

EFFECTS OF ENHANCED VISUAL FEEDBACK ON POSTURAL CONTROL IN STATIC AND IN DYNAMIC CONDITIONS

Turbanski Stephan¹, Schwarzlose Jonas, Haas Christian¹, Schmidbleicher Dietmar¹

(Johann Wolfgang Goethe-University Frankfurt/Main¹, Germany)

Introduction

It is well known that postural control is a complex task based on integration processes involving proprioceptive, vestibular, and visual cues. In order to gain a better understanding of the relative contributions of these different physiological systems to postural control, one can remove or modify the modalities of certain feedback systems and then evaluate subject's performance in balance tasks. For instance, numerous studies have been shown that impaired visual feedback leads to decreased postural stability. In contrast little is known about the influence of enhanced visual feedback. Accordingly, the aim of this study was to evaluate the effects of enhanced visual feedback on postural control in static and in dynamic conditions.

Methods

Twelve healthy male subjects, all physical education students, ranging in age from 23 to 30 years, participated in this study. Subjects were tested on their ability to maintain postural stability in a standardised one-leg stance (I) on a force platform (posturography, static condition) and (II) on a movable and instable platform attached to four springs (dynamic condition). First, in order to analyse postural control with normal visual feedback, subjects were instructed to look straight ahead and focus on a sign at the wall. Second, postural control with enhanced visual feedback was assessed by showing motions of centre of pressure (in static condition) and displacements of support surface (in dynamic condition) to the subjects in real time on a computer screen straight ahead (see ROUGIER et al. 2004). Each measurement of postural control consisted of three tests on each leg (L and R). Trials were carried out in a random order to prevent order effects.

Results

In static, and particularly in dynamic condition, enhanced visual feedback shows a tendency to improve postural control [+3.5% (L)/+2.6% (R) and +11.4% (L)/+12.3% (R), respectively]. However, analyses of group differences using paired t-tests showed no significant differences, both for the static condition [$p=0.64$ (L)/ $p=0.73$ (R)] as well as the dynamic condition ($p=0.53$ (L)/ $p=0.37$ (R)).

Discussion

In accordance with LEUKEL et al. (2006) we found a tendency for improved postural control due to enhanced visual feedback. However, in contrast to their study our results failed the level of significance clearly. A reason for this may lie in the fact that in static condition the measurement is not sensitive enough to detect differences in performance. In dynamic condition, on the other hand, subjects showed strong learning effects and variation of results. We hypothesised that in some subjects the focus on enhanced visual

feedback on the computer screen impairs their automatic postural control processes.

ROUGIER et al. (2004), *Clinical Biomechanics* 19: p. 858-867

LEUKEL et al. (2006), *Book of Abstracts ECSS congress, Lausanne*: p. 22

Keywords: Posture, Biomechanics