TASK-SPECIFIC ACUTE AND ADAPTIVE CHANGES IN ACCURACY OF VISUAL FEEDBACK CONTROL OF BODY POSITION

Abstract
Aim. The study evaluates acute and adaptive changes in accuracy of visual feedback control of body position during task-oriented sensorimotor exercise. Methods. Subjects (16 PE students and 6 individuals with functional disbalances) were provided by feedback on COM displacement on a computer screen while standing on dynamometric platform. Their task was to trace, by shifting COM, a curve flowing either in vertical or horizontal direction. The deviation of instant COP position from the curve was recorded at 100 Hz by means of the system FiTRO Sway Check. In the first case, the test consisted of twenty 30-seconds trials randomly performing in each direction. After its completion, additional 6 trials (one to each direction) were performed every 5 minutes. The same task was performed also under dynamic conditions (standing on unstable surface). In the second, the training during initial four weeks consisted of conventional exercises (4 sessions/week) followed by including visual feedback exercises into the program during next eight weeks (2 of 4 sessions/week). Adaptive changes in sensorimotor parameters were evaluated every week using two different tests – visually guided COM tracking and target-matching task. Prior to and after the training also static balance with eyes open and eyes closed was evaluated. Parameters of balance were registered by means of the posturography system FiTRO Sway Check based on dynamometric platform. Results. Distance of sway trajectory from the curve decreased in both antero-posterior and medio-lateral direction when repeatedly performing visually-guided COM tracking task. However, a significant ($p \leq 0.01$) improvement was observed only during initial seven trials. After cessation of practice its values slightly decreased over a period of 10 minutes and then gradually increased toward 30 minute of recovery. When performing visually-guided COM tracking task under dynamic conditions, there was a greater decline in mean COP distance from the curve over repeated trials than during stance on stable platform (46.1% and 26.3%, respectively). Results of the training study showed that COP distance from both horizontally and vertically flowing curves measured during visually-guided COM tracking task only slightly decreased (8.7%) during initial four weeks. However, its greater decline was observed from the 5^{th} to 8^{th} (10.6%) and from 9^{th} to 12^{th} week of the training (14.5%) when visual feedback exercises were included into the training program. Similar trend was observed also in case of visually-guided COM target-matching task. Contrary to this, no significant changes were found in parameters of balance registered in static conditions under and without visual control. Conclusions. Task-oriented sensorimotor exercise leads to more precise perception of COM position and regulation its movement in both antero-posterior and medio-lateral direction. However, learning effect is greater when performing visually-guided COM tracking task under dynamic than under static conditions. Conventional training consisting of balance exercises does not improve visual feedback control of body position until given feedback in the second and third phase of the program.

Key words**:** *Acute adjustments – Chronic adaptations – Sensorimotor parameters – Task-oriented sensorimotor exercise – Visual feedback control of body position*