

## Takojšnji učinki masaže stopala na statično ravnotežje pri zdravih mladih preiskovancih

viš. pred. mag. **Sonja Hlebs**, viš. fiziot., univ. dipl. org.; **Tadeja Dolinščak**, dipl. fiziot.; doc. dr. **Urška Puh**, dipl. fiziot.

Univerza v Ljubljani, Zdravstvena fakulteta, Ljubljana

**Korespondenca/Correspondence:** viš. pred. mag. Sonja Hlebs, viš. fiziot., univ. dipl. org.; e-pošta: sonja.hlebs@zf.uni-lj.si

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

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

---

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

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

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

### Literatura/References:

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