: 57 %; drugi sklepi: 41 %). 45 % v raziskavi sodelujočih delavcev pretežno sedi. Obe ciljni skupini si najbolj želita intervencij s področij, kot so obvladovanje stresa (zaposleni: 55 %; menedžment: 67 %), skrb za zdravo hrbtenico (zaposleni: 58 %; menedžment: 50 %) in spodbujanja telesne dejavnosti pri delu (zaposleni: 47 %; menedžment: 44 %). Na podlagi rezultatov smo pripravili poseben strateški načrt intervencij promocije zdravja na delovnem mestu, da bi jih implementirali v raziskavi sodelujočih podjetjih do konca projekta. Od septembra 2015 do marca 2017 je bilo tako izvedenih 13 skupnih seminarjev in usposabljanj za motivatorje promocije zdravja na delovnem mestu, sedem dni zdravja in gibanja, 14 delavnic zdravega življenjskega sloga, v 13 podjetjih so potekale meritve telesne sestave, v šestih prikaz aktivnega odmora, v treh pa demonstracije nordijske hoje. Pri intervencijah, povezanih z gibanjem za zdravje, preprečevanje sedenja, zdravje hrbtenice in ergonomijo, je sodelovalo deset fizioterapevtov (z Nacionalnega inštituta za javno zdravje, iz zdravstvenovzgojnega centra oziroma centra za krepitev zdravja, zasebne prakse). **Zaključki:** Med vsemi strokovnjaki za gibanje delodajalci in delavci najbolj zaupajo prav fizioterapevtu, ker je kot zdravstveni delavec kompetenten za predpisovanje, svetovanje in vodenje programov gibanja za zdravje tako zdravim kot bolnim osebam. Projekt Zdravi na kvadrat 2 ima velik vpliv na zaposlene iz podjetij predelovalne industrije, saj so podjetja glede na udeležbo in odzive zelo zadovoljna z intervencijami in izvajalci. Marsikje je prišlo do konkretnih premikov na področju promocije zdravja na delovnem mestu.

Ključne besede: promocija zdravja na delovnem mestu, fizioterapija, ocena stanja in potreb, intervencije, gibanje.

Physiotherapy with the workplace health promotion in process manufacturing industry enterprises, in the framework of the Healthy on a square project

Introduction: Physiotherapy activities are carried out in a variety of environments, which includes workplaces/companies (1). Physiotherapy deals with defining and improving the quality of an individual's life and their capacity for physical activity in the fields of health promotion (HP), treatment, habilitation and rehabilitation (1). In accordance with the Health and Safety at Work Act, the employer is required to plan and implement workplace health promotion (WHP) (2). A growing number of health problems are connected with unhealthy lifestyles, while the workplace can present an ideal opportunity to make positive changes. The purpose of the Healthy on a Square project (HS) is a long-term contribution to the better health of employees, a reduction of absenteeism, and an increase in the qualifications of persons responsible for WHP in companies (3). **Work Methods:** The project HS 2 is the sequel to the first (in operation from 2013 to 2015). With the project HS 2, we are developing a comprehensive practical approach to WHP by – at a local level –connecting companies and stakeholders, which offer support in the field of healthy lifestyle development (3). The areas of activity include: psychosocial risks, ergonomics, nutrition and movement of employees. The project HS 2 includes 58 process manufacturing industry enterprises. To accurately assess the state and the needs, we used two dedicated survey questionnaires for employers and employees and submitted them to the companies in April 2016 (3). **Results**: In the spring of 2016, 19 companies and 860 employees (55% of which were men) took part in the survey of the state and the needs in the field of WHP. Among other things, we found that in the period of 30 days prior to the survey, most of the participating workers had experienced health problems caused by musculoskeletal pains (lower back: 61%; neck/shoulders: 57%; other joints: 41%). 45% of participating workers usually work in a sitting position. What both target groups want the most are interventions in the fields such as stress management (staff: 55%; management: 67%), spinal care (employees: 58%; management: 50%) and the promotion of physical activity at work (employees: 47%; management: 44%). Based on the results, we have created a specific strategic plan for WHP interventions, with the outlook of its implementation in the companies who partook in the survey before the project completion. Following that, from September 2015 to March 2017, we organised 13 joint seminars and trainings for WHP motivators; 7 days of health and movement; 14 workshops on healthy lifestyle; measurements of body composition in 13 companies; work break (active pause) demonstrations in 6 companies; and Nordic walking demonstrations in 3 companies. 10 physiotherapists participated in the interventions related to the movement for health, sitting prevention, spinal care and ergonomics (from National Institute of Public Health, the health education center/center for the promotion of health, private practices). **Conclusions:** Among all the movement experts, employers and workers trust physiotherapists the most, since as health professionals, they can prescribe, counsel and manage movement for health programmes, both for healthy and sick persons. The project HS 2 has greatly impacted the employees of process manufacturing industry enterprises, since – judging by the participation and the response – the companies have been very satisfied with the interventions and the contractors. In many places, concrete steps forward have been made in the field of WHP.

Key words: workplace health promotion, physiotherapists, assessment of the state and the needs, intervention, physical activity.

Literatura/References:

1. RSK za fizioterapijo (2012). Opis poklica fizioterapevt. Ljubljana: DFS-SZ. www.dfs.si/mojprostor/novica/Opis%20poklica%20fizioterapevt%20RSK%202012.pdf. <10. 3. 2017>.
2. Uradni list RS, št. 43, 2011. Zakon o varnosti in zdravju pri delu (ZVZD-1). https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/103969. <10. 3. 2017>.
3. Backović Juričan A, Dovč A (2016). Promocija zdravja na delovnem mestu v podjetjih predelovalne industrije – projekt Zdravi na kvadrat 2. V: Kongres preventivne medicine 6. Javno zdravje – povezovanje za zdravje [Elektronski vir], Portorož, 22.–22. oktober 2016. Ljubljana: Sekcija za preventivno medicine Slovenskega zdravniškega društva, 127–8.

Vloga fizioterapije pri paliativnem bolniku v rehabilitaciji

Bernarda Hafner, dipl. fiziot.

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Bernarda Hafner, dipl. fiziot.; e-pošta: bernarda.hafner@ir-rs.si

Paliativna medicina raziskuje in skrbi za bolnike z neozdravljivimi boleznimi ter krajšo pričakovano življenjsko dobo. Cilj zdravljenja je omogočiti najboljše mogoče pogoje za najboljšo mogočo kakovost življenja bolnika in njegove družine do konca življenja (1).

Svetovna zdravstvena organizacija opredeljuje paliativno oskrbo kot pristop, ki s preprečevanjem in lajšanjem trpljenja, torej z zgodnjim odkrivanjem in natančno oceno ter zdravljenjem bolečine in drugih fizičnih, psihosocialnih in duhovnih težav izboljšuje kakovost življenja bolnikov in njihovih družin, ki se spoprijemajo s težavami, povezanimi z življenje ogrožajočimi boleznimi (2).

Rehabilitacija v paliativni oskrbi je pogosto spregledana (3). Namen rehabilitacije pri obravnavi bolnikov v paliativni oskrbi je določiti cilj zdravljenja, tako da lahko bolnik ohrani ali izboljša funkcijo in zmanjša posledice bolezni za tako dolgo, kot je mogoče (4). Bolnike z resnimi, življenje ogrožajočimi boleznimi prizadene visoka stopnja funkcionalne izgube z zmanjšanjem neodvisnosti v njihovih vsakodnevnih aktivnostih in mobilnosti (5). Dejavniki, ki prispevajo k izgubi funkcije, so podaljšano bolnišnično zdravljenje, upad zmogljivosti, bolečine, utrudljivost, depresija, podhranjenost, odpoved organov, nevrološke poškodbe in mišično-skeletne težave (3). Postopki fizioterapevtske obravnave so uporabni za številna življenje ogrožajoča in življenje omejujoča stanja, kot so rak in z njim povezana stanja, HIV, nevrodegenerativne bolezni, bolezni dihal, psihiatrične bolezni in spremembe duševnega stanja (6). Rehabilitacija je za bolnika v paliativni oskrbi dostopna v akutni bolnišnični oskrbi, rehabilitacijskih ustanovah, negovalnih bolnišnicah, ambulantah, hospicih in v domači oskrbi (7). Cilj fizioterapevtske obravnave je obdržati čim večjo neodvisnost in poenostaviti za bolnika pomembne aktivnosti (4). S fizioterapijo pri paliativnem bolniku ne vplivamo le na ohranjanje ali izboljšanje gibanja in funkcijskih sposobnosti, temveč tudi na zaplete, kot so anksioznost, depresija, utrudljivost, oslabelost, bolečina, oteklina, občutek težkega dihanja, slabost in zaprtost (1).

Danes paliativni bolniki živijo dlje zaradi izboljšane zdravstvene oskrbe. Številni med njimi imajo kronično funkcijsko okvaro, ki jo je povzročila bolezen ali medicinski in/ali kirurški posegi, zato je rehabilitacija, katere del je tudi fizioterapija, zelo pomembna (8).

Ključne besede: paliativna oskrba, fizioterapija, rehabilitacija, zapleti, kakovost življenja.

The role of physiotherapy in palliative care of a patient in rehabilitation

Palliative medicine includes care of and research on patients with incurable diseases and short expected survival. The goal of the treatment is to give the best possible conditions to the best possible quality of life for patients and their families for the rest of their lives (1).

World Health Organization defines palliative care as an approach that improves quality of life of patients and their families facing the problem associated with life-threating illness through prevention and relief of suffering by means of early identification and impeccable assessment, as well as treatment of pain and other physical, psychosocial and spiritual problems (2).

Rehabilitation in palliative care is often overlooked (3). The aim of having a rehabilitative approach when treating patients in palliative care is to set the goal for treatment so the patient can keep or improve functions and reduce the consequences of the disease for as long as possible (4). Patients with a serious life threatening illness experience high levels of functional loss, with decreased independency for their activities of daily living and mobility (5). Among the factors that can contribute to loss of function are prolonged hospitalization, deconditioning, pain, fatigue, depression, undernutrition, organ failure, neurologic injury, and musculoskeletal problems (3). Physiotherapy treatment methods are useful for a range of life threatening and life limiting conditions like cancer and cancer associated conditions, HIV, neurodegenerative disorders, respiratory disorders, psychiatric disorders and altered mental states (6). Settings for delivery of rehabilitation services for palliative care include the acute care hospitals, rehabilitation hospitals, skilled nursing facilities, outpatient clinics, hospice settings and home (7). The goal for the physiotherapeutic treatment is to keep as much independency as possible to make the important activities for the patient easy (4). Physiotherapy in palliative care influences not only maintenance or improvement of the patient's movement or functional abilities but also the complications such as: anxiety, depression, fatigue, weakness, pain, swelling, dyspnoea, nausea, and constipation (1).

Today patients in a palliative stage live with their illness longer thanks to the improved medical treatment. Many of these patients get chronic functional impairment caused by the disease or by medical or surgical treatments. This makes rehabilitation and physiotherapy very important (8).

Key words: palliative care, physiotherapy, rehabilitation, complications, quality of life.

Literatura/References:

1. Physiotherapy in palliative care – a clinical handbook. Frymark U, Hallgren L, Reisberg AC. http://www.stockholmssjukhem.se/Documents/SPN/Physiotherapy%20in%20palliative%20care%20-%20a%20clinical%20handbook.pdf <23. 2. 2017>.
2. WHO Definition of Palliative Care. http://www.who.int/cancer/palliative/definition/en/.
3. Javier NS, Montagnini ML (2011). Rehabilitation of the hospice and palliative care patient. J Palliat Med 14: 638.
4. Bruera E, Higginson I, Ripamonti C, von Gunten C (2006). Textbook of palliative medicine, Oxford university press inc USA.
5. Jordhoy MS, Inger Ringdal G, Helbostad JL et al (2007). Assessing physical functioning: a systematic review of quality of life measures developed for use in palliative care. Palliat Med 21: 673.
6. Kumar SP, Jim A (2010). Physical therapy in palliative care: from symptom control to quality of life: a critical review. Indian J Palliat Care 16 (3): 138–46.
7. Montagnini M, Noelle MJ. Physical therapy and other rehabilitation issues in the palliative care setting. http://www.uptodate.com/contents/physical-therapy-and-other-rehabilitation-issues-in-the-palliative-care-setting <21. 2. 2017>.
8. Doyle D, Hanks G, Cherny N, Calman K (2004). Oxford textbook of palliative medicine. Third edition.

Mreža pokritosti in značilnosti fizioterapevtskih obravnav na primarni ravni leta 2015

Silvestra Arhar, dipl. fiziot.[1]; pred. **Mojca Divjak**, viš. fiziot., univ. dipl. org.[1]; **Alenka Jerič Jaklič**, dipl. fiziot.[2]

[1]Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana; [2] Fizioterapija Alenka Jerič Jaklič, Logatec

Korespondenca/Correspondence: Silvestra Arhar, dipl. fiziot.; e-pošta: silvestra.arhar@gmail.com

Uvod: Fizioterapija na primarni ravni se na podlagi šifranta vrst vodi pod številko 507 028. Izvaja se v zdravstvenih domovih, bolnišnicah, zdraviliščih, socialnih zavodih in pri zasebnikih s koncesijo. Fizioterapevti na primarni ravni načrtujejo delo v številu uteži in obravnav. Leta 2015 je bilo določeno, da mora fizioterapevt opraviti 568,19 uteži in 286 obravnav (1). Predvideno število obravnav je bilo 329. Ker je fizioterapija na primarni ravni javna služba, se opravlja v okviru mreže pokritosti (2). Leta 2015 naj bi en fizioterapevt pokrival 3978 zavarovancev (1). Namen dela je opraviti poglobljeno statistično analizo podatkov o številu obravnavanih primerov posameznih izvajalcev fizioterapije na primarni ravni in preveriti dostopnost do fizioterapevtskih storitev. **Metode:** Literatura je bila iskana v Cobbisu in PubMedu. Pregledani so bili zakonska podlaga in splošni dogovori. Podatki, uporabljeni za statistično obdelavo, so bili povzeti s spletnih strani ZZZS. Uporabili smo podatke vseh izvajalcev fizioterapije na primarni ravni. Od statističnih metod so bile uporabljene mere središčnosti in razpršenosti, odstotni račun ter Studentov t-test za neodvisne vzorce. **Rezultati:** 506,61 fizioterapevta je naredilo skupno 161.412 obravnav. Fizioterapevt v povprečju pokriva 4043 zavarovanih oseb. Med območnimi enotami se pojavljajo občutne razlike v pokritosti. Najbolje je pokrita območna enota Celje, najslabše pa je pokrita območna enota Ljubljana. Velike razlike v pokritosti je opaziti tudi med izpostavami znotraj območnih enot. Približno polovico obravnav so naredili zdravstveni domovi. Predvideno število obravnav je doseglo 42 odstotkov izvajalcev. Minimalno število obravnav je doseglo 85 odstotkov izvajalcev. Analiza je pokazala, da število fizioterapevtov pri izvajalcu ne vpliva na realizirano število obravnav izvajalca. **Zaključek:** Fizioterapevtska dejavnost na primarni ravni ni enakomerno porazdeljena znotraj Slovenije. Največ obravnav naredijo zdravstveni domovi. Izvajalci težko dosežejo predvideno število obravnav, minimalno število obravnav pa v večini realizirajo. Nekateri izvajalci so opravili veliko več obravnav od predvidenega števila, pri takih bi bilo treba preveriti kakovost storitev. Ustanove z več fizioterapevti ne dosežejo večjega števila obravnav. Kot možna rešitev problematike se omenjata neposredni dostop in razširitev vloge fizioterapevtov. Obravnavano področje je precej slabo raziskano, zato bi bile potrebne dodatne raziskave.

Ključne besede: fizioterapija na primarni ravni, mreža pokritosti, obravnave, izvajalci.

Network of coverage and features of physiotherapy treatments at the primary level of health care in the year of 2015

Background: Physiotherapy at the primary level is listed under the number 507 028. It is carried out in health centers, hospitals, spas, social institutions and in private practices with concession. Physiotherapists at the primary level plan their work in the number of weights and treatments. In the year 2015, it was determined that a physiotherapist carries out 568.19 weights and 286 treatments (1). The estimated number of treatments was 329. Since physiotherapy at the primary level is a public service it is arranged through the network of coverage (2). In 2015, one physiotherapist covered 3978 insured individuals (1). The purpose of the work is in-depth statistical analysis of data on the number of cases dealt with individual providers of physiotherapy at the primary level, and to check availability of physiotherapy services. **Methods**: The literature was searched in Cobiss and PubMed. The legal basis and general arrangements were also examined. The data used for the statistical analysis was summarized from the websites of the Health Insurance Institute of Slovenia. Statistical methods used are a degree of centrality and variability, percentage, and Student t-test for independent samples. **Results**: 506.61 physiotherapists made a total of 161,412 treatments. At the national level, a single physiotherapist covers 4,043 insured individuals on average, between regional units significant differences occur. The best covered regional unit is Celje, the worst covered regional unit is Ljubljana. Big differences in coverage were observed among city municipalities within the regional units. Health care centers made approximately half of the treatments. Planned number of treatments was reached by 42 % of the providers. Minimal number of treatments was reached by 85 % of the providers. Analysis showed that the size of the team does not affect the number of treatments. **Conclusion**: Physiotherapy activity at the primary level is not evenly distributed within Slovenia. Health centers made most of the treatments. Most providers have not reached the planned number of treatments; the minimum number of treatments is accessible. Certain providers exceeded the planned number of treatments. In such cases, the quality of work should be inspected. Providers with numerous teams do not reach a greater number of treatments. As a possible wholesome solution for the listed problems direct access and expanded role of physiotherapist should be taken into consideration. The presented subject is poorly researched, so additional studies are needed.

Key words: physiotherapy in primary health care, network of coverage, treatments, providers.

Literatura/References:

1. ZZZS (2015a). Splošni dogovor za pogodbeno leto 2015. Dostopno na: http://www.zzzs.si/egradivap/2EC3F2AC07922434C1257E7C0040094A <20. 2. 2016>.
2. Zakon o zdravstveni dejavnosti (ZZDej) (2005). Uradni list RS 05 (23).

Načini merjenja razmika preme trebušne mišice –pregled literature

Erika Mihelj, dipl. fiziot.[1]; viš. pred. mag. **Darija Šćepanović**, viš. fiziot.[2]

[1]Splošna bolnišnica Dr. Franca Derganca, Nova Gorica; [2]Univerzitetni klinični center Ljubljana, Ginekološka klinika, Ljubljana

Korespondenca/Correspondence: Erika Mihelj, dipl. fiziot.; e-pošta: erika.mihelj@gmail.com

Uvod: Razmik preme trebušne mišice je stanje, pri katerem pride do nenormalnega razmika med trebuhoma preme trebušne mišice vzdolž bele črte zaradi njene raztegnitve (1). Največkrat se pojavi pri ženskah med nosečnostjo in po porodu (2, 3). Fizioterapevt si pri pregledu in postavitvi fizioterapevtske diagnoze pomaga z različnimi metodami merjenja razmika preme trebušne mišice (4). Namen pregleda literature je bil na podlagi pregleda strokovne in znanstvene literature predstaviti metode merjenja, ki se uporabljajo pri razmiku preme trebušne mišice, ter ugotoviti njihovo zanesljivost in veljavnost. **Metode:** Uporabljena je bila deskriptivna oziroma opisna metoda. Za tehniko zbiranja in analize podatkov je bil izbran pregled literature s podatkovnimi bazami PubMed, Science direct, SpringerLink, Dikul, Cochrane, PEDro in drugimi. Iskanje literature je potekalo tudi ročno v različnih strokovnih revijah in knjigah, omejeno je bilo na članke v angleškem in slovenskem jeziku. Članki obsegajo obdobje od leta 1987 do 2015. **Rezultati:** Po iskalni strategiji je merilom izbora ustrezalo enajst raziskav. V klinični praksi je metoda merjenja razmika preme trebušne mišice s prsti še vedno najbolj razširjena metoda, čeprav, če jo uporablja več preiskovalcev, zaradi različne debeline prstov oziroma različne interpretacije dobljenih rezultatov ni zanesljiva. Kljunasto merilo se je izkazalo za zanesljivo pri opravljanju meritev v predelu popka in nad njim. Najbolj zanesljiv in hkrati veljaven merilni instrument za merjenje razmika je ultrazvok. Na tem področju je bilo opravljenih tudi največ raziskav. V klinični praksi ultrazvoka žal ne uporabljamo velikokrat, ker je predrag in zahteva posebna usposabljanja za fizioterapevta. **Sklep:** Pri pregledu literature je bilo najdenih malo strokovnih in znanstvenih raziskav s tega področja. V prihodnosti bi potrebovali nadaljnje in bolj poglobljene študije. Uvesti bi bilo treba tudi standardni protokol, ki bi vključeval kritično mejo (širino), ki predstavlja patološki razmik preme trebušne mišice, točno določiti lokacijo za merjenje razmika in določiti, kaj pomeni širina prstov v centimetrih. Le tako nam bodo dobljeni izmerjeni podatki pravilno služili.

Ključne besede: razmik preme trebušne mišice, merilna orodja, veljavnost, zanesljivost.

Measurement methods for diastasis of the rectus abdominis muscle – literature review

Introduction: Diastasis recti abdominis muscle is a condition where there is abnormal separation of rectus abdominis muscle along the white lines as a result of its stretching (1). Most often it occurs in women during pregnancy and after childbirth (2, 3). During reviewing and setting physiotherapy diagnosis, physiotherapist helps himself with different methods of measuring the distance of rectus abdominis muscle (4). The purpose of the thesis is based on a review of technical and scientific literature to present the measurement methods used in diastasis recti abdominis muscle and determine their reliability and validity. **Methods:** In this thesis the descriptive method was conducted. Data collection and analysis were based on the overview of the literature, using the databases PubMed, Science Direct, SpringerLink, Dikul, Cochrane, Pedro and other. Literature search was conducted manually in various professional journals and books. The search was limited to articles in English and Slovene, published between 1987 and 2015. **Results:** According to the search strategy, 11 studies complied with the inclusion criteria. In clinical practice, a method of measuring the distance rectus abdominis muscle, using fingers, is still the most widely used method, although it is unreliable, when it is used by several raters, because of the different thickness of the fingers or different interpretations of the results. Caliper has proved to be reliable in performing measurements in the area of the umbilicus and above. The most reliable and at the same time a valid measuring instrument for measuring the separation is ultrasound. In this area, also the most studies have been done. In clinical practice, unfortunately, it is not used often because it is too expensive and requires special training for physical therapist. **Conclusion:** During the review of the literature, not many technical and scientific researches were found in this field. In the future, it would require further and more in-depth study. There should be a standard protocol that would include a critical threshold (width), which represents the pathological separation rectus abdominis muscle, to accurately determine the location of the measurement and, of course, to determine what constitutes a finger width in centimeters. Only in this way the obtained and measured data will be useful.

Key words: diastasis recti abdominis, measuring tools, validity, reliability.

Literatura/References:

1. Noble E (1982). Essential Exercises for the Childbearing Year, ed 2. Boston, MA, Houghton Mifflin Co 45–81.
2. Boissonault JS, Blaschak MJ (1988). Incidence of diastasis recti abdominis during the childbearing year. Phys Ther 68 (7):1082–6.
3. Gilleard W, Brown M (1996). Structure and function of the abdominal muscles in primigravid subjects during pregnancy and the immediate post partum period. Phys Ther 76 (7): 750–62.
4. Van de Water, Benjamin DR (2016). Measure methods to assess diastasis of the rectus abdominis muscle (DRAM): A systematic review of their measurement properties and meta- analytic reliability generalization. Man Ther 21: 41–53.

Ocenjevalno-triažni postopek pri pacientih s sindromom fibromialgija na Univerzitetnem rehabilitacijskem inštitutu Republike Slovenije - Soča, Ljubljana

Irena Zabukovec, dipl. fiziot.; asist. dr. **Barbara Horvat Rauter**, univ. dipl. psih., certificirana EuroPsy psihologinja

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Irena Zabukovec, dipl. fiziot.; e-pošta: irena.zabukovec@ir-rs-si

Uvod: Sindrom fibromialgije je kronično idiopatsko stanje z razširjeno mišično-skeletno bolečino (1). Simptomatika vključuje pacienta celostno, kar pomeni, da vključuje njegovo telesno, čustveno in socialno področje (2, 3). Zdravljenje z zdravili ni zadostno, temveč ga je treba oblikovati po bio-psiho-socialnem modelu (2, 3). Na URI - Soča smo oblikovali interdisciplinarni tim, ki temelji na tem pristopu. Izvajamo dva programa, in sicer prilagojeni štiritedenski in intenzivnejši pettedenski program. **Namen**: Namen prispevka je predstaviti ocenjevalno-triažni postopek pacientov s sindromom fibromialgija, ki ga izvajamo na URI - Soča. **Metode dela**: Pred vsako obravnavo pacienta s fibromialgijo je ta vključen v ocenjevalno-triažni pregled, v katerem ga ocenijo zdravnik, psiholog, fizioterapevt in socialni delavec. V prispevku se usmerimo na fizioterapevtsko testiranje, ki vključuje šestminutni test hoje, vizualno analogno lestvico pred testom hoje in po njem, Bergovo ravnotežno lestvico in meritve aktivne gibljivosti. **Rezultati:** Leta 2014 sta bila v ocenjevalno-triažni postopek vključena 202 pacienta. Interdisciplinarni tim je na podlagi testiranj odločil, da je 53 pacientov primernih za vključitev v prilagojen program, 34 za intenzivnejši program in 25 za individualen pristop. 90 pacientov ni bilo primernih za vključitev v obravnavo v naši ustanovi. **Zaključek:** Rezultati ocenjevalno-triažnega postopka nakazujejo, da pacienti z zelo visoko oceno bolečine po vizualni analogni lestvici dosegajo pomembno nižje rezultate pri šestminutnem testu hoje, Bergovi ravnotežni lestvici in aktivni gibljivosti ter tudi težje sledijo programu, zato jih ne vključujemo v zahtevnejše oblike programa, temveč jih usmerimo v individualen program, center za poklicno rehabilitacijo ali invalidsko komisijo. V intenzivnejši pettedenski program so vključeni pacienti, ki v povprečju dosegajo najboljše rezultate na vseh fizioterapevtskih testiranjih, v prilagojeni program pa so vključeni tisti, ki na vseh testiranjih dosegajo zmerne rezultate.

Ključne besede: kronično razširjena bolečina, interdisciplinarni rehabilitacijski program, ocenjevalni postopki.

The process of triage assessment process of patients with fibromyalgia syndrome at the University Rehabilitation Institute of the Republic of Slovenia – Soča, Ljubljana

Introduction: Fibromyalgia syndrome (FMS) is a chronic, idiopathic condition of widespread musculoskeletal pain (1). Symptomatology includes patient's overall functioning. It integrates his physical, psychical and social functioning (2, 3). This is why the medical model of treatment has to be replaced with the bio-psycho-social approach (2, 3). At the URI - Soča, we have formed an interdisciplinary team, which is based on the bio-psycho-social model. We implement two programs at the URI - Soča: an adjusted four-week and intensive five-week program. **Purpose:** The purpose of this paper is to describe the process of triage assessment for people with FMS. **Methods:** Before each treatment all patients with FMS are included in the triage assessment. They are assessed by a doctor, a psychologist, a physiotherapist and a social worker. In this presentation we are focused on physiotherapy testing, which includes six-minute walk test, a visual analogue scale before and after the walk test, Berg balance scale and measurements of the active range of motion. **Results:** In the 2014, 202 patients were included in the process of triage assessment. On the basis of the assessment, the interdisciplinary team decided that the 53 patients were eligible for inclusion in the adjusted program, 34 in the intensive program and 25 for an individual program. 90 patients were not suitable for inclusion in any treatment in our institution. **Conclusion:** The results of the triage assessment process suggested that patients with very high pain assessment by visual analogue scale achieved significantly lower results at six-minute walk test, Berg balance scale and active range of motion. We noticed that these patients had difficulties to follow the program, so they are not included in the advanced form of the program, but we directed them to the individual program, Centre for Vocational Rehabilitation and disability commission. Patients with the average best results on all physiotherapeutic tests are included in the intensive five-week program; those with moderate results on these scales are included in the adjusted program.

Key words: chronic widespread pain, interdisciplinary rehabilitation program, triage examination.

Literatura/References:

1. Theoharides TC, Tsilioni I, Arbetman L et al. (2015). Fibromyalgia Syndrome in Need of Effective Treatments. J pharmacol Exp Ther 355: 255–63.
2. Gatchel JR, McGeary DD, McGeary CA, Lippe B (2014). Interdisciplinary Chronic Pain Management: Past, Present, and Future. American Psychologist 69 (2): 119–30.
3. Kamper SJ, Apeldoorn AT, Chiarotto A et al. (2014). Multidisciplinary biopsychosocial rehabilitation for chronic low back pain. Cochrane systematic review and meta-analysis. BMJ 2015; 350.

Znanje, stališča in prepričanja pomurskih fizioterapevtov o telesni dejavnosti ter njihova vloga pri spodbujanju telesne dejavnosti

Miha Raščan, dipl. fiziot.; doc. dr. **Renata Vauhnik**, dipl. fiziot.

Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana

Korespondenca/Correspondence: Miha Raščan, dipl. fiziot.; e-pošta: miha.rascan@gmail.com

Uvod: V raziskavi CINDI Slovenija 2002 do 2003 je bilo ugotovljeno, da je med odraslimi Slovenci zadosti telesno dejavnih samo 32,4 odstotka odraslih prebivalcev v starostni skupini od 25 do 64 let (1). Svetovna organizacija fizioterapevtov trdi, da so fizioterapevti po svoji izobrazbi pravi strokovnjaki za spodbujanje telesne dejavnosti (2). Medtem ko se po vsem svetu kopičijo dokazi spodbujanja telesne dejavnosti, nastaja potreba po raziskavah, ki se osredotočajo na to, kako fizioterapevtske stroke prenašajo te dokaze v klinično prakso (3). Namen raziskave je bil raziskati odnose med znanjem pomurskih fizioterapevtov, njihovimi stališči in prepričanji o telesni dejavnosti in njihovim spodbujanjem telesne dejavnosti ter jih primerjati z raziskavo v Belgiji (3). **Metode dela:** Uporabljena je bila kvantitativna metoda raziskovanja. Kot raziskovalni instrument smo uporabili anketni vprašalnik, ki je bil preveden iz angleškega jezika. Prvi del anketnega vprašalnika je obsegal vprašanja z demografskimi podatki (spol, starost, strokovni naziv, leta delovnih izkušenj in delovno mesto) ter osebnimi telesnimi značilnostmi anketirancev (telesna višina in telesna teža), s pomočjo katerih je bil izračunan indeks telesne mase. Drugi del anketnega vprašalnika je vključeval sedem odprtih vprašanj vprašalnika mednarodne telesne dejavnosti – IPAQ-S. Temu je sledilo šest vprašanj odprtega tipa, s katerimi so se ugotavljali znanje, stališča in prepričanja o telesni dejavnosti ter njihova vloga pri spodbujanju telesne dejavnosti (3). V raziskavi je sodelovalo 55 fizioterapevtov, zaposlenih v pomurski regiji. **Rezultati:** Pri pomurskih fizioterapevtih je bila povprečna vrednost vprašalnika mednarodne telesne dejavnosti 1971,38 (±1589,42). Skupni povprečni rezultat znanja, stališč in prepričanj o telesni dejavnosti med anketiranimi fizioterapevti je znašal 15,956 ± 3,66 od 25 možnih točk. **Zaključki:** V primerjavi rezultatov vprašalnika mednarodne telesne dejavnosti z belgijsko raziskavo je bilo ugotovljeno, da so pomurski fizioterapevti v povprečju dosegli višjo povprečno vrednost, kar pomeni, da so v povprečju telesno bolj dejavni. Prav tako je bilo ugotovljeno, da je skupni povprečni rezultat znanja, stališč in prepričanj o telesni dejavnosti med anketiranimi pomurskimi fizioterapevti višji kot med anketiranimi fizioterapevti v belgijski raziskavi. Zasluge za to lahko pripišemo kakovostno zastavljenemu visokošolskemu študijskemu programu na področju fizioterapije v Sloveniji in nacionalnim projektom, ki spodbujajo telesno dejavnost pod vodstvom CINDI Slovenija.

Ključne besede: telesna dejavnost, spodbujanje, fizioterapevti.

Knowledge, attitudes and beliefs of the pomurje physiotherapists about activity and their role in physical activity promotion

Background: The research study CINDI Slovenia 2002 to 2003 found, that only 32.4% of adult Slovenes from the age of 25 to 64 are sufficiently physically active (1). The World Confederation for Physical Therapy claims, that physiotherapists are the true experts for promoting physical activity due to their education (2). While the evidence to promote physical activity accumulates across the world, it creates a need for research, focusing on how the profession of physiotherapy transmits the evidence into clinical practice (3). The purpose of the study was to examine the relationships between Pomurje physical therapists' knowledge, attitudes and beliefs towards physical activity, and their physical activity promotion, and also to compare the results with the study in Belgium (3). **Methods**: Quantitative research method was used in this study. As a research tool a questionnaire was used, which had been translated from English. The first part of the questionnaire included questions on demographic data (gender, age, professional title, years of work experience, workplace) and personal physical characteristics of the respondents (body height, body weight) by which the body mass index was calculated. The second part of the questionnaire consisted of seven open-ended questions of the International Physical Activity Questionnaire – (IPAQ-S). This was followed by a series of six open-ended questions, by which the knowledge, attitudes and beliefs towards physical activity and their role in physical activity promotion were found. (3). The study involved 55 physical therapists employed in the Pomurje region. **Results**: In physical therapists from Pomurje, the average value of the International Physical Activity Questionnaire was 1971.38 (±1589.42). The overall score of knowledge, attitudes, and beliefs about physical activity among the interviewed physical therapists was 15.956 ± 3.66 out of 25. **Conclusion**: The comparison of the results of the International Physical Activity Questionnaire (IPAQ-S) between the Belgian study and the current study found that the physical therapists from Pomurje achieved a higher average value, meaning they are physically more active. It was also found that the total average score of knowledge, attitudes, and beliefs about physical activity among the interviewed physical therapists from Pomurje is higher than among respondents in the Belgian study. The credit for this can be attributed to the quality higher education program in the field of physiotherapy in Slovenia and many national projects for promoting physical activity led by CINDI Slovenia.

Key words: physical activity, promotion, physical therapists.

Literatura/References:

1. Fras Z, Maučec Zakotnik J, Zupančič A, in sod. (2007). Nacionalni program spodbujanja telesne dejavnosti za krepitev zdravja od 2007 do 2012: povzeto po strategiji Vlade Republike Slovenije na področju telesne (gibalne) dejavnosti za krepitev zdravja od 2007 do 2012. Ljubljana: Ministrstvo za zdravje, 8–9.
2. World Confederation for Physical Therapy (2007). Position Statement – Physical therapists as the exercise experts across the life span. General meeting 16 June. London.
3. Mouton A, Mugnier B, Demoulin C, Cloes M (2014). Physical Therapists' Knowledge, Attitudes, and Beliefs About Physical Activity: A Prerequisite to Their Role in Physical Activity Promotion? Journal of Physical Therapy Education (Vol. 28): 120–7.

Pridobitev poklicne kvalifikacije za poklic fizioterapevt v Republiki Sloveniji s primeri držav Evropske unije

Greg Mirt, dipl. fiziot., PgDip (Švica)[1]; pred. mag. **Barbara Toplak**, univ. dipl. prav.[2]

[1]Dom starejših občanov Preddvor, Preddvor; [2]Alma Mater Europaea – Evropski Center Maribor, Maribor

Korespondenca/Correspondence: Greg Mirt, dipl. fiziot., PgDip (Švica); e-pošta: mirtgregor@gmail.com

Uvod: Raziskava predstavlja primerjalno-pravni pregled in umestitev Slovenije v Evropi glede pridobitve poklicne kvalifikacije za opravljanje poklica fizioterapevt. Za pridobitev poklicne kvalifikacije za poklic fizioterapevt je v državah članicah Evropske unije (EU) zahtevano izpolnjevanje različnih pogojev. V Sloveniji traja visokošolski strokovni študij tri leta in obsega 180 ECTS. Diplomirani fizioterapevt ne more samostojno opravljati fizioterapevtskega poklica, dokler v skladu z določili Zakona o zdravstveni dejavnosti (1) ne opravi pripravništva in strokovnega izpita. Raziskava primerja države članice glede na leta študija in ugotavlja, ali sta po diplomi praksa in strokovni izpit ter ali deluje fizioterapevt kot primarni stik z možnostjo postavljanja diagnoze. **Metode**: Znanstveni članek temelji na kvalitativni raziskavi, in sicer na pregledu sekundarnih podatkov, ki so dopolnjeni s komparativno metodo. V raziskovalni vzorec je bilo vključenih vseh 28 držav članic EU. Izbor podatkov je temeljil na zbiranju kvantitativnih in kvalitativnih podatkov za vsako izmed 28 držav EU posebej. **Rezultati**: Že ugotovitve različnih mednarodnih raziskav v ekonomiji in ekonomski svobodi (2) opozarjajo na neskladnost slovenske zakonodaje na področju izobraževanja in pridobivanja poklicne kvalifikacije. Postopek formalnega priznanja delovne, poklicne oziroma strokovne usposobljenosti za opravljanje poklica fizioterapevt v Sloveniji je primerljiv s Hrvaško, Romunijo in Liechtensteinom. V Sloveniji pripravništvo po diplomi ni urejeno sistemsko, kar pomeni, da si ga mora diplomant fizioterapije urediti sam. To pa je odvisno od finančne likvidnosti države in zavoda, v katerem se pripravništvo izvaja, kar povzroča zaostajanje za diplomanti drugih držav, ki pripravništva nimajo. Poleg tega v Sloveniji nimamo sistema samonapotitve (3). Slovensko združenje fizioterapevtov je leta 2016 podalo predlog po zgledu uspešne prakse v drugih evropskih državah na tem področju. Slovenija spada tudi med države, v katerih fizioterapevt ne sme postavljati diagnoze, postavi jo lahko le zdravnik. Fizioterapija se je v Sloveniji tako kot tudi drugod razvila v samostojno strokovnoznanstveno dejavnost, vendar se stopnja avtonomnosti fizioterapevta po posameznih državah v Evropski uniji razlikuje. Vidimo, da ima slovenska fizioterapija pomanjkljivosti v regulaciji in organizaciji stroke. Obstaja viden interes, da bi bili slovenski fizioterapevti obravnavani kot avtonomni zdravstveni delavci z večjim obsegom kompetenc. **Zaključki**: Klinično delo in izobraževanje za poklic fizioterapevta se v državah članicah Evropske unije razlikujeta, hkrati pa se oblikuje skupen evropski trg dela. Slovenski fizioterapevti bi na skupen evropski delovni trg vstopali bolj enakovredno, če bi Slovenija spremenila zakonodajo s področja obveznega opravljanja pripravništva ter regulirala zakonodajo in tako odpravila pomanjkljivosti fizioterapevta, kot je sistem samonapotitve ter postavljanja diagnoze.

Ključne besede: formalno priznanje, zakonodaja, fizioterapija, skupen trg dela EU, konkurenčnost.

The acquisition of professional qualification for the profession of physiotherapist in the Republic of Slovenia with examples of members states of the European Union

Background: The purpose of this scientific article is to explore and compare different European practices that enable one access to pursue the physiotherapy profession. To achieve that we rely on both the comparative and legal overview to establish the placement of Slovenia within the European area concerning the acquisition of professional qualifications required to practise the profession of a physiotherapist. A physiotherapist (BA) cannot independently perform his physiotherapeutical profession until he has officially finished his internship and successfully passed his professional exam, which in accordance with the laws of the Act on medical activity (1) endows him with full professional qualifications. Professional qualifications give a physiotherapist autonomy to exercise all his professional activities. Of course, the field of physiotherapy in Slovenia as well as in other developed countries has become an independent scientific expertise, but the extent of autonomy among the EU countries differs substantially. **Methods:** The scientific article is based on a qualitative study which minutely analyses all thus collected currently existing secondary data which have been upgraded by using comparative methods. The research sample embodied all 28 EU member states. Thus, the selection of data was based on the collection of these for each of the 28 EU countries respectively. **Results:** The conclusions of various international researches so far have proved that there is a lack of accordance (2) when it comes to the programs of university studies and the acquisition of professional qualifications. The process of official recognition of vocational qualifications necessary for the pursuit of the profession of a physical therapist in Slovenia is comparable to Croatia, Romania and Liechtenstein. Slovenia belongs to a handful of four EU countries, which require specific internships after the university graduation. Moreover, the internship in Slovenia is not regulated systematically, which means that individuals need to arrange it for themselves, which again in itself depends on the solvency of the country and each institution respectively. In this respect physical therapists (BA) are lagging behind their colleagues from other countries where internship is not a must. Besides, in Slovenia there is no possibility for one's own referral to physical therapists (3). The Slovenian Association of Physiotherapists made a proposition in 2016 to consider a self-referral as a solution that already exists in the majority of EU countries. What is more, Slovenia belongs to a group of countries where physical therapists are exempt from making a diagnosis; only doctors can do that. All things considered, physiotherapy in Slovenia obviously lacks in internal regulations and the organisation within the field itself, which would endow physical therapists with more autonomy and a wider scope of competences. **Conclusions:** Clinical work and training for the profession of a physical therapist in the EU member states is different, while at the same time a common EU labour market is being developed. If Slovenia agreed to change the legislation governing the mandatory internship following the university graduation, Slovenian physiotherapists could access the European labour market more equally, which would further enable physiotherapists from the EU countries a better chance to upgrade their knowledge and be more actively involved in lifelong education across Europe.

Key words: Formal recognition, legislation, physiotherapy, common EU labour market, competitiveness.

Literatura/References:

1. Zakon o zdravstveni dejavnosti. Uradni list Republike Slovenije št. 9/92, s spremembami.
2. Slovenija in ekonomska svoboda. TV Slovenija dne 28. 10. 2011. Dostopno na: https://www.youtube.com/watch?v=cc0sIHv91f8 (31. 8. 2016). Economic Survey of Slovenia 2015. OECD. 2016. Dostopno na: http://www.oecd.org/eco/surveys/economic-survey-slovenia.htm (31. 8. 2016).
3. Lovinčič H. Predlog za dostop do fizioterapevta brez napotnice. MMC RTV Slovenija. 2016. Dotopno na: http://www.rtvslo.si/zdravje/novice/predlog-za-dostop-do-fizioterapevta-brez-napotnice/402228 (31. 8. 2016).

Rehabilitacija po delni amputaciji roke zaradi vojne poškodbe – poročilo o primeru

Slavica Bajuk, dipl. fiziot.; **Jaka Borišek**, dipl. fiziot.; **Mira Barič**, dipl. del. ter.; **Barbara Osolnik**, dipl. del. ter.; asist. **Helena Jamnik**, dr. med.

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Slavica Bajuk, dipl. fiziot.; e-pošta: slavica.bajuk@ir-rs.si

Uvod: Fizioterapija ima pomembno vlogo v rehabilitaciji vojnih poškodb in delo fizioterapevta je med vojaki dobro sprejeto ter spoštovano (1). Incidenca parcialnih ročnih amputacij je pri moških od tri- do šestkrat večja kot pri ženskah (2). Namen prispevka je prikaz rehabilitacije vojaka po poškodbi levega zgornjega uda. **Metode:** 26-letni tuji vojak je štiri mesece pred začetkom obravnave utrpel delno amputacijo leve roke po eksploziji na tujem bojišču. Prišlo je do zloma proksimalne falange 3. prsta, amputacije 5. prsta po zlomu, do eksartikulacije 2. prsta in amputacije 4. prsta po zlomu proksimalne falange. Utrpel je večplastne poškodbe živcev medianusa, ulnarisa in radialisa. Utrpel je tudi udarec v prsni koš, desno stegno, levo ramo in blago poškodbo glave. Prisotne so nevropatska bolečina po poškodbi živcev, fantomska bolečina, ki je najhujša v predelu 4. in 5. prsta, ter distonija v predelu 3. prsta. Pred obravnavo in po njej so bili izvedeni manualno testiranje mišic, meritve gibljivosti sklepov, vidna analogna lestvica (VAL) za oceno bolečine, meritev obsegov udov in test za senzoriko. Pacient je bil vključen v fizioterapijo in delovno terapijo, ne pa v psihološko obravnavo, ker je bila ovira jezikovno sporazumevanje. V fizioterapiji so bile izvajane individualna kinezioterapija, sklepna mobilizacija za povečanje gibljivosti, terapija z ogledalom, protibolečinska transkutana električna nevrostimulacija (TENS) in terapija za zmanjšanje brazgotin. V delovni terapiji je bila izdelana elastična opornica za izboljšanje opozicije, vključevani so bili tudi elementi desenzitizacije (1, 3). Terapija je trajala tri tedne, štiri ure na dan. **Rezultati:** Mišični test ob odpustu kaže popoln gib v vertikalni smeri z normalnim uporom v ramenskih in komolčnih mišicah ter mišicah zapestja. Mišice palca in sredinca so napredovale iz nepopolnega giba v vertikalni smeri do popolnega giba z minimalnim uporom. Gibljivost v ramenskem sklepu, komolcu, zapestju in palcu se je izboljšala do normalne stopnje. V vseh sklepih sredinca so bile na začetku prisotne močne kontrakture, na koncu pa so se zmanjšale, tako da sklene palec s sredincem. Bolečine so se med obravnavo zmanjšale, po vidni analogni lestvici na začetku iz 7 na 4 ob zaključku. Senzorika se v treh tednih ni spremenila. **Zaključki:** Pacient je po obravnavi pridobil sklepno gibljivost in mišično moč, brazgotine so se zmehčale in postale bolj elastične, zmanjšala se je bolečina in izboljšala se je funkcija leve roke pri aktivnostih, ker lahko sklene palec z edinim prstom sredincem.

Ključne besede: delna amputacija, prsti, vojna poškodba, rehabilitacija, fizioterapija.

Rehabilitation after partial hand amputation because of the war injury – case report

Background: Physical therapy has an important role in the rehabilitation of war injuries and is well received and respected by soldiers (1). The incidence of partial hand amputation is 3 to 6 times higher in men than in women (2). The purpose of this paper is to show the rehabilitation of a soldier after injury of the left upper limb. **Methods:** A 26-year-old foreign male soldier suffered partial hand amputation after an explosion 4 months before therapy. There was minor damage to the thumb, exarticulation of the first finger, fracture of the proximal phalanx of the second finger, third finger amputated due to fracture of the proximal phalanx, and fourth finger amputated due to fracture of phalanx. He suffered multifaceted damage to the medianus, ulnaris and radialis nerves. He also suffered a blow to the chest, right thigh, and left shoulder. There was neuropathic pain after nerve injury and phantom pain which was the worst in the region of the third and the fourth finger, as well as dystonia in the area of the second finger. Before and after therapy muscle testing, range of motion (ROM), visual analog scale (VAS) for pain assessment, limb circumference, and sensitivity were evaluated to assess the functional status. The patient participated in physical therapy and occupational therapy but did not receive psychological therapy due to the language communication problem. The physical therapy program included individual kinesiotherapy, joint mobilization to increase mobility, mirror therapy, transcutaneous electrical nerve stimulation (TENS), and massage to reduce scar tissue. In occupational therapy an elastic splint was made to improve opposition and treatment included elements of desensitization (1, 3). Therapy lasted 3 weeks, 4 hours per day. **Results:** Muscle test results after treatment show full vertical movement with normal resistance in the shoulder, elbow and wrist muscles. Thumb and middle finger muscles improved from incomplete vertical movement to complete movement with minimal resistance. ROM of shoulder, elbow, wrist and thumb joints improved to normal. In the beginning strong contractions were present in all joints of the middle finger, in the end contractions were reduced so that he could touch thumb to middle finger. During the treatment the pain decreased from 7 to 4 according to VAS. Sensitivity did not change in three weeks. **Conclusions:** After the treatment the patient acquired joint mobility, muscle strength, softened and more elastic scar tissue, reduced pain, and improved function of the left hand because he can now connect the thumb to the remaining middle finger.

Key words: partial amputation, finger, war injury, rehabilitation, physical therapy.

Literatura/References:

1. Springer B, Doukas WC (2006). Process of care for battle casualties at Walter Reed Army Medical Center: part II. Physical therapy service. Mil Med; 171 (3): 203–5.
2. Burger H, Maver T, Marincek C (2007). Partial hand amputation and work. Disabil and Rehabil; 29 (17): 1317–21.
3. Smurr LM, Gulick K, Yancosek K, Ganz O (2008). Managing the upper extremity amputee. J Hand Ther; 21: 160–76.

Ocenjevanje premičnosti pacientov z mišično-kostnimi okvarami z indeksom premičnosti de Morton

Aleksander Zupanc, dipl. fiziot.[1]; doc. dr. **Primož Novak**, dr. med.[1]; doc. dr. **Urška Puh**, dipl. fiziot.[2]

[1]Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana; [2]Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana

Korespondenca/Correspondence: Aleksander Zupanc, dipl. fiziot.; e-pošta: aleksander.zupanc@gmail.com

Uvod: Za oceno sposobnosti izvajanja gibalnih dejavnosti sta pri pacientu najpomembnejši oceni ravnotežja in premičnosti. Indeks premičnosti de Morton (angl. de Morton mobility index – DEMMI) vključuje oceno ravnotežja in sposobnosti premikanja. Ocenjuje 15 gibalnih nalog, od enostavnih, kot je premikanje po postelji ali hoja, do zahtevnejših nalog, kot je poskok s tal (1). Je zanesljivo in veljavno merilno orodje, sposobno zaznati spremembe pri starostnikih v različnih obdobjih zdravljenja in z različnimi vzroki za zmanjšano sposobnost premikanja (2). Namen prispevka je predstaviti del izsledkov raziskave, v kateri smo ugotavljali veljavnost slovenskega prevoda DEMMI za ocenjevanje premičnosti pri pacientih z mišično-kostnimi okvarami na rehabilitaciji. **Metode:** S slovenskim prevodom DEMMI (1), Bergovo lestvico za oceno ravnotežja (3) in motoričnim delom lestvice funkcijske neodvisnosti (4) smo ocenili 30 priložnostno izbranih pacientov (46,6 odstotka moških, 53,4 odstotka žensk) z mišično-kostnimi okvarami z okvarami perifernega živčevja ali brez njih. Njihova povprečna starost je bila 54 let (razpon: od 22 do 84 let). Ocenjevanje je potekalo ob sprejemu na rehabilitacijo in po štirih tednih obravnave. Razlike povprečnih ocen med prvim in drugim ocenjevanjem smo ugotavljali s testom t za odvisne vzorce, povezanost med ocenami različnih merilnih orodij pa smo ocenili z izračunom Spearmanovega korelacijskega koeficienta. Raziskavo je odobrila komisija za medicinsko etiko URI - Soča. **Rezultati:** Po povprečno 27,5 dne (SO 1,8) rehabilitacije so se pri pacientih statistično pomembno izboljšale povprečna ocena DEMMI za 23 točk (SO 9,4), povprečna ocena Bergove lestvice za oceno ravnotežja za 18,3 točke (SO 10,9) in povprečna ocena motoričnega dela lestvice funkcijske neodvisnosti za 22,2 točke (SO 14). Med ocenami DEMMI in Bergove lestvice za oceno ravnotežja je bila povezanost zelo dobra, tako ob sprejemu (ro = 0,78) kot pri drugem ocenjevanju (ro = 0,92). Z ocenami motoričnega dela lestvice funkcijske neodvisnosti je bila povezanost ob sprejemu dobra (ro = 0,54), pri drugem ocenjevanju pa zelo dobra (ro = 0,75). **Zaključki:** Izsledki o dobri oziroma zelo dobri povezanosti z Bergovo lestvico za oceno ravnotežja in z motoričnim delom lestvice funkcijske neodvisnosti potrjujejo veljavnost konstrukta DEMMI pri pacientih z mišično-kostnimi okvarami na rehabilitaciji. Ocenjevanje z DEMMI je kljub različnim vzrokom in ravnem zmanjšane sposobnosti premikanja pri preiskovancih pokazalo izboljšanje premičnosti po štirih tednih rehabilitacije, zato ga priporočamo za uporabo v fizioterapiji. Po končani raziskavi bo prevod DEMMI objavljen za uporabo v Sloveniji.

Ključne besede: premičnost, mišično-kostne okvare, DEMMI, ocenjevanje, veljavnost konstrukta.

Mobility assessment of patients with musculoskeletal impairments with de Morton mobility index

Background: The assessment of balance and mobility of a patient is crucial for assessing abilities to perform motor activities. De Morton mobility index (DEMMI) includes assessment of balance and ability to move. The 15 mobility items vary from the easiest, i.e., to move in bed and walk, to the most difficult, i.e., to jump from the floor (1). It is a reliable and valid measurement tool, which is able to detect change in older adults in different periods of health care and with different causes of mobility declines (2). The aim is to present a part of the study results in which validity of the Slovene translation of DEMMI for assessing mobility in patients with musculoskeletal impairments in rehabilitation was established. **Methods:** Thirty conveniently selected patients (46.6% men, 53.4% women) with musculoskeletal impairments with or without impairments of peripheral nerves, were assessed with the Slovene translation of DEMMI (1), Berg balance scale (3) and functional independence measure – motor part (4). Their age was 54 years on average (range: 22–84 years). The assessment was performed at admission to rehabilitation and after four weeks of treatment. The differences in scores of each measurement tool between the first and the second assessment were established with paired t test, and correlations between DEMMI and other measurement tools were assessed with the calculation of the Spearman's correlation coefficient. The research was approved by the Ethics Committee of URI - Soča. **Results:** After 27.5 days on average (SD 1.8) of rehabilitation, improvements of patients were significant; the DEMMI score increased on average for 23 points (SD 9.4), the Berg balance score increased on average for 18.3 points (SD 10.9) and the functional independent measure – the motor part increased on average for 22.2 points (SD 14). Correlation between the DEMMI and the Berg balance scores was very good at admission (*rho*=0.78) and at the second assessment (*rho*=0.92). Correlation with the functional independent measure – the motor part scores was good at admission (*rho*=0.54) and very good at the second assessment (*rho*=0.75). **Conclusions:** The results of good or very good relationship between the DEMMI, the Berg balance score, and functional independence measure – the motor part confirmed the construct validity of the DEMMI in patients with musculoskeletal impairments at rehabilitation. Despite different causes and levels of mobility decline in patients' assessment with DEMMI showed improved mobility after 4-week rehabilitation, therefore we recommended it for use in physiotherapy. At the end of the study, the translation of DEMMI will be published for use in Slovenia.

Key words: mobility, musculoskeletal impairments, DEMMI, assessment, construct validity.

Literatura/References:

1. De Morton NA, Davidson M, Keating JL (2008). The de Morton Mobility Index (DEMMI): an essential health index for an ageing world. Health Qual Life Outcomes 6: 63.
2. Zupanc A, Puh U (2016). Psihometrične značilnosti de Morton indeksa premičnosti za ocenjevanje premičnosti starostnikov - pregled literature. Rehabilitacija 15 (3): 53–62.
3. Rugelj D, Palma P (2013). Bergova lestvica za oceno ravnotežja. Fizioterapija 21 (1): 15–25.
4. Grabljevec K (2003). Lestvica funkcijske neodvisnosti (FIM). Ocenjevanje izida v medicinski rehabilitaciji. V: zbornik predavanj 14. dnevi rehabilitacijske medicine, Ljubljana, 4. in 5. april 2003. Ljubljana: Inštitut Republike Slovenije za rehabilitacijo, 59–65.

Prehrana in fizioterapija: ali nas zanima prehrana bolnika pred fizioterapijo?

asist. dr. **Mojca Amon**, dipl. fiziot.[1]; prof. dr. **Igor Mekjavić**, dipl. inž. el.[2]

[1]Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana; [2]Jožef Stefan Institut, Oddelek za avtomatiko, biokibernetiko in robotiko, Ljubljana

Korespondenca/Correspondence: Mojca Amon, dipl. fiziot.; e-pošta: mojca.amon@zf.uni-lj.si

Uvod: O ergonomski oceni napora za izvedbo pasivne ali aktivne terapije se v okviru fizioterapije redko pogovarjamo. Fizioterapija lahko za bolnika predstavlja različno stopnjo metabolne energetske porabe, zato je smiselno, da se upošteva metabolna poraba v mirovanju, da bi bolje razumeli ergonomsko stanje posameznika med fizioterapevtsko obravnavo. Cilj predmetne raziskave je bil ovrednotiti metabolni učinek zaužitega prehranskega obroka v mirovanju. Da bi izključili potencialno vpletene dejavnike telesne aktivnosti ali spremenjene prehrane na metabolizem, so preiskovanci deset dni bivali v nadzorovanem okolju brez večjih telesnih naporov. **Metode**: Preiskovali smo metabolne odzive zdravih posameznikov z normalno telesno maso in dobro aerobno treniranostjo (n = 11; 73,0 ± 7,7 kg; 23,7 ± 4,0 leta, ITM 22,2 ± 2,4 $kg \cdot m^{-2}$; VO_{2max} 60,6 ± 9,5 $ml \cdot kg^{-1} \cdot min^{-1}$). Preiskovanci so pod stalnim strokovnim nadzorom deset dni bivali v kontroliranem okolju z omejeno telesno aktivnostjo (dovoljeno le prosto gibanje po bivalnem prostoru), pri čemer smo nadzorovali tudi celodnevni energetski vnos posameznikov. Pred bivanjem v energetsko nadzorovanem okolju in po njem smo opravili metabolni tolerančni test (MTT), s katerim smo lahko podrobno opazovali metabolne odzive po hranjenju. Izmerili smo metabolno energetsko porabo v mirovanju (REE), sedem različnih metabolnih dejavnikov (krvni sladkor, GLP-1, inzulin, kateholamine, grelin, peptid-YY in leptin), črevesni pretok in subjektivno oceno apetita. Opisane parametre smo primerjali na tešče (pred hranjenjem) in desetkrat v času dveh ur po hranjenju (vsakih 15 min MTT). **Rezultati**: Rezultati študije so pokazali značilno zmanjšano telesno maso po desetdnevni izpostavitvi (–0,7 ± 0,2 kg). Opazili smo povečanje celotne telesne maščobe (0,23 ± 0,45 kg) po desetdnevnem obdobju zmanjšane telesne aktivnosti. Rezultati MTT se odražajo s značilnimi spremembami opazovanih metabolnih hormonov po prehranjevanju. **Zaključek**: Iz predstavljene raziskave izhaja, da ima zmanjšana telesna aktivnost sama po sebi učinek na telesno maso in sestavo telesa pri posameznikih z normalno telesno maso. Prehranjevanje sproži številne metabolne procese, ki smo jih opazovali med metabolnim testiranjem. Izrazite metabolne spremembe pred prehranjevanjem in dve uri po njem (črevesni pretok, krvni parametri metabolnih hormonov ter subjektivna ocena apetita) lahko predstavljajo proces, ki poteka pri vsakem bolniku ne glede na izbrani protokol fizioterapije (pasivna ali energetsko zahtevnejša aktivna fizioterapija). Poznavanje osnovnih metabolnih odzivov v mirovanju je lahko prispevek k optimizaciji izbranega fizioterapevtskega protokola.

Predstavljeno delo je nastalo v okviru raziskovalnega projekta.

Ključne besede: ergonomija, napor, mirovanje, metabolizem, hormoni.

Nutrition and physiotherapy: should we consider the patient's nutrition before physiotherapy?

Background: The ergonomic evaluation of effort required to perform passive or active physiotherapy is rarely debated in physiotherapy. Since physiotherapy can represent a different state of metabolic energy consumption for the patient, it would make sense to examine their metabolic consumption in a resting and fasted state, in order to better understand the ergonomic state of an individual during the course of physiotherapeutic treatment. The purpose of the presented part of research project was to examine the effect of food consumption in a resting state. In order to eliminate potential effects of physical activity or an altered diet on the metabolism, the subjects lived in a controlled environment for 10 days without any strenuous physical activity. **Methods:** We examined metabolic responses in healthy individuals with normal body mass, who were also well trained aerobically (n=11; 73.0±7.7 kg; 23.7±4.0 years, ITM 22.2±2.4 $kg \cdot m^{-2}$; VO_{2max} 60.6±9.5 $ml \cdot kg^{-1} \cdot min^{-1}$). The subjects remained in a controlled environment for 10 days under constant supervision with limited physical activity (they were only allowed to move around the apartment), while their daily caloric intake was monitored. Before and during their stay in the controlled environment a metabolic tolerance test was performed (MTT) in order to carefully examine the metabolic responses after feeding. We monitored their resting energy expenditure (REE), seven different metabolic factors (circulating glucose, GLP-1, insulin, catecholamines, ghrelin, peptide-YY, leptin), gastro-intestinal blood flow and appetite sensations. The listed parameters were compared in a resting state (before feeding) and ten times during the two hours after feeding (MTT every 15 min). **Results:** The results of the study demonstrated that body mass was significantly reduced after the 10-day confinement (–0.7±0.2 kg). There was an increase in body fat mass (0.23±0.45 kg) following the 10-day period of reduced physical activity. The MTT results reflect typical changes of the monitored metabolic hormones after feeding. **Conclusions:** The presented study demonstrated that reduced physical activity has an effect on the body mass and body composition in individuals with a normal body mass. Feeding induces several metabolic processes, which were monitored during the metabolic testing. Significant metabolic changes before and 2 hours after feeding (gastro-intestinal flow, blood parameters of metabolic hormones and appetite sensations) can represent processes that take place in every patient, regardless of the chosen physiotherapeutic protocol (passive or active physiotherapy, which requires more energy). The knowledge of basic metabolic responses in a resting state can help with optimizing the chosen physiotherapeutic protocol.

The presented paper is part of a research project.

Key words: ergonomics, effort, resting, metabolism, hormones.

Literatura/References:

1. Amon M (2012). Normobaric hypoxia: Metabolic responses following 10-day hypoxic confinement. Doctoral Dissertation. Jožef Stefan International Postgraduate School.
2. Hamburg NM, McMackin CJ, Huang AL, Shenouda SM, Widlansky ME, Schulz E, Gokce N, Ruderman NB, Keaney JFJr, Vita JA (2007). Physical inactivity rapidly induces insulin resistance and microvascular dysfunction in healthy volunteers. Arterioscler Thromb Vasc Biol 27: 2650–6.
3. Mekjavic IB, Debevec T, Amon M, Keramidas ME, Kounalakis SN (2012). Intermittent normobaric hypoxic exposures at rest: effects on performance in normoxia and hypoxia. Aviat Space Environ Med 83 (10): 942–50.
4. Wasse LK, Sunderland C, King JA, Batterham RL, Stensel DJ (2012). The influence of rest and exercise at a simulated altitude of 4000 m on appetite, energy intake and plasma concentrations of acylated ghrelin and peptide YY. J Appl Physiol 112: 552–9.

Prvi primer sodelovanja strokovnjaka za disfunkcijo medeničnega dna in prehrano – poročilo o primeru

viš.pred. mag. **Darija Šćepanović**, viš. fiziot.; **Iva Weingerl**, dipl. san. inž., dipl. fiziot., (magistrandka študija dietetike)

Univerzitetni klinični center Ljubljana, Ginekološka klinika, Ljubljana

Korespondenca/Correspondence: viš.pred. mag. Darija Šćepanović, viš. fiziot.; e-pošta: darija.scepanovic@kclj.si

Uvod: Vadba mišic medeničnega dna je metoda prvega izbora za zdravljenje stresne urinske inkontinence pri odraslih ženskah (1). Obstajata dva dokazana mehanizma, kako deluje vadba mišic medeničnega dna pri zdravljenju stresne urinske inkontinence. Prvi, ženske se naučijo zavestno kontrahirati te mišice tik pred ali med povečanjem pritiska v trebušni votlini (angl. the Knack) in tako preprečijo spust medeničnega dna navzdol. Drugi, ženske izvajajo redno vadbo mišic medeničnega dna, da bi povečale »čvrstost« in strukturno podporo medenici. Pomembna je tudi ustrezna prehrana po vadbi, torej zadosten vnos ogljikovih hidratov in beljakovin v telo. Ogljikovi hidrati so namreč bistveni za obnovo zalog glikogena, beljakovine pa zagotavljajo gradnike, ki omogočijo hitrejšo mišično obnovo in rast (3). **Prikaz primera:** 45-letna pacientka je bila napotena na fizioterapevtsko obravnavo z diagnozo stresna urinska inkontinenca. Fizioterapevtska obravnava je potekala skladno s trenutno veljavnimi priporočili. V anamnezi, tako urološki, medicinski, kirurški, družinski, ginekološki, nosečnosti in poroda kot črevesja ni bilo posebnosti. Indeks telesne mase je znašal 20,2. Fizikalni pregled, ki je vključeval hitri nevrološki pregled, pregled trebuha in oceno zunanjih genitalij, je bil brez posebnosti. Vaginalna ocena funkcije mišic medeničnega dna po shemi PERFECT je bila: jakost – 2; vzdržljivost – 10; število ponovitev – 10; hitre kontrakcije – Da; elevacija posteriorne stene nožnice – Da; ko-kontrakcija z m. transversus abdominis – Da; kontrakcija pred kašljem/ob njem – Ne. Pacientka je dobila navodilo, da izvaja vadbo od 3- do 5-krat na dan, in sicer od 8 do 12 kontrakcij z zadržkom od 6 do 8 sekund. Čez čas je dodala še od 3 do 4 kontrakcije z višjo hitrostjo. Poleg tega je vadila tudi the Knack. Pacientki smo priporočili, da po vadbi mišic medeničnega dna zaužije obrok, bogat z ogljikovimi hidrati, ki imajo visok glikemični indeks (izdelki iz bele moke: kruh, testenine), saj sta v prvih dveh urah povečana privzem glukoze v mišice in obnova glikogenskih zalog (4). V kombinaciji z beljakovinami se sinteza glikogena v mišicah še pospeši, zato smo pacientki priporočili, da po vadbi zaužije beljakovine (sirotka, beljak, mleko z manj maščobe, jogurt z manj maščobe, beljak ali meso). V času 6 mesecev je pacientka imela štiri obravnave. **Zaključki:** Jakost mišic medeničnega dna se je izboljšala (oc. 5). Ob kašlju je bila hkrati prisotna kontrakcija mišic medeničnega dna. Simptomi stresne urinske inkontinence niso bili več prisotni. K izdatnemu povečanju jakosti mišic medeničnega dna je najverjetneje prispeval tudi ustrezen vnos ogljikovih hidratov in beljakovin v telo po vadbi, zato bomo pacientkam tudi v prihodnosti svetovali o načinu prehranjevanja po vadbi mišic medeničnega dna.

Ključne besede: stresna urinska inkontinenca, mišice medeničnega dna, vadba, ogljikovi hidrati, beljakovine.

The first example of cooperation between expert for pelvic floor dysfunction and nutrition – case report

Introduction: Pelvic floor muscle (PFM) training is the first line of treatment for women with stress urinary incontinence. To date, there are two main proven mechanisms on how PFM training may be effective in the treatment of stress urinary incontinence. First, women learn to consciously contract before and during an increase in abdominal pressure ('the Knack'), and continue to perform such contractions as a behavioral modification to prevent descent of the pelvic floor. And second, women are taught to perform regular strength training over time to build up 'stiffness' and structural support of the pelvic floor. Proper nutrition after PFM training is also important, i.e., adequate intake of carbohydrates and proteins in the body. Carbohydrates are in fact essential for the restoration of glycogen; proteins provide the building blocks that enable faster muscle recovery and growth (3). **Case report:** A 45-year old female patient was referred to physiotherapy treatment with a diagnosis of stress urinary incontinence. Physiotherapy treatment is carried out in accordance with current recommendations. The history (urological, medical, surgical, family, gynecological, of pregnancy and birth, bowel) showed no specifics. Body mass index was 20.2. Physical examination, which included fast neurological examination, examination of the abdomen and evaluation of external genitalia, was unremarkable. Vaginal assessment of PFM function using the PERFECT scheme was as follows: Strength – 2; Endurance – 5; Repetitions – 10; Fast contractions – Yes; Elevation (of the posterior wall of the vagina) – Yes; Co-contraction (of m. transversus abdominis) – Yes; Timing (contraction before/during cough) – No. The patient was instructed to perform PFM training 3-5 times per day, 8-12 contractions, sustained for 6-8 seconds. Over time, she added 3-4 quick contractions on the top of the holding period. In addition, she also practiced the Knack. It was recommended to the patient that after the PFM training she consumed a meal rich in carbohydrates that have a high glycemic index (products from white flour: bread, pasta), as during the first two hours glucose uptake in muscles and restoration of glycogen storage are increased (4). In combination with proteins, the synthesis of glycogen in muscle speeds up, therefore we recommended the patient consumption of proteins (whey, egg white, milk with less fat, yogurt with less fat, white or flesh) after the PFM training. In a period of 6 months the patient had 4 treatments. **Conclusions**: PFM strength was improved (oc. 5). At cough, simultaneous contraction of MMD was present. Symptoms of stress urinary incontinence were no longer present. The substantial increase in PFM strength was probably also due to adequate intake of carbohydrates and proteins in the body after PFM training, so we will advise patients also in the future on eating after PFM training.

Key words: stress urinary incontinence, pelvic floor muscles, training, carbohydrates, proteins.

Literatura/References:

1. Lucas MG, Bedretdinova D, Berghmans LC et al. (2016). Guidelines on Urinary Incontinence. European Association of Urology.
2. Bø K, Berghmans B, Mørkved S, Van Kampen M, eds (2015). Evidence-based physical therapy for the pelvic floor: Bridging science and clinical practice. Edinburgh (etc.): Churchill Livingstone Elsevier.
3. Metul D, ed (2015). Priporočila za prehrano športnika. Ljubljana: Društvo študentov medicine Slovenije.
4. Fink HH, Mikesky AE (2015). Practical application in sports nutrition. Burlington: Jones&Bartlett Learning.

Mobilna aplikacija za vadbo mišic medeničnega dna

Mojca Rostohar, dipl. fiziot.[1]; viš. pred. mag. **Darija Šćepanović**, viš. fiziot.[2]

[1]Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana; [2]Univerzitetni klinični center Ljubljana, Ginekološka klinika, Ljubljana

Korespondenca/Correspondence: Mojca Rostohar, dipl. fiziot.; e-pošta: mojca.rostohar@gmail.com

Uvod: Mobilne naprave z razvojem niso prinesle le komuniciranja in povezovanja, temveč tudi uporabo storitev in aplikacij (1). Mobilna aplikacija je programska oprema, ki je prilagojena za delovanje na mobilnem telefonu. Na njen pospešeni razvoj so vplivali predvsem pametni telefoni, ki omogočajo preprost dostop prek aplikacijskih trgovin (2). Danes se vse več ljudi zaveda pozitivnih učinkov telesne aktivnosti in se obrača k bolj zdravemu življenjskemu slogu, pri čemer so jim na voljo tudi številne mobilne aplikacije, ki spodbujajo, zapisujejo podatke in dajejo napotke za telesno vadbo. Kljub večji ozaveščenosti o pomembnosti gibanja v vsakodnevnem življenju pa je zavedanje pomena vadbe za mišice medeničnega dna pomanjkljivo, zato je tudi manj aplikacij za njeno izvajanje. Razumevanje in pravilno izvajanje kontrakcij mišic medeničnega dna sta zelo pomembni za učinkovitost te vadbe. Eden izmed pogojev, da je vadba mišic medeničnega dna lahko učinkovita, je tudi ta, da oseba zna oziroma zmore krčiti prave mišice in izvesti pravilno hoteno krčenje mišic medeničnega dna ter izvajati vadbo po specifičnem programu (3). V literaturi lahko zasledimo velike razlike v programih vadbe mišic medeničnega dna. Do zdaj ni dokazov o najučinkovitejšem programu. Ker gre za skeletne mišice, pri tem upoštevamo načela in zakonitosti mišičnega treninga: načelo specifičnosti, reverzibilnosti, nadobremenitve, vzdrževanja in progresivnosti (4). Namen raziskave je bil preveriti, koliko in kakšne mobilne aplikacije za vadbo mišic medeničnega dna so trenutno na voljo uporabnikom in ali upoštevajo smernice strokovne in znanstvene literature; ter zasnovati papirni prototip mobilne aplikacije za vadbo mišic medeničnega dna v slovenskem jeziku, ki bi posameznikom služila kot dopolnilo oziroma medij za lažje izvajanje vadbe mišic medeničnega dna. **Metode:** Mobilne aplikacije za vadbo mišic medeničnega dna smo iskali s pomočjo mobilnih aplikacij Google Play (za sistem Android) in Apple App Store (za sistem iOS). Pri skiciranju papirnega prototipa aplikacije smo uporabili program Adobe Illustrator. **Rezultati:** Da bi bila izdelana mobilna aplikacija čim bolj optimalna, smo vsebinsko analizirali 15 aplikacij za vadbo mišic medeničnega dna za Android in iOS. Na podlagi strokovne in znanstvene literature smo sami zasnovali nov papirni prototip mobilne aplikacije za vadbo mišic medeničnega dna v slovenskem jeziku. Pri predlagani rešitvi smo predvideli tako aplikacijo, ki bo za uporabnika pregledna in enostavna za uporabo, pri čemer smo upoštevali strokovne in znanstvene smernice ter priporočila za izvajanje vadbe mišic medeničnega dna. **Zaključki:** Rezultati analize, ki smo jo izvedli na podlagi lastne kodirne knjige, so pokazali, da aplikacije v več kot polovici primerov glede na merila, ki smo jih postavili, ne ustrezajo oziroma niso primerne za izvajanje vadbe mišic medeničnega dna. Sami smo pripravili papirni prototip take mobilne aplikacije za vadbo mišic medeničnega dna, ki je za uporabnika enostavna in razumljiva ter hkrati upošteva strokovna in znanstvena priporočila in se je posameznik predhodno nauči pod strokovnim vodstvom fizioterapevta. Dodana vrednost mobilne aplikacije v slovenskem jeziku je, da posamezniku ni treba namenjati pozornosti časovnim parametrom, temveč se lahko bolj osredotoča na kakovost izvedbe vadbe mišic medeničnega dna.

Ključne besede: vadba mišic medeničnega dna, mobilna aplikacija, papirni prototip, mobilna tehnologija.

Mobile application for pelvic floor muscle training

Background: The development of mobile devices has resulted not only in improved communication and connection but also their wider use and application (1). Mobile applications are software tailored for mobile phone use. Their development was boosted in particular by smart phones which facilitate simple access via application stores (2). As people are increasingly aware of the positive effects of exercise, they also turn to a healthier life style. In addition, there are various mobile applications available which give encouragement, record data and offer advice concerning exercises. However, in spite of the increased awareness of mobility in day-to-day life, the awareness of the importance of pelvic floor muscle training (PFMT) is poor. This is one reason why there are fewer applications available for this training. Understanding PFM and exercising proper contractions is paramount in order to achieve good results. One of the prerequisites for PFMT to be effective is in the person being able to contract the right muscles and correct PCM contractions following a specific programme (3). In literature major differences can be found in various PFMT programmes. So far no evidence has been confirmed as the most effective one. As the exercises concern skeleton muscles, the following principles of muscle training should be taken into account: specificity, reversibility, resistance, maintenance and progressiveness (4). The purpose of the study was to establish which mobile applications for pelvic floor muscle training are currently accessible to users and whether these are based on the guidelines of professional and scientific research; in addition, the objective included a design of a paper prototype of a mobile application for pelvic floor muscle training. **Methods:** The existing mobile applications for PFMT were searched by means of Google Play (for the Android system) and Apple App Store (for the iOS system). Adobe Illustrator was used to outline the application paper prototype. **Results:** In order to make the mobile application as optimal as possible, 15 existing applications for PFMT for Android and iOS systems were analysed. Based on the results of scientific research published we developed a new paper prototype of a mobile application for PFMT in Slovene. Attempts were made to make an application which would be clear and simple to use while taking into account professional and scientific guidelines and recommendations for PFMT. **Conclusions:** The results were obtained on the basis of our own criteria and showed that more than half of the applications are not suitable or are not suitable for PFMT in relation to the criteria set. Attempts were made to make an application which would be clear and simple to use while taking into account professional and scientific guidelines and recommendations for PFMT.

Key words: pelvic floor muscle training, mobile applications, paper prototype, mobile technology.

Literatura/References:

1. Hribar U (2007). Mobilne refleksije. V: Razvoj mobilnih tehnologij. Ljubljana: Fakulteta za družbene vede, 85–322.
2. Kaj so mobilne aplikacije? Safe. http://www.safe.si <5. 9. 2016>.
3. Bø K (2004). Pelvic floor muscle training is effective in treatment of female stress urinary incontinence, but how does it work? Int Urogynecol J Pelvic Floor Dysfunct. 15 (2): 76–84.
4. American College of Sports: The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness and flexibility in healthy adults (1998). Med Sci Sports Exerc 30: 975–91.

Fizioterapevtska obravnava pacientke z retenco urina – poročilo o primeru

viš. pred. mag. **Darija Šćepanović**, viš. fiziot.; strok. sod. **Lidija Žgur**, dipl. fiziot.

Univerzitetni klinični center Ljubljana, Ginekološka klinika, Ljubljana

Korespondenca/Correspondence: viš. pred. mag. Darija Šćepanović, viš. fiziot.; e-pošta: darija.scepanovic@kclj.si

Uvod: Retenca urina pri ženskah se pojavlja redko in v različnih oblikah. Lahko se pojavi popolna retenca, nepopolno ali nezadostno praznjenje in povečan postmikcijski rezidualni urin. Retenca je lahko akutna ali kronična, simptomatska ali asimptomatska. Etiologija je večfaktorska in slabo razumljena. Vključuje lahko anatomsko ali funkcijsko zunanjo obstrukcijo in disfunkcijo sečnega mehurja v povezavi z nevrološkimi obolenji, sladkorno boleznijo, staranjem, farmakoterapijo, bolečino in vnetnim obolenjem ali idiopatsko etiologijo (1). Zdravljenje retence urina je še nedorečeno. **Prikaz primera:** 64-letna pacientka je bila napotena na fizioterapevtsko obravnavo z diagnozo neobstruktivna retenca urina v trajanju 6,5 meseca. Pred pol leta je pacientka imela diarejo z zelo bolečimi črevesnimi krči in omejeno spontano mikcijo. Osebna zdravnica je predpisala spasmex, krči so se sčasoma umirili, vendar se je zaustavilo tudi spontano uriniranje in povečal se je abdomen. V urgentni ambulanti so izvedli katetrizacijo, ki je pokazala 2000 ml urina. Vstavili so stalni kateter. Čez dva dni je bil kateter odstranjen, spontano uriniranje je bilo neuspešno, zvečer so v urgentni ambulanti ponovno izvedli katetrizacijo, ki je pokazala 1500 ml urina. Pacientka je bila naslednji dan napotena v urološko ambulanto, kjer so opravili cistoskopijo, ki pa je bila brez posebnosti. Prejela je antibiotik. Pozneje je opravila še urodinamske preiskave in elektromiografijo mišic medeničnega dna, ki niso pokazale posebnosti. Pri ponovnem pregledu pri urologu so jo naučili izvajati čisto intermitentno samokatetrizacijo. Opravila je še ultrazvok trebuha in magnetno resonanco medenice ter lumbosakralnega predela zaradi suma na posledice lumboishialgije pred leti. Prvi dve preiskavi sta pokazali močno distendiran sečni mehur z divertiklom desno posteriorno. Tretja je pokazala stenozo spinalnega kanala. Napotena je bila k nevrokirurgu, ki pa je ocenil, da retenca urina ni bila posledica stenoze spinalnega kanala, in svetoval fizioterapijo. Pred fizioterapevtsko obravnavo je pacientka imela povprečen zaostanek urina v povprečju 700 ml, 7-krat med 1000 in 1500 ml. Vaginalni pregled mišic medeničnega dna ni pokazal posebnosti. Pacientko smo naučili pravilnega položaja telesa med mikcijo in tehnik za popolno izpraznitev sečnega mehurja. Zaostanek je bil enak kot pred obravnavo, zato smo aplicirali funkcionalno magnetno simulacijo z ročnim aplikatorjem na predel S2–S4. V desetih obravnavah se je zaostanek v povprečju nekoliko povečal (760 ml, od tega 2-krat več kot 1000 ml). Nato smo se odločili za terapijo s površinsko električno stimulacijo z ruskimi tokovi čez sečni mehur in S2–S4. Po 20 obravnavah je bilo povprečje zaostanka urina 703 ml, od tega 2-krat okoli 1500 ml. Največji preskok v zmanjšanju zaostanka je bil po uvedbi transkutane električne stimulacije posteriornega tibialnega živca, zaostanek se je zmanjšal na povprečno 450 ml. Zaostankov, večjih kot 1000 do 1500 ml, ni bilo več. **Zaključki:** Kot je razvidno iz prikazanega primera, transkutana električna stimulacija posteriornega tibialnega živca daje spodbudne rezultate za zdravljenje neobstruktivne retence urina. Potrebne so nadaljnje raziskave, ki bodo dokazale morebitno učinkovitost te metode za zdravljenje retence urina.

Ključne besede: retenca urina, idiopatska, fizioterapevtska obravnava, elektroterapija, transkutana električna stimulacija posteriornega tibialnega živca.

Physiotherapy treatment of patient with urinary retention – case report

Introduction: Urinary retention in women is rare and diverse. Its aetiology is multifactorial and not known, and its treatment has not been clearly defined yet (1). **Case report:** The patient (64 years, female) was referred to physiotherapy treatment diagnosed with nonobstructive urinary retention with the duration of 6.5 months. Six months previously, the patient had diarrhea with very painful intestinal cramps and limited spontaneous micturition. Her personal doctor prescribes Spasmex, the cramps subside over time, but it also stops the spontaneous urination leading to increased abdomen. In the emergency clinic, catheterization is performed (2,000 ml of urine) and permanent catheter is inserted. Two days later, the catheter is removed, spontaneous urination is unsuccessful, and catheterization is repeated in the evening (1,500 ml of urine). The following day cystoscopy is performed, the results are unremarkable and antibiotic treatment is prescribed. Urodynamic tests and electromyography of pelvic floor muscles reveal no specifics. Following urology re-examination, the patient is taught the technique of clean intermittent self-catheterization. She undergoes abdominal ultrasound scan and magnetic resonance imaging of the pelvis and lumbosacral area (because of the suspicion of the consequences of sciatica years ago). The first two tests show strong distended bladder with diverticulum posteriorly on the right side. The third examination shows spinal canal stenosis. She is referred to neurosurgeon, who determines that neurological findings have no connection with urinary retention and advises physiotherapy treatment. Prior to the latter, the average post-void residual was 700 ml, 7 times between 1000 and 1500 ml. Vaginal examination of the pelvic floor muscles shows no specifics. The patient is taught correct body position during micturition and techniques for complete emptying of bladder. The post-void residual remains the same as was before the treatment. Therefore, functional magnetic simulation of a manual applicator in the area of the S2-S4 is applied. After 10 treatments, the average post-void residual slightly increased (760 ml, 2 times over 1000 ml). Consequently, the therapy with the surface electrical stimulation with the Russian currents through the urinary bladder and S2-S4 is applied. After 20 treatments, the average post-void residual is 703 ml, twice about 1500 ml. The biggest reduction of post-void residual is observed after the transcutaneous tibial nerve stimulation therapy. After 10 treatments, the residual is reduced to an average of 450 ml. The post-void residual of over 1000 -1500 ml is no longer present. **Conclusions:** The case presented indicates encouraging results in the treatment of non-obstructive urinary retention by transcutaneous electrical stimulation of the posterior tibial nerve. Further research is needed to confirm the potential effectiveness of this method for the treatment of non-obstructive urinary retention.

Key words: urinary retention, idiopathic, physiotherapeutic treatment, electrotherapy, transcutaneous electrical stimulation of the posterior tibial nerve.

Literatura/References:

1. Agency for healthcare research and quality (Author), U.S. Department of health and human services. Chronic urinary retention: Comparative effectiveness and harms of treatments: Comparative effectiveness review 2014.

Pojavnost urinske inkontinence pri profesionalnih in rekreativnih športnicah – pregled literature

Tjaša Grudnik, dipl. fiziot.[1]; viš. pred. mag. **Darija Šćepanović**, viš. fiziot.[2]

[1]Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana; [2]Univerzitetni klinični center Ljubljana, Ginekološka klinika, Ljubljana

Korespondenca/Correspondence: Tjaša Grudnik, dipl. fiziot.; e-pošta: grudniktjasa@gmail.com

Uvod: Urinska inkontinenca je po mednarodnem združenju za urinsko inkontinenco definirana kot nehoteno uhajanje seča do te mere, da predstavlja higiensko, socialno ali finančno težavo (2). Kljub splošnemu prepričanju, da imajo športnice močne mišice medeničnega dna, je čedalje pogostejša pri mladih, telesno dejavnih, nuliparnih ženskah. V splošni populaciji žensk, starih od 15 do 64 let, je urinska inkontinenca prisotna v 10 do 55 odstotkih. (1). Predpostavki, da intenzivna telesna vadba krepi mišice medeničnega dna, nasprotuje hipoteza, da ta povzroča progresivne strukturne in funkcionalne spremembe na mišicah, jih s tem oslabi in tako vodi v pojav urinske inkontinence (3). Mišice medeničnega dna so le ena izmed sestavin, ki prispevajo k zapiralnim mehanizmom sečnice in so ciljno tkivo pri fizioterapevtski obravnavi inkontinence. S pregledom strokovne in znanstvene literature smo želeli ugotoviti pojavnost urinske inkontinence in vpliv telesne vadbe na njene simptome pri profesionalnih in rekreativnih športnicah. **Metode:** Diplomsko delo je temeljilo na kritičnem pregledu strokovnih in znanstvenih člankov v tujem jeziku. Ob upoštevanju vključitvenih in izključitvenih meril je bilo v končno analizo vključenih 18 raziskav. **Rezultati:** V vseh raziskavah, s kontrolno skupino ali brez, je bila ugotovljena visoka pojavnost urinske inkontinence, do 90 odstotkov. Pri profesionalnih športnicah je bila prisotnost urinske inkontinence enkrat višja kot pri rekreativnih športnicah. Gimnastika, trampoliniranje, košarka, odbojka in druge odbojne športne aktivnosti so navajale najvišji delež športnic s simptomi urinske inkontinence. Na pojav simptomov urinske inkontinence so vplivali pogostost, intenzivnost in dolžina trajanja treningov. Profesionalne in rekreativne športnice so uporabljale različne strategije za zmanjševanje simptomov, niso pa poznale, niti izvajale vadbe mišic medeničnega dna. Najpogostejše vsakodnevne aktivnosti, ki so izzvale nehoteno uhajanje seča, so bile kihanje, kašljanje, smejanje, hoja proti stranišču, dvigovanje in nošnja bremen. **Zaključki:** Visok odstotek prisotnosti urinske inkontinence pri mladih rekreativnih in profesionalnih športnicah, ki še niso rodile, je zaskrbljujoč, zato je treba povečati skrb, povezano z negativnim vplivom telesne vadbe na medenično dno. Promoviranje redne telesne dejavnosti je zaradi preprečevanja kroničnih nenalezljivih bolezni pomembno, obveščanje rekreativnih športnic o izbiri primerne vadbe in pravilni izvedbi s hkratno kontrakcijo mišic medeničnega dna ob naporu ter vključevanje vadbe mišic medeničnega dna v profesionalnem športu pa lahko vpliva na zmanjšanje urinske inkontinence in pripomore k temu, da se lahko ženske varno udejstvujejo v profesionalnem in rekreativnem športu.

Ključne besede: urinska inkontinenca, telesna dejavnost, visokointenzivni šport, mišice medeničnega dna.

The incidence of urinary incontinence in both professional and recreational athletes – literature review

Introduction: International association of urinary incontinence (ICS) defines urinary incontinence (UI) as involuntary leakage of urine to such extent, that it presents hygiene, social and financial problem. (2). Despite the general belief that sportswomen have strong pelvic floor muscles (PFM), it is increasingly common in physically active young nulliparous women. In the general population of women aged 15 to 64 years it is present in 10 to 55% (1). The assumption that intense physical exercise strengthens PFM opposes the hypothesis that it causes progressive structural and functional changes in the muscle that can weaken and it also leads to the emergence of UI (3). PFM is only one of the components that contribute to the closing mechanism of the urethra, and the target tissue for physiotherapeutic treatment of incontinence. A review of professional and scientific literature was to determine the incidence of UI and the effect of exercise on symptoms of UI, from professional and recreational athletes. **Methods:** The thesis is based on a critical review of the technical and scientific articles in a foreign language. Having regard to the assimilation and exclusion criteria, 18 studies were included in the final analysis. **Results:** In all studies, with or without control group, a high incidence of UI was found – up to 90 %. For professional athletes, the presence of UI was twice as high as for recreational athletes. Gymnastics, jumping on a trampoline, basketball, volleyball and other bouncing sports indicated the highest proportion of athletes with symptoms of UI. The onset of UI symptoms was influenced by the frequency, intensity and length of training. Professional and recreational athletes have resorted to different strategies to reduce the symptoms of UI, but were not aware, and did not undertake PFM training. The most common daily activities, which promoted the involuntary leakage of urine, were sneezing, coughing, laughing, walking toward the bathroom, lifting and carrying of loads. **Conclusions:** A high percentage of the presence of UI in young recreational and professional athletes who have not given birth is worrying, therefore it is necessary to raise concern about the negative impact of exercise on the pelvic floor. Promoting regular physical activity for the prevention of chronic non-communicable diseases is very important. However, giving information for recreational athletes on the selection of appropriate exercise and the correct execution of the simultaneous contraction of the PFM with exertion, and the integration of PFM training in professional sports can influence the reduction of UI and help to keep women active participants in professional and recreational sport.

Key words: urinary incontinence, physical activity, high-intensity sports, the pelvic floor muscles.

Literatura/References:

1. Da Roza T, Brandao S, Oliveira Mascharenhas T, Parente M, Duarte JA, Jorge RN (2015b). Football practice and urinary incontinence: relation between morphology, function and biomechanics. J Biomech 48 (9): 1587–92.
2. Jacome C, Oliveira D, Marques A, Sa-Couto P (2011). Prevalence and impact of urinary incontinence among female athletes. Int J Gynaecol Obstet 114 (1): 60–3.
3. Opara J, Socha T, Bidzan M, Mehlich K, Poswiata A (2011). Stress urine incontinence especially in elite women athletes extremely practicing sport. Arch Budo 7 (4): 227–31.

FIZIOTERAPIJA

oktober 2017, letnik 25, suplement 1 ISSN 1318-2102; e-ISSN 2536-2682

17. kongres fizioterapevtov Slovenije
Fizioterapija za vse

17. Congress of Slovenian Physiotherapists
Physiotherapy for everyone

VABLJENA PREDAVANJA/INVITED LECTURES

PLENARNA PREDAVANJA/PLENARY LECTURES

PREDAVANJA/ORAL PRESENTATIONS