

Effectiveness of Imagery Compared with Exercise Training on Hip Abductor Strength and EMG Production in Healthy Adults

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Abstract : Imagery training could be an important treatment for muscle function improvements in patients who are facing limitations in exercise training by pain or other adverse symptoms. However, recent studies are mostly limited to small muscle groups and are often contradictory. Moreover, a possible bilateral transfer effect of imagery training has not been examined. We, therefore, investigated the effectiveness of unilateral imagery training in comparison with exercise training on hip abductor muscle strength and EMG. Additionally, both limbs were assessed to investigate bilateral transfer effects. Healthy individuals took part in an imagery or exercise training intervention for two weeks and were assessed pre and post training. Participants (n=30), after randomization into an imagery and an exercise group, trained 5 times a week under supervision with additional self-performed training on the weekends. The training consisted of performing, or to imagine, 5 maximal isometric hip abductor contractions (= one set), repeating the set 7 times. All measurements and trainings were performed laying on the side on a dynamometer table. The imagery script combined kinesthetic and visual imagery with internal perspective for producing imagined maximal hip abduction contractions. The exercise group performed the same number of tasks but performing the maximal hip abductor contractions. Maximal hip abduction strength and EMG amplitudes were measured of right and left limbs pre- and post-training period. Additionally, handgrip strength and right shoulder abduction (Strength and EMG) were measured. Using mixed model ANOVA (strength measures) and Wilcoxon-tests (EMGs), data revealed a significant increase in hip abductor strength production in the imagery group on the trained right limb (~6%). However, this was not reported for the exercise group. Additionally, the left hip abduction strength (not used for training) did not show a main effect in strength, however, there was a significant interaction of group and time revealing that the strength increased in the imagery group while it remained constant in the exercise group. EMG recordings supported the strength findings showing significant elevation of EMG amplitudes after imagery training on right and left side, while the exercise training group did not show any changes. Moreover, measures of handgrip strength and shoulder abduction showed no effects over time and no interactions in both groups. Experiments showed that imagery training is a suitable method for effectively increasing functional parameters of larger limb muscles (strength and EMG) which were enhanced on both sides (trained and untrained) confirming a bilateral transfer effect. Indeed, exercise training did not reveal any increases in the parameters above omitting functional improvements. The healthy individuals tested might not easily achieve benefits from exercise training within the time tested. However, it is evident that imagery training is effective in increasing the central motor command towards the muscles and that the effect seems to be segmental (no increase in handgrip strength and shoulder abduction parameters) and affects both sides (trained and untrained). In conclusion, imagery training was effective in functional improvements in limb muscles and produced a bilateral transfer on strength and EMG measures.

Keywords : imagery, exercise, physiotherapy, motor imagery

Conference Title : ICP 2018 : International Conference on Physiotherapy

Conference Location : London, United Kingdom

Conference Dates : January 18-19, 2018