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Structured balance exercises improve dynamic balance ability for community-dwelling older women: a randomized control trial

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Introduction: Falls are a major problem for older adults, causing many to become dependent on others. Maintaining and/or improving balance ability is crucial in preventing falls. Although many intervention studies have found that exercises can improve/maintain balance ability, the few balance ability tests were arbitrarily selected making it difficult to determine clearly how specific exercise regimens affect balance ability. We confirmed that balance ability consists of static, dynamic and reactive balance ability based on factor analysis [1]. We have developed structured balancing exercises, characterized by perturbing upright posture using a manufactured sponge and a Swiss ball. This study examined the effects of these exercises on either static; dynamic or reactive balance ability in community-dwelling older women.

Methods: Participants comprised 26 community-dwelling older women in Japan, randomized for age and gait speed to the exercise group (n=13) or the control group (n=13). The exercise group performed structured balancing exercises, in which they maintained upright posture on the sponge and the ball, once weekly for 24 weeks. The control group performed stretching exercises once per month. At baseline and at the end of the intervention, all participants completed balance ability tests. Static balance ability was assessed by measuring postural sway and standing on one leg; dynamic balance ability was assessed by measuring functional reach, timed up and go, and gait; and reactive balance ability was assessed using the EquiTest. We also measured knee and ankle strengths using an isokinetic machine. The data were analyzed using SPSS16.0.

Results: At baseline, the two groups were well matched in physical characteristics and in the results of all balance ability and strength tests. After 24 weeks, timed up and go ($p=0.042$), cadence of preferred speed walking ($p=0.047$), and peak torque of knee flexion ($p=0.008$) improved in the exercise group. In the control group, none of the items showed improvement, except for cadence of preferred walking ($p=0.003$). There was no correlation between timed up and go and knee flexion torque.

Conclusions: These results suggest that these structured balance exercises are effective in improving dynamic, but not static or reactive, balance ability. Improvements in dynamic balance ability were not dependent on improved muscle strength.

References

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Myofunctional therapy in Parkinson's disease patients. A controlled randomized blind clinical study

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Introduction: Myofunctional Therapy (MT) is a particular type of neuro-psychomotor rehabilitation, finalized to the acquisition of a correct deglutition, through the re-education of the position and movements of the tongue and re-balancing of the orofacial muscles. The aim of this research is to verify whether MT, associated with pharmacological therapy and neuromotor rehabilitation, could positively influence the characteristic symptoms of Parkinson's disease, such as camptocormic posture, bradykinesia, balance disorders, thus improving the quality of life and the safety of this population.

Methods: The sample was composed by 54 patients (mean age 67.06 years SD 9.55 years) selected according to the following criteria: age < 80 years, stage on the Hoehn-Yahr scale ≤ 3, independent gait (even with aid), clinical and pharmacological stability, cooperative patients, absence of contraindications to motor rehabilitation practice, absence of cognitive decline (Mini Mental Scale Evaluation ≥ 24). The sample was randomly subdivided into three groups of 18 persons: Group A: patients were submitted only to pharmacological therapy; Group B: patients were submitted to group neuromotor rehabilitation (2 times a week, 60 minutes) associated with pharmacological therapy; Group C (experimental): patients were submitted to group neuromotor rehabilitation (2 times a week, 50 minutes) associated with pharmacological therapy, associated with the elevation of the tongue towards the palatine spot (10 minutes), which is the main procedure of MT. Measures from pre and post therapy were analyzed thought repeated measures ANOVA and Tukey-Kramer post-hoc multiple-comparison test.

Results: Hoehn-Yahr scale showed no significant differences ($p_{group}=0.767$; $p_{time}=0.616$; $p_{group\times time}=0.940$). Chair stand test showed significant difference within time ($p_{group}=0.261$; $p_{time}<0.001$**; $p_{group\times time}=0.084$). All the other measures showed significant differences within time and interaction of group and time factors: Berg balance scale ($p_{group}=0.928$; $p_{time}<0.001$**; $p_{group\times time}=0.004$**), UPDRS III ($p_{group}=0.597$; $p_{time}<0.001$**; $p_{group\times time}=0.039$*), four meter walk test ($p_{group}=0.357$; $p_{time}=0.007$**; $p_{group\times time}=0.001$**), occiput-wall distance ($p_{group}=0.694$; $p_{time}<0.001$**; $p_{group\times time}<0.001$**). Post-hoc tests showed

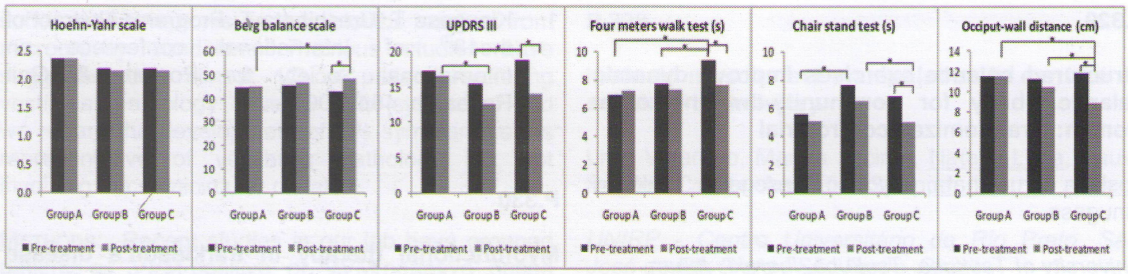

Fig.1 Mean results pre and post-treatment divided by groups

significant differences within pre and post treatment only in group C in all measures but Hoehn-Yahr scale.

Conclusions: MT, performed with experimental group C, supported improvements in the following areas: camptocormia, meaning the posture in anterior flexion of the body, reducing the risk of falls which is higher in these subjects as the barycentre is shifted forward; balance skills, also during gait. These results clearly show a quality and safety improvement: we therefore wish for the use of MT in the large population of Parkinson's disease patients, in order to improve their posture, make their gait safer and prevent the risk of falls.

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Perception exercises involving the sole of the foot enable the oldest old to better maintain postural balance while standing

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Introduction: Previous studies have revealed that postural balance while standing is better maintained as a result of perception exercises involving the sole of the foot [1] [2]. However, it has not yet been determined whether such exercises are effective for very old people, i.e., those aged 80 years or more (the oldest old). In this study, oldest-old participants performed a perception exercise wherein they were required to determine the hardness of a surface by using the soles of their feet. We investigated the effects of this perception task on the postural balance maintained while standing, from the perspectives of postural sway and brain activity.

Methods: The study involved 14 of the oldest old residing in a long-term care facility for the elderly. Written informed consent was obtained from all the participants before the study, and they were randomly assigned to an exercise group or a control group. The exercise group (n=7) performed perception exercises involving the sole of the foot for 10 days. Participants in the control group (n=7) were required to only stand on a rubber surface without trying to determine its hardness. The perception task was performed as follows. First, the participants stood on 5 types of rubber that differed in hardness, and they were required to assess the hardness by using the foot sole and to remember their assessment. The participants were then randomly given each of the 5 types of rubber and requested to determine their hardness over 10 trials. The number of incorrect answers obtained in these trials was determined in order to examine the effects of learning. The centre of pressure (COP), which was determined using a stabilometer (Anima, Japan), was used as an indicator of postural sway. During the task performed on the first and last day of the trial, the brain activity of the subjects in both groups was measured over the frontal lobe by using functional near-infrared spectroscopy (Shimadzu, Japan). To determine the effects of learning, we statistically analyzed the changes in the number of incorrect answers obtained during each exercise session by using repeated-measures one-way analysis of variance (ANOVA). The stabilometric measurements and the extent of forward displacement of the COP before and after the exercises were examined using a paired t-test. In addition, the changes in these measurements before and after the exercises were determined and compared using an unpaired t-test. The level of significance was set at 5%.

Results: For the exercise group, the number of incorrect answers obtained significantly decreased as the trial progressed, and the stabilometric measurements significantly decreased after the intervention. In contrast, the forward displacement of the COP significantly increased after the trial. Within the control group, no significant differences were observed in the stabilometric measurements and forward displacement of the COP. Comparison of the changes in the measurements recorded before and after the trial revealed a significant difference between the exercise and control groups, with the former exhibiting the positive effects of the intervention. The subjects in the exercise group showed an increase in the cerebral blood flow (oxy-Hb) in the dorsolateral prefrontal cortex on the first day of the perception exercise program.

Conclusions: We demonstrated that the postural balance maintained while standing improves with perception exercises involving the sole of the foot in the oldest old. Further, the changes in the brain activity enable these individuals to better maintain postural balance while standing.

References