

Indeks premičnosti de Morton ima dobre merske lastnosti za ocenjevanje odraslih z mišično-skeletnimi okvarami na rehabilitaciji

Aleksander Zupanc¹, mag. fiziot., doc. dr. Primož Novak¹, dr. med., doc. dr. Urška Puh², dipl. fiziot.

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

Korespondenca / Correspondence: Aleksander Zupanc; e-naslov: aleksander.zupanc@gmail.com

Uvod: Indeks premičnosti de Morton (angl. de Morton mobility index – DEMMI) je standardizirano merilno orodje, s katerim ocenjujemo premikanje na postelji, stolu, statično ravnotežje, sposobnost hoje in dinamično ravnotežje (skupno število točk: 0–100) (1). Je zanesljivo in veljavno za ocenjevanje pri starejših z različnimi ravnmi funkcioniranja od akutne bolnišnične obravnave do rehabilitacije (2). Slovenski prevod DEMMI ima odlično zanesljivost med preiskovalci in je razumljiv (3). Namen prispevka je predstaviti izsledke raziskave, v kateri smo za ocenjevanje z DEMMI ugotavljali konvergentno veljavnost, odzivnost, najmanjšo klinično pomembno razliko ter učinka tal in stropa pri pacientih z mišično-skeletnimi okvarami na rehabilitaciji, ne glede na starost. **Metode:** S slovenskim prevodom DEMMI, razvrstitvijo funkcijske premičnosti, testom hoje na 10 metrov in 6-minutnim testom hoje smo ocenili 30 priložnostno izbranih pacientov z mišično-skeletnimi okvarami. Preiskovanci so bili stari od 22 do 84 let (povprečno 54 let). Ocenjevanje je potekalo ob sprejemu na rehabilitacijo in po štirih tednih obravnave. Izračunali smo Spearmanov koeficient korelacije (r_o) med ocenami DEMMI in izidi drugih merilnih orodij, velikost učinka (Cohenov d) in najmanjšo klinično pomembno razliko. Učinka tal in stropa smo ugotavljali z izračunom deleža preiskovancev ($>15\%$), ki so dosegli najnižje in najvišje število točk. Raziskavo je odobrila komisija za medicinsko etiko URI - Soča. **Rezultati:** Povprečna ocena DEMMI ob sprejemu je bila 34 točk (SO 10) in po štirih tednih 57 točk (SO 13). Med ocenami DEMMI in razvrstitvijo funkcijske premičnosti je bila povezanost ob sprejemu zelo dobra ($r_o = 0,84$), pri drugem ocenjevanju pa dobra ($r_o = 0,74$). Tudi s testom hoje na 10 metrov je bila povezanost najprej zelo dobra ($r_o = 0,75$) in nato dobra ($r_o = 0,74$). S 6-minutnim testom hoje pa je bila povezanost zelo dobra, tako pri prvem ($r_o = 0,80$) kot pri drugem ocenjevanju ($r_o = 0,77$). Ocena velikosti učinka za DEMMI je 1,97 in najmanjša klinično pomembna sprememba 5 točk. Pri obeh ocenjevanjih nihče od preiskovancev ni bil ocenjen z 0 točk DEMMI. Prav tako nihče ni prejel 100 točk ob sprejemu, po štirih tednih obravnave pa jih je dosegla ena preiskovanka. **Zaključki:** Izsledki o dobri oziroma zelo dobri povezanosti s funkcijsko razvrstitvijo premičnosti, testom hoje na 10 metrov in 6-minutnim testom hoje potrjujejo konvergentno veljavnost DEMMI pri odraslih z mišično-skeletnimi okvarami na rehabilitaciji različne starosti. Ima veliko odzivnost za spremembe med rehabilitacijo. Učinka tal in stropa za DEMMI nismo ugotovili. Fizioterapevtom ga priporočamo za uporabo pri odraslih ljudeh z zmanjšano sposobnostjo premikanja, na nižji in osnovni ravni funkcioniranja.

Ključne besede: DEMMI, konvergentna veljavnost, odzivnost, najmanjša klinično pomembna sprememba, premičnost

De Morton mobility index has good measurement properties for assessment of adults with musculoskeletal impairments at rehabilitation

Background: de Morton mobility index (DEMMI) is a standardized measurement tool, which assesses moving in bed, chair, static balance, walking ability and dynamic balance (total score: 0–100) (1). It is reliable and valid for assessment of older adults with different functioning level from acute hospital treatment to rehabilitation (2). Slovenian translation of DEMMI has excellent inter-rater reliability and is comprehensible (3). The aim is to present results of the study, in which convergent validity, responsiveness, minimal clinically important difference and floor and ceiling effects of DEMMI in patients with musculoskeletal impairments at rehabilitation, regardless of age, were established. **Methods:** Thirty conveniently selected patients with musculoskeletal impairments were assessed with Slovenian translation of DEMMI, functional ambulation category, 10-meter walk test and six-minute walk test. Their age ranged from 22 to 84 years (mean = 54 years). Assessment was performed at admission and after four weeks of rehabilitation. Spearman's correlation coefficient (ρ) between DEMMI scores and other measurement tools, effect size (Cohen d) and minimal clinically important difference were calculated. Floor and ceiling effects were established by calculation of percentage of participants (>15 %) with the minimal and maximal scale score. The research was approved by the Ethics Committee of URI - Soča. **Results:** At admission, the mean DEMMI score was 34 (SD 10) and after four weeks of rehabilitation it was 57 (SD 13). Correlation with functional ambulation category was very good at admission ($\rho = 0.84$) and good at the second assessment ($\rho = 0.74$). Correlation with 10-meter walk test was also very good at first ($\rho = 0.75$) and good after that ($\rho = 0.74$). Correlation with six-minute walk test was very good at first ($\rho = 0.80$) and at the second assessment ($\rho = 0.77$). Effect size of DEMMI was 1.97 and minimal clinically important difference was 5 points. No participant was score with 0 points on DEMMI at both assessments. Also no participant achieved 100 points at admission, but one got it after four weeks of rehabilitation. **Conclusions:** Good to very good correlations with functional ambulation category, 10-meter walk test and six-minute walk test confirm convergent validity of DEMMI in adults of all ages with musculoskeletal impairments at rehabilitation. It is highly responsive for changes during rehabilitation. No floor and ceiling effects were identified. We recommend DEMMI for mobility assessment in adults at low and basic functioning level.

Key words: DEMMI, convergent validity, responsiveness, minimal clinical important difference, mobility

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. Zupanc A, Puh U (2018). Indeks premičnosti de Morton: zanesljivost med preiskovalci pri pacientih z mišično-skeletnimi okvarami. *Fizioterapija* 26 (1): 24-34.

Povezanost L-testa s testi vstajanja s stola pri pacientih po amputaciji spodnjega uda v protetični fazi rehabilitacije

Veronika Podlogar, dipl. fiziot.¹; prof. Helena Burger, dr. med.¹; doc. dr. Urška Puh, dipl. fiziot.²

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

Korespondenca / Correspondence: Veronika Podlogar; e-naslov: veronika.podlogar@ir-rs.si

Uvod: Vstajanje in sedanje sta poleg hoje pomembni komponenti premičnosti. Za paciente po amputaciji spodnjega uda sta to zaradi zmanjšane mišične zmogljivosti in proprioceptivnih informacij precej zahtevni nalogi (1). Za kvantitativno ocenjevanje sposobnosti vstajanja se najpogosteje uporabljata test petih vstajanj (5TSTS) in 30-sekundni test vstajanja s stola (30SSTS) (2). L-test je modifikacija časovno merjenega testa vstani in pojdi in je namenjen oceni premičnosti. Pri pacientih po amputaciji spodnjega uda smo ugotovili odlično zanesljivost (3). Namen prispevka je predstaviti izsledke raziskave, pri kateri smo za L-test ugotavljali diskriminacijsko in sočasno veljavnost s 5TSTS in 30SSTS pri pacientih po amputaciji spodnjega uda v protetični fazi rehabilitacije. **Metode:** V raziskavi smo uporabili priložnostni vzorec 29 preiskovancev (23 moških, 6 žensk), starih povprečno 64,0 (SO: 12,8) let, ki so bili na bolnišnični rehabilitaciji prvič oskrbljeni s protezo. 22 jih je imelo transtibialno in 7 transfemoralno amputacijo. Vzroki amputacije so bili žilni (n = 25) in drugi (n = 4). Prvo ocenjevanje smo izvedli takoj, ko so bili sposobni samostojno hoditi s protezo, drugo po dveh tednih. Pri prvem ocenjevanju jih je 10 uporabljalo bergli in 19 hoduljo. Po L-testu smo hkrati izvedli oba testa vstajanja. Poleg opisne statistike in Pearsonovih korelacijskih koeficientov (*r*) smo naredili analizo kovariance (1. ocenjevanje). Raziskavo je odobrila komisija za medicinsko etiko URI - Soča (št. 19/2017). **Rezultati:** Povprečen čas izvedbe L-testa pri prvem ocenjevanju je bil 72,1 (SO: 31,5) sekunde, pri drugem ocenjevanju pa 46,1 (SO: 20,0) sekunde. Med skupinama preiskovancev po trans-tibialni in trans-femoralni amputaciji je bila statistično značilna razlika v izidih L-testa ($F(1, 31) = 5,858; p = 0,022$). Z regresijsko analizo izidov L-testa glede na raven amputacije smo ugotovili pomembno skupno linearno povezanost z drugimi spremenljivkami ($R^2 = 0,55; p < 0,001$). Pri tem so bili potrjeni statistično pomembni vplivi starosti preiskovanca, vzroka amputacije in pripomočka za hojo. Povprečen čas izvedbe 5TSTS pri prvem ocenjevanju je bil 28,1 (SO: 12,4) sekund, ob drugem pa 18,9 (SO: 7,8) sekund. Pri prvem ocenjevanju so pri 30SSTS preiskovanci v povprečju izvedli 6,5 (SO: 2,5) popolnega prehoda v stoječi položaj, pri drugem pa 9,3 (SO: 3,2). Med izidi L-testa in 5TSTS je bila povezanost zmerna pri prvem ($r = 0,54$) in drugem ocenjevanju ($r = 0,63$). Tudi s 30SSTS je bila povezanost zmerna pri prvem ($r = -0,56$) in drugem ocenjevanju ($r = -0,54$). Vse korelacije so bile statistično značilne ($p < 0,001$). **Zaključki:** L-test in testa vstajanja s stola so uporabna merilna orodja pri pacientih po amputaciji spodnjega uda tudi v obdobju protetične faze rehabilitacije. Izid L-testa sovpada s posameznikovo sposobnostjo vstajanja in sedanja. Za določitev, kateri test vstajanja je primernejši, so potrebne nadaljnje raziskave.

Ključne besede: L-test, 30SSTS, 5TSTS, premičnost, veljavnost

Correlation of the L-test with sit-to-stand tests in patients after lower limb amputation in prosthetic phase of rehabilitation

Background: Standing up and sitting down are in addition to walking important components of mobility. These tasks are relatively demanding for patients after lower-limb amputation, due to their reduced muscular capacity and proprioceptive information (1). For the quantitative assessment of the ability to stand up, the five times sit-to-stand (5TSTS) and the 30-second sit-to-stand test (30SSTS) are most commonly used (2). The L-test is a modification of the timed up and go test, it is designed to assess mobility. In patients after lower-limb amputation we found excellent reliability (3). The aim is to present the results of the study, in which discriminant validity of the L-test and concurrent validity with the 5TSTS and the 30SSTS, performed by patients after lower-limb amputation in the prosthetic phase of rehabilitation, were established. **Methods:** A convenience sample of 29 subjects (23 male, 6 female), mean age 64.0 (SD: 12.8) years, who underwent an inpatient rehabilitation and were provided with prosthesis for the first time, were included in the study. 22 had trans-tibial and 7 trans-femoral amputation. They were amputated due to vascular disease ($n = 31$) or other medical conditions ($n = 4$). The first assessment was conducted as soon as patients were able to walk independently with prosthesis and the second after two weeks. At the first assessment 10 of them used crutches and 19 a walking frame. After the L-test we conducted both sit-to-stand tests simultaneously. Descriptive statistics, the Pearson's correlation coefficient (r) and analysis of covariance (the first assessment) were calculated. The study was approved by The Ethics Committee of URI - Soča (no. 19/2017). **Results:** At the first assessment the mean time of the L-test was 72.1 (SD: 31.5) seconds, and 46.1 (SD: 20.0) seconds at the second assessment. There was a significant difference in mean L-test results ($F(1, 31) = 5.858$; $p = 0.022$) between the subjects following trans-tibial and trans-femoral amputation. Regression analysis of the results of the L-test with respect to the level of amputation revealed an important total linear correlation with other variables ($R^2 = 0.55$; $p < 0.001$). In this regard, statistically significant influences of the age of the subject, the cause of amputation and the walking aid were confirmed. The mean time of the 5TSTS was 28.1 (SD: 12.4) seconds at the first assessment and 18.9 (SD: 7.8) seconds at the second assessment. At the first assessment at the 30SSTS subjects performed 6.5 (SD: 2.5) complete transitions to a standing position and 9.3 (SD: 3.2) at the second assessment. The correlation between results of the L-test and the 5TSTS was moderate at the first ($r = 0.54$) and also at the second assessment ($r = 0.63$). The correlation with the 30SSTS was also moderate at the first ($r = -0.56$) and at the second assessment ($r = -0.54$). All correlations were statistically significant ($p < 0.001$). **Conclusions:** The L-test and both sit-to-stand tests are useful measuring tools in patients after lower-limb amputation during the prosthetic phase of rehabilitation. The result of the L-test coincides with the individual's ability to stand up. Further research is needed to determine which of the sit-to-stand tests is more appropriate.

Key words: L-test, 30SSTS, 5TSTS, mobility, validity

Literatura/References:

1. Özyürek S, Demirbüken İ, Angın S (2014). Altered movement strategies in sit-to-stand task in persons with transtibial amputation. *Prosthet Orthot Int* 38 (4): 303-9.
2. Bohannon RW, Bubela DJ, Magasi SR, Wang YC, Gershon RC (2010). Sit-to-stand test: Performance and determinants across the age-span. *Isokinet Exerc Sci* 18 (4): 235-40.
3. Podlogar V, Burger H, Drole S, Puh, U (2018). The L-test of functional mobility: reliability and correlation with the 6-minute walk test and the 10-meter walk test in people after lower-limb amputation in early rehabilitation – preliminary results. In: International central European ISPO conference, September 20–22, 2018, Portorož, Slovenia. https://www2.cd-cc.si/Skripte/ISPO/Abstract_Book_ISPO2018.pdf. <7. 3. 2019>.

Najprimernejši izid in zanesljivost posameznega preiskovalca pri ročni dinamometriji po postopku TRICALS pri zdravih odraslih

Sanja Lubej, mag. fiziot.^{1,2}, Fabio Valenti, mag. fiziot.³, doc. dr. Lea Leonardis, dr. med²,
doc. dr. Urška Puh, dipl. fiziot.¹

¹Zdravstvena fakulteta, Univerza v Ljubljani, ²Klinični inštitut za klinično nevrofiziologijo, Nevrološka klinika, UKC Ljubljana, ³Inštitut za medicinsko rehabilitacijo UKC Ljubljana, ³Klinični inštitut za klinično nevrofiziologijo, Nevrološka klinika, UKC Ljubljana

Korespondenca/Correspondence: Sanja Lubej; e-naslov: lubej.sanja@gmail.com

Uvod: Z ročno dinamometrijo lahko v fizioterapiji na preprost, standardiziran in poceni način ocenimo mišično jakost udov z merjenjem sile pri izvedbi maksimalne hotene izometrične kontrakcije (1). Eden od načinov testiranja je tehnika preloma sile. Zaradi razlik v položajih za merjenje posameznih mišičnih skupin z ročnim dinamometrom in drugih elementov ocenjevalnega postopka so pripravili postopek TRICALS (4). Primarno je namenjen ocenjevanju bolnikov z amiotrofično lateralno sklerozo. Način za določanje izida še ni jasno določen in tudi zanesljivost še ni bila preverjena. **Namen:** Opredeliti najprimernejši način za določanje izida in preveriti zanesljivost posameznega preiskovalca pri merjenju mišične jakosti po postopku TRICALS pri zdravih ljudeh. **Metode:** V raziskavi je sodelovalo 21 zdravih preiskovancev, starih povprečno $24,8 \pm 6,1$ leta, ki so opravili testiranje z ročnim dinamometrom (MicroFet2, Hoggan Health Industries, ZDA) na zgornjih udih (fleksorji ramena, fleksorji in ekstenzorji komolca, ekstenzorji zapestja in prvi dorzalni interoseus). Pri testiranju mišic spodnjih udov (fleksorjev kolka, fleksorjev in ekstenzorjev kolena in dorzalnih fleksorjev stopala) je sodelovalo 20 preiskovancev, starih povprečno $30 \pm 8,8$ leta. Za vsako mišično skupino smo izvedli tri meritve. Testiranje je potekalo dvakrat, na zgornjih udih v razmiku 9 ali 17 dni in na spodnjih v razmiku 5 dni. Izvedli smo analizo variance ANOVA s primerjavo več možnih izbir izida ter izračunali standardno napako merjenja. Za zanesljivost posameznega preiskovalca smo izračunali intraklasni koeficient korelacije (ICC 3,1). Raziskavo je odobrila Komisija za medicinsko etiko (št. 0120-370/2017/6). **Rezultati:** ANOVA ni pokazala statistično značilnih razlik ($p > 0,05$) med različnimi izidi pri ročni dinamometriji. V primerjavi z največjo meritvijo smo nižje standardne napake merjenja izmerili pri povprečju treh meritev, zato smo za nadaljnjo analizo uporabili ta izid. Zanesljivost posameznega preiskovalca je bila za zgornji ud na dominantnem udu visoka do odlična (ICC = 0,80–0,96), na nedominantnem udu pa zmerna do visoka (ICC = 0,64–0,93). Za spodnje ude je bila zanesljivost visoka do odlična pri merjenju vseh mišičnih skupin na dominantnem udu (ICC = 0,87–0,97) in zmerna do visoka za vse mišične skupine na nedominantnem udu (ICC = 0,74–0,97). Zmerne vrednosti zanesljivosti pri upoštevanju povprečja meritev so bile ugotovljene za mišice ekstenzorji zapestja (ICC = 0,64) in fleksorji kolena (ICC = 0,74). **Zaključek:** Priporočamo, da se za izid ročne dinamometrije izračuna povprečje meritev. Zanesljivost posameznega preiskovalca za protokol TRICALS pri zdravih preiskovancih je po mišičnih skupinah zmerna do odlična. Za ocenjevanje mišičnih skupin z zmerno zanesljivostjo bi bilo smiselno zmanjšati napako merjenja z uporabo trakov za stabilizacijo ali drugega položaja. Preveriti je treba tudi zanesljivost med preiskovalci za testiranje z ročno dinamometrijo pri zdravih odraslih in zanesljivost pri pacientih.

Ključne besede: merjenje mišične jakosti, merske lastnosti, maksimalna izometrična kontrakcija, mišična jakost, zgornji in spodnji udi

Best outcome selection and intrarater reliability of hand-held dynamometry in healthy adults using tricals protocol

Introduction: Hand-held dynamometry is a simple, standardized and inexpensive method of measuring limb muscle strength by measuring the force required to perform the maximum voluntary isometric contraction (1). A break test is one of the techniques for assessment of individual muscle groups. Due to differences in positions for individual muscle groups measurement and other elements of the assessment process, the TRICALS protocol was proposed. Its aim was primarily the assessment of patients with amyotrophic lateral sclerosis. The method for determining the outcome is not clearly defined, and reliability has not been established. **Purpose:** To identify the most appropriate way to determine the outcome and evaluate the intra-rater reliability of the TRICALS procedure of hand-held dynamometry in healthy people. **Methods:** 21 healthy subjects (aged 24.8 ± 6.1 years) were tested with hand-held dynamometer (MicroFet2, Hoggan Health Industries, USA) on the upper (shoulder flexors, elbow flexors and extensors, wrist extensors and first dorsal interosseous) and 20 subjects (aged 30 ± 8.8 years) on the lower limbs (hip flexors, knee flexors and extensors, dorsal flexors). Three measurements were performed for each muscle group. The test was performed twice, on the upper limbs with 9 or 17 days, and on the lower at a spacing of 5 days. ANOVA was performed by comparing several possible output choices and calculating the standard measurement error (SEM). Intraclass coefficients of correlation (ICC 3,1) were calculated for the reliability of each investigator. The survey was approved by National Medical Ethics Committee (No. 0120-370/2017/6). **Results:** ANOVA showed no statistically significant differences ($p > 0.05$) between various outcomes in hand-held dynamometry. Compared with the maximum measurement, the lower SEM was present at the average of three measurements, and this result was used for further analyses. Intra-rater reliability was good to excellent for the dominant upper limb (ICC = 0.80-0.96) and moderate to good (ICC = 0.64-0.93) for the non-dominant upper limb. For the lower limbs, there was good to excellent intra-rater reliability in muscle groups on dominant side (ICC = 0.87-0.97) and moderate to good for non-dominant side (ICC = 0.74-0.97). Moderate values of reliability were measured for wrist extensors (ICC = 0.64) and knee flexors (ICC = 0.74). **Conclusion:** We recommend calculation of average for the outcome for hand-held dynamometry. Intra-rater reliability for TRICALS protocol in healthy subjects is moderate to excellent. In the future, it would be sensible to reduce the measurement error by using straps or different position, especially at the lower limb. Studies of inter-rater reliability in healthy adults and reliability of the protocol in patients are needed.

Key words: muscle strength measurement, measurement properties, maximum voluntary isometric contraction, muscle strength, upper and lower limbs

Literatura/References:

1. Schrama PPM, Stenneberg MS, Lucas C, van Trijffel E (2014). Intraexaminer reliability of hand-held dynamometry in the upper extremity: a systematic review. *Arch Phys Med Rehabil* 95: 2444-69.
2. Andrews AW, Thomas MW, Bohannon RW (1996). Normative values for isometric muscle force measurements obtained with hand-held dynamometer. *Phys Ther* 76 (3): 248-59.
3. Kilmer DD, McCrory MA, Wright NC, Rosko RA, Kim HR, Aitkens SG (1997). Hand-held dynamometry reliability in persons with neuropathic weakness. *Arch Phys Med Rehabil* 78 (12): 1364-8.
4. Treatment research institute for the cure for ALS (2018). TRICALS Protocol Isometric Strength Testing 2018. Dosegljivo na: https://www.encafs.eu/wp-content/uploads/2018/04/TRICALS_Protocol_Isometric_Strength_Testing_2018.pdf <1. 7. 2018>.

Kakšne so sposobnosti tipanja študentk fizioterapije?

Nataša Mlakar, študentka fizioterapije, viš. pred. mag. Sonja Hlebš, viš. fiziot., univ. dipl. org.

Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana

Korespondenca/Correspondence: Sonja Hlebš; e-naslov: sonja.hlebs@zf.uni-lj.si

Uvod: Tipanje je fizioterapevtski preiskovalni postopek, s katerim se ocenjuje kakovost, morfološke spremembe in občutljivost tkiva. Natančnost tipanja je odvisna od zaznave z dotikom in izkušeni preiskovalca (1, 2). Test zaznave z dotikom se uporablja za prepoznavanje oblike tipane strukture. Z uporabo tablic z vgraviranimi simboli, ki jih preiskovanec tipa in nato preríše na papir (3), so ugotovili povezavo med številom napak pri prerisovanju simbola in časom, porabljenim za njegovo tipanje (4). Namen naše raziskave je bil ugotoviti, ali poraba časa pri tipanju in prerisovanju narašča s težavnostjo simbola ter ali je težavnost tipanega simbola povezana z večjim številom napak pri njegovem prerisovanju pri študentkah fizioterapije. **Metode:** Sodelovalo je 20 študentk tretjega letnika in magisterija na Zdravstveni fakulteti, Univerze v Ljubljani, starih povprečno 23,7 (SO 3,8) leta, brez poškodb zgornjih udov v šestih mesecih pred raziskavo. Za test zaznave z dotikom (3) smo uporabili tri lesene tablice (tablice 1, 2 in 3) velikosti 13 krat 13 cm, s širino črt simbola/-ov 7 mm in globino 3 mm. V vsako je bil vgraviran simbol različne težavnosti. Preiskovalke so z obema rokama s prekritimi očmi tipale simbol na tablici največ 3 minute in ga nato z odprtimi očmi narisale na list papirja. Merili smo čas tipanja in risanja simbola na list ter število napak na prerisanem simbolu po opisanem postopku (3). Preiskovanke so ocenile težavnost risanja simbola z Likertovo lestvico od 1 do 5. Komisija RS za medicinsko etiko je ocenila, da je raziskava etično primerna (št. 0120-17/2018). **Rezultati:** Tablico 1 so ocenile za najlažjo (težavnost 2: n = 11; razpon 1–2), pri prerisovanju naredile najmanj napak (\bar{x} = 1,3, SO 0,8) in v primerjavi z drugima tablicama za tipanje ter risanje simbola porabile najmanj časa (tipanje \bar{x} = 30,7, SO 12,4 s; risanje \bar{x} = 8,3, SO 5 s). Tablico 2 so ocenile kot najtežjo (težavnost 4: n = 14; razpon 2–5), naredile največ napak (\bar{x} = 1,9, SO 0,8) in za tipanje ter risanje simbola porabile največ časa (tipanje \bar{x} = 128,5, SO 45,3 s; risanje \bar{x} = 35,7, SO 21,9 s). Tablico 3 so ocenile kot srednje težko (težavnost 4: n = 8; razpon 2–5), število napak je bilo \bar{x} = 1,6, SO 0,9, čas tipanja je bil \bar{x} = 91,4, SO 40,5 s in čas risanja \bar{x} = 27,3, SO 17 s. Naknadni t-test za odvisne vzorce z Bonferronijevim popravkom je pokazal, da so pri času tipanja in risanja med vsemi tremi tablicami statistično pomembne razlike ($p < 0,016$). **Zaključki:** Test zaznave z dotikom bi bil lahko uporaben pripomoček za učenje in vrednotenje sposobnosti tipanja med študijem fizioterapije.

Ključne besede: zaznava z dotikom, fizioterapija, študenti, težavnost

What are the palpation skills of physiotherapy female students?

Background: Palpation is used in physiotherapy to assess quality, morphological changes and sensitivity of tissue. Tactile perception and previous experience of the investigator is required to properly evaluate structure (1, 2). To assess tactile sensitivity, tactile perception test is used by palpating the engraved symbol in tablets (3). Time used for tactile examination of symbols engraved on tablets and the time for its reproduction by drawing on the piece of paper correlated with accuracy scores (4). The purpose of this study is to determine whether the palpation time, drawing time and accuracy scores increase with difficulty of palpated engraved symbol among female physiotherapy students. **Methods:** Twenty students of 3rd year and a Master's program in the Faculty of Health Sciences Ljubljana, aged average 23.7 (SD 3.8) years without any injuries of upper limb last six months before the study were included. For tactile perception test (3) three wooden tablets (tablet 1, 2, 3) size 13 x 13 cm, width of the symbol lines 7 mm and depth 3 mm were used. Symbols of different difficulties were engraved in each wooden plate. Subject palpated the symbol with both hands with their eyes closed on each tablet separately for maximum of 3 minutes and then reproduced it by drawing on a piece of paper with open eyes. The palpation time, drawing time and accuracy of symbol were scored (3). After finishing the drawing subject was asked to score the symbol difficulty on a 1-5 Likert scale. The study protocol was approved by the Commission of Republic Slovenia for Medical Ethics (No.: 0120-17/2018). **Results:** On average, tablet 1 was rated as the easiest of all three (difficulty 2: n = 11; range 1-2) with accuracy score 1.3, SD 0.8, palpation time 30.7, SD 12.4 s and drawing time 8.3, SD 5 s. Tablet 2 was perceived as the most difficult (difficulty 4: n = 14; range 2-5), with accuracy score 1.9, SD 0.8, and the longest palpation and drawing time (128.5, SD 45.3 s; 35.7, SD 21.9 s, respectively). The difficulty of tablet 3 was rated as medium out of all three tablets (difficulty 4: n = 8; range 2-5). The accuracy score was 1.6, SD 0.9, time needed for palpation and drawing was 91.4, SD 40.5 and 7.3, SD 17 s, respectively. The subsequent t test for dependent samples with Bonferroni correction showed statistically significant differences between the three tablets for palpation and drawing time ($p < 0.016$). **Conclusion:** Tactile perception test may be used as a tool for training and evaluating touch sensitivity among physiotherapy students.

Key words: tactile sensitivity, physiotherapy, students, difficulty

Literatura/References:

1. Field D (1997). Anatomy – palpation and surface markings. 2nd ed. Oxford: Butterworth – Heinmann 2-9.
2. Snider KT, Snider EJ, Degenhardt BF, Johnson JC, Kribs JW (2011). Palpatory accuracy of lumbar spinous processes using multiple bony landmarks. *J Manip Physiol Ther* 34: 306-13.
3. Grunwald M, Etrich C, Krause W, Assmann B, Dhne A, Weiss T, Gertz HJ (2001). Haptic perception in anorexia nervosa before and after weight gain. *J Clin & Exper Neuropsychology* 23 (4): 520-9.
4. Nascimento LP, Oliva-Pascual-Vaca A, Renan-Ordine R, Riquelme I, Ricard F, Rodriguez-Blanco C (2016). Comparative assessment of tactile sensitivity between undergraduate and postgraduate health sciences students. *Int Jour Osteo Med* 19: 13-9.

Bolečina kot večsistemski pojav

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

Mediko, d.o.o.

Korespondenca/Correspondence: Blanka Koščak Tivadar; e-naslov: blanka@mediko.si

Uvod: Doživljanje neprijetne senzorne in čustvene zaznave v povezavi z resnično ali možno poškodbo tkiva se med posamezniki razlikuje (1). Bolečina lahko povzroči pomanjkanje ali odpor do gibanja (2) in vpliva na bio-psiho-socialne komponente zdravja. V raziskavi smo želeli preveriti, ali so posamezniki z bolečino manj telesno dejavni in ali ta vpliva na sposobnosti pomnjenja in psihološko naravnost pri starejših odraslih. **Metode:** Podatke smo zbirali pri premičnih odraslih, starejših od 65 let, z demografskim vprašalnikom, mednarodnim vprašalnikom o telesni dejavnosti (IPAQ) (3) in s kratkim vprašalnikom o zdravju (SF 36) (4), ki nam je dal podatek o intenzivnosti bolečine v zadnjih štirih tednih in s katerim smo preverili, ali vprašani menijo, da se bo njihovo zdravje poslabšalo. S pomnjenjem števil oziroma testom N-DIGIT(5) smo preverjali zmožnosti kratkoročnega delovnega spomina. Podatke smo statistično analizirali s programom Microsoft Office Excel in SPSS. **Rezultati:** Med 80 sodelujočimi (ženske 84 %, moški 16 %), ki so navedli rahle do zmerne bolečine (50 %), velike bolečine (20 %) ali, da bolečin niso imeli oziroma so jih imeli zelo malo (30 %), nismo zaznali statistično značilnih razlik pri telesni dejavnosti in izvajanju testa N-DIGIT. Statistično značilno boljše rezultate ($p = 0,002$) pri delovnem spominu smo ugotovili pri anketiranih, ki ne pričakujejo, da se jim bo zdravje v prihodnje poslabšalo, v primerjavi s tistimi, ki ne vedo, ali pričakujejo poslabšanje zdravja. Anketiranci, ki so menili, da je njihovo zdravje odlično, so dosegli več točk na testu N-DIGIT kot tisti, ki ne menijo, da je njihovo zdravje dobro ($p = 0,039$). V nadaljevanju smo analizirali število dni, ko so bili telesno dejavni, in povezavo z delovnim spominom. Anketiranci, ki so v prostem času telesno dejavni od 1 do 3 dni ($M = 3,59$), so imeli statistično značilno boljše rezultate od anketirancev, ki niso telesno dejavni ($M = 2,70$), in anketirancev, ki so telesno dejavni od 4 do 7 dni ($M = 4,71$), $p = 0,002$. **Zaključki:** V naši raziskavi smo ugotovili, da je za kognitivne naloge pomembnejši odnos, ki ga ima posameznik do zdravja, kot bolečina. Bolečina ima vpliv na odnos do zdravja, lahko zmanjšuje količino telesne dejavnosti in posredno vpliva na posamezne komponente delovnega spomina. Pomembna je tudi ustrezna količina telesne dejavnosti.

Ključne besede: bolečina, pomnjenje, psihološka naravnost

Pain as multisystemic phenomenon

Background: Experiencing unpleasant sensory and emotional perception in connection with actual or potential damage to tissue varies between individuals (1). Pain can cause deficiency or resistance to movement (2), and affects the bio-psycho-social components of health. In the study, we wanted to check whether individuals with pain are less physical active and whether physical inactivity affects the ability of memory and the psychological orientation in elderly adults. **Methods:** Data collection was carried out in older adults over the age of 65 with the help of demographic questionnaire, an international questionnaire on physical activity (IPAQ) (3) and a short health questionnaire on the quality of life (SF 36) (4), that gave us data of intensity of pain in the last 4 weeks and with which we asked whether they thought their health would deteriorate. Using the numerical memory test (N-DIGIT test) (5), we checked the capabilities of short-term working memory. We analyzed the data statistically with Microsoft Office Excel and SPSS. **Results:** Of the 80 participants (84% women, 16% men) who reported little to moderate pain (50%), severe pain (20%) or none to very little (30%) pain, no statistically significant differences were observed in physical activity and test. Statistically significantly better results ($p = 0.002$) on working memory were found with respondents who do not expect that their health will deteriorate in the future compared to those who do not know whether they expect a deterioration in health. Respondents who thought that their health was excellent had achieved more points in the test than those who did not feel that their health was good ($p = 0.039$). In the following, we analyzed the number of days they were physically active and the connection with working memory. Respondents who were active in their free time from 1 to 3 days ($M = 3.59$) showed statistically significantly better results than respondents who were not active ($M = 2.70$) and respondents who were active for 4-7 days ($M = 4.71$), $p = 0.002$. **Conclusions:** In our study, we found that for cognitive tasks, attitude to health is more important than pain. Pain has an impact on health attitudes, it can reduce the quantity of movement and has an indirect effect on certain components of the working memory. A proper quantity of physical activity is also important.

Key words: pain, memory, psychological orientation

Literatura/References:

1. Hodges P (2016). Motor Control and Pain. In: Sluka K, Pain mechanisms and management for physical therapists. 2nd ed. IASP.
2. Tomioka K, Iwamoto J in Okamoto N (2011). Reliability and validity of the international physical activity questionnaire (IPAQ) in elderly adults: The Fujiwara-kyo study. *Journal of epidemiology* 21(6): 459-65.
3. Walters SJ, in Brazier JE (2003). What is the relationship between the inimally important difference and health state utility values? The case of the SF-6D. *Health and quality of life outcomes* 1 (4).
4. Woods DL, Kishiyama MM, Yund, EW, Herron, TJ, Edwards B, Poliva O, Hink, RF in Reed B (2012). Improving digit span assessment of short-term verbal memory. *Journal of clinical and experimental neuropsychology* 33 (1); 101-11.
5. Perrot S, Trouvin A-P, Rondeau V, Chartier I, Arnaud R, Milon J-Y, Pouchain D (2018). Kinesiophobia and physical therapy-related pain in musculoskeletal pain: A national multicentre cohort study on patient and their general physicians. *Joint Bone Spine* 85 (1): 101-7.

Prepoznavanje, pojavnost in obravnava centralne senzitivacije pri osebah s kronično bolečino

Saša Bole, dipl. fiziot.

Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča, Ljubljana

Korespondenca/Correspondence: Saša Bole; e-naslov: sasa.bole@ir-rs.si

Uvod: S pomočjo sodobne nevroznanosti lahko bolje razumemo mehanizme bolečine. Tako danes vemo, da je kronična bolečina odraz kompleksnega stanja v centralnem živčnem sistemu (1) in da je nevrofiziološko dogajanje, odgovorno za razvoj in vztrajanje kronične bolečine, kompleksno in zapleteno. Pri kronični bolečini, ki je dolgotrajna in pri kateri ni jasnega izvora nocicepcije, je pogosto prisotna centralna senzitivacija – povečana odzivnost nociceptorjev v osrednjem živčnem sistemu. Namen prispevka je opisati fenomen centralne senzitivacije, njeno prepoznavanje in pojavnost, saj lahko razumevanje mehanizmov kronične bolečine pomembno prispeva h kakovostnejši obravnavi pacientov. **Metode:** V podatkovni zbirki Pubmed in dLib so bile pregledane raziskave in pregledni članki, objavljeni med letoma 2009 in 2019, s ključnimi besedami kronična bolečina, centralna senzitivacija, nevroplastičnost in fizioterapija. **Rezultati:** Senzitivacija pripelje do trajnih anatomskih in funkcionalnih sprememb živčnega sistema (2). Te obsegajo spremembe na molekularni ravni in ravni posameznih sinaps. Okrepi se sinaptični prenos v sinapsah in spremeni se število sinaps zaradi sprememb na ravni nevronske mreže. Pri osebah s kronično bolečino in prisotno centralno senzitivacijo slabše funkcioniira tudi descendenti mehanizem modulacije bolečine. Neustrezno delovanje tega sistema povzroči pretiran odziv osrednjega živčnega sistema, kar poveča bolečine. Pri določeni populaciji pacientov je lahko centralna senzitivacija poglavitni mehanizem, ki vzdržuje kronično bolečinsko stanje, kot na primer pri fibromialgiji, nihajni poškodbi vratu, kronični utrujenosti in sindromu razdražljivega črevesja. Centralna senzitivacija ni prisotna pri vseh pacientih s kronično bolečino, lahko pa je prisotna pri podskupinah oseb s kronično bolečino v križu, artrozo, nihajno poškodbo vratu, teniškim komolcem, bolečinami v rami in pri glavobolih (3). **Zaključki:** Pri pacientih, ki trpijo za kronično bolečino in pri katerih je prisotna centralna senzitivacija, uporaba metod in tehnik, ki so usmerjene na obravnavo lokalnega telesnega področja, napoveduje slab rezultat in ni učinkovita (4). Bolj so zaželeni centralni pristopi, ki ciljajo možganske in tako imenovane top down mehanizme. Ker je kronična bolečina kompleksna izkušnja, so se po svetu razvile multidisciplinarne obravnave, ki temeljijo na bio-psiho-socialnem modelu razumevanja bolečine. Glavni cilji rehabilitacije po bio-psiho-socialnem modelu so razumevanje kronične bolečine, stopnjevanje aktivnosti, obvladovanje nefunkcionalnih prepričanj o bolečini in katastrofičnega doživljanja bolečine, da bi izboljšali kakovost življenja in povečali vključenost tako v zasebnem kot v poklicnem življenju (5).

Ključne besede: kronična bolečina, centralna senzitivacija, fizioterapija, nevroplastičnost, bio-psiho-socialni pristop

Recognition, occurrence and treatment of central sensitization in chronic pain patients

Background: Modern neuroscience gives us a better understanding of pain mechanisms. We know that chronic pain is a reflection of the complex state in the central nervous system (1) and that the neurophysiological events, responsible for the development and persistence of chronic pain are complex and complicated. In persistent chronic pain, where there is no clear origin of nociception, central sensitization –increased responsiveness of nociceptive neurons in the central nervous system – is commonly present. The purpose of this paper is to describe the phenomenon of central sensitization, its recognition and incidence, since the understanding of chronic pain mechanisms can significantly contribute to a better treatment of patients. **Methods:** In Pubmed and dLib databases, research and review articles, published between 2009 and 2019, were reviewed with the key words chronic pain, central sensitization, neuroplasticity, and physiotherapy. **Results:** Sensitization leads to permanent anatomical and functional changes in the nervous system (2). These include changes at the molecular level and at the level of individual synapses, which strengthen synaptic transmission in existing synapses, and changes in the number of synapses and at the level of neural networks, which increase the number of synapses. In patients with chronic pain and the presence of central sensitization, the descending mechanism of pain modulation also works poorly. Inadequate operation of this system causes an excessive response of the central nervous system, which strengthens pain. For a certain population of patients, central sensitization can be the main mechanism for maintaining chronic pain, for example in fibromyalgia, whiplash disorders, chronic fatigue and irritable bowel syndrome. Central sensitization is not present in all patients with chronic pain, but it may be present in subgroups of people with chronic back pain, arthrosis, whiplash, tennis elbow, shoulder pain and headaches (3). **Conclusions:** In patients suffering from chronic pain and in whom central sensitization is present, the use of methods and techniques aimed at addressing the local area of the body predicts a poor result and is not effective (4). Central approaches targeting brain and so-called 'top down' mechanisms are more desirable. Because chronic pain is a complex experience, multidisciplinary treatments have developed around the world, based on a bio-psycho-social model of understanding pain. The main goals of rehabilitation according to the bio-psycho-social model are understand chronic pain, graded activity, managing dysfunctional beliefs about pain and catastrophic pain experiencing with the goal of improving the quality of life and increasing inclusion in both private and professional life (5).

Key words: chronic pain, central sensitization, physiotherapy, neuroplasticity, biopsychosocial approach

Literatura/References:

1. Zaletel M (2014). Nevrološke bolezni s simptomi bolečine in utrudljivosti. V: Vodenje in rehabilitacija bolnikov s kronično bolečino: Izbrane teme s področja vodenja in rehabilitacije bolnikov s kronično nerakavo bolečino: redna letna učna delavnica: zbornik predavanj. Ljubljana: Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča.
2. Kovačič D (2014). Bolečina: Psihološka stran mehanizma preživetja. *Anthropos* 46: 65-86.
3. Nijs J, Torres-Cueco R, van Wilgen CP, Girbes EL, Struyf F, Roussel N, van Oosterwijck J, Daenen L, Kuppens K, Vanwerwee L, Hermans L, Beckwee D, Voogt L, Clark J, Moloney N, Meeus M (2014). Applying modern pain neuroscience in clinical practice: criteria for the classification of central sensitization pain. *Pain Physician* 17 (5): 447-57.
4. Nijs J, Goubert D, Ickmans K (2016). Recognition and Treatment of Central Sensitization in Chronic Pain Patients: Not Limited to Specialized Care. *J Orthop Sports Phys Ther* 46 (12): 1024-8.
5. Horvat B, Vidmar J, Zabukovec I, Klar N, Žalik, T, Perme Sušnik K, Jamnik H. (2014). Predstavitev interdisciplinarne obravnave pacientov s kronično razširjeno nerakavo bolečino na URI - Soča. V: Vodenje in rehabilitacija bolnikov s kronično bolečino: Izbrane teme s področja vodenja in rehabilitacije bolnikov s kronično nerakavo bolečino: redna letna učna delavnica: zbornik predavanj. Ljubljana: Univerzitetni rehabilitacijski inštitut Republike Slovenije - Soča

Fizioterapevtska obravnava pacienta z obsežno opeklino - Poročilo o primeru

Renata Javornik, dipl. fiziot., Božena Primožič, dipl. fiziot.

Oddelek za plastično kirurgijo, Univerzitetni klinični center Maribor

Korespondenca/Correspondence: Renata Javornik; e naslov: javornikr@gmail.com

Uvod: Opeklina je posebna vrsta rane, povzročena zaradi delovanja toplotne, kemične ali električne energije na tkivo in povzroča lokalni ali generaliziran edem (1, 2). Opeklinška poškodba je posledica dotika kože z vročimi tekočinami ali delovanje toplotne energije zaradi suhe vročine. Posledice težjih opeklin predstavljajo kompleksen problem, ki terjajo dobro organizirano timsko obravnavo pacienta (3-5). Na podlagi z dokazi podprte prakse (4) je protibolečinska fizioterapevtska obravnava z uporabo številnih masažnih tehnik, mandibularne distrakcije in številnih drugih fizioterapevtskih postopkov najučinkovitejša pri zmanjšanju percepcije in intenzivnosti bolečine v akutni fazi opeklino. Prikaz primera: 44 letni pacient z 80 % deležem opeklino v zgodnji fazi obravnave je bil napoten na fizioterapijo. Ob začetku fizioterapevtske obravnave je bila izdelana ocena funkcionalnega stanja, načrt programa fizioterapije z zastavljenimi kratko- in dolgoročnimi cilji z namenom optimalne funkcioniranja pacienta. Glede na oceno so bili izbrani fizioterapevtski postopki za zmanjšanje edema, preprečevanje deformacije sklepov, izboljšanje obsega gibljivosti sklepov in izboljšanja prožnosti mehko tkivnih struktur ter celjenje tkiva. Velik poudarek je bil na obravnavi brazgotine s tehnikami manipulacije fascij. Za podporno terapijo so bile vključene tudi tehnike respiratorne fizioterapije, čiščenju dihalne poti in izboljšanju pljučne funkcije. Uporabljene so bile tudi pasivne in aktivno asistiranje vaje za izboljšanja mišične moči in nadzora nad ostalimi gibalnimi funkcijami. Z zgodnjo mobilizacijo, intenzivnim motoričnim učenjem je bila dosežena reedukacija hoje. V sklopu delovne terapije je pacient prejel statično opornico za desno roko in kompresijsko oblačilo. Ob zacelitvi ran so bile pri pacientu uporabljene tehnike ročne masaže, sklepne mobilizacije in PNF tehnike »zadrži-sprosti«. Pred odpustom je bil s pacientom izveden polstrukturirani intervju glede osebnega doživljanja izida rehabilitacije. Izvedeni so bili postopki meritev obsega edema na ekstremitetah, gibljivosti udov, ocenjena koordinacija gibanja, hoje, ravnotežja ter drže. Obravnava je trajala tri dni v tednu, dva do trikrat dnevno v razmahu treh mesecev. Pacient in svojci so bili deležni zdravstvene vzgoje: o načinu življenja doma, o omejitvah in pomenu nadaljevanja naučenega programa fizioterapevtske vadbe in masaže telesa. Tekom fizioterapevtskega programa je prišlo do izboljšanja rezultatov vseh zgoraj omenjenih meritev. Fizioterapevtski postopki so vplivali na telesno zgradbo in funkcijo od zmanjšanja stopnje bolečine, zmanjšanje edema, na kakovost brazgotine, zmanjšanje srbenja, preprečevanje disfunkcije v mehkih tkivih in nenazadnje na zmanjšanje psiholoških simptomov (depresija, tesnoba, strah). Pacient je izboljšal mišično moč, gibljivost, izboljšanje pljučne funkcije. **Zaključek:** Na podlagi kvantitativnih in kvalitativnih rezultatov ugotavljamo, da je bil fizioterapevtski program pri pacientu z obsežno opeklino uspešen. Kombinacija specifičnih fizioterapevtskih postopkov je pripomogla k izboljšanju stanja na področju telesnih zgradb in funkcij, na področju vsakodnevnega funkcioniranja ter na področju sodelovanja pacienta z obsežno opeklino.

Ključne besede: telo, opeklina, celjenje, rehabilitacija

Physiotherapy management of a patient after burn injury – Case report

Introduction: Burn is a special type of wound caused by the action of heat, chemical or electrical energy on tissue and causes local or generalized edema (1, 2). Burning damage is the result of touching the skin with hot fluids or the operation of heat due to dry heat. The consequences of severe burns constitute a complex problem requiring a well organized team treatment (3-5). Based on evidence-based practice (4), antipain physiotherapy treatment using numerous massage techniques, mandibular distraction and many other physiotherapy procedures is most effective in reducing the perception and intensity of pain in the acute phase of burnout. Case report: A 44 year old patient with an 80% share of burns at an early stage of treatment was referred to physiotherapy. At the beginning of the physiotherapeutic treatment, an assessment of the functional state, the plan of the physiotherapy program with the set short and long-term goals was made an optimal functioning of the patient. According to the assessment, physiotherapeutic procedures for the reduction of edema, prevention of deformation of the joints, improvement in the flexibility of the joints and improvement of the flexibility of the soft tissue structures and of tissue healing were selected. A great deal of emphasis was on the treatment with techniques of fascia manipulation. Supportive therapy also included respiratory physiotherapy techniques, airway cleaning and improvement of pulmonary function. Passive and actively assisted exercises were also used to improve muscular strength and control over other motor functions. Early mobilization, intensive motor learning, achieved reeducation of the walk. Within the scope of occupational therapy, the patient received a static shoulder for the right hand and a compression garment. When the wounds were healed, manual massage techniques, concave mobilization and PNF "hold-release" technique were used in the patient. Before the dismissal, we conducted a semi-structured interview with the patient about the personal experience of the outcome of rehabilitation. We measured the extent of edema on the extremities, the movability of the limbs, the evaluation of the coordination of movement and walking, balance and posture. The treatment lasted three days a week, two to three times a day for three months. The patient and relatives received health education: the way of life at home, about the limitations and the importance of continuing the learned program of physiotherapeutic exercise and body massage. During the physiotherapeutic program, the results of all the above measurements were improved. Physiotherapeutic techniques influenced on the body structure and the function of reducing the degree of pain, reducing edema, on the quality of scars, treating itching, preventing the dysfunction in soft tissues as well as reducing psychological symptoms (depression, anxiety, fear). The patient improved muscular strength, flexibility, and improved pulmonary function. **Conclusions:** Based on quantitative and qualitative results, we have established that the physiotherapeutic program was successful in a patient with extensive burnout. The combination of specific physiotherapeutic procedures was improved the situation in the field of body buildings and functions, in the field of daily activity and in the field of patient co-operation with extensive burns.

Key words: body, burn, healing, rehabilitation

Literatura/References:

1. Ratray, F., Ludvig, L (2000). »Clinical Massage Therapy«. Talus Incorporated. Toronto.
2. Sheridan, R.L.; »Burn Rehabilitation«. Dostopno na internetu: <http://www.emedicine.co/pns/tropic163.htm>. 13.6.2005.
3. Silverberg, R., Johnson, J., Moffet, M (1996). »The Effect of Soft Tissue Mobilization on Inmature Burn Scars; Results of a Pilot Study«. Journal of Burn Care and Rehabilitation 17(3): 252-8.
4. Wesley Edgar D, et al. (2011). Local and Systemic Treatments for Acute Edema After Burn Injury: A Systematic Review of the Literature, J Burn Care Res 32 (2): 334-347.
5. Zbornik referatov (2005). 50 let oddelka za plastično in rekonstruktivno kirurgijo, Maribor