EFFECT OF VISION AND SURFACE SLOPE ON POSTURAL SWAY IN HEALTHY ADULTS

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Introduction

Postural control (PS) is achieved by a complex interaction between the central nervous system and three main systems including visual, somatosensory, and vestibular systems. The active collaboration of these systems ensures that the posture-stabilizing muscles of the legs and trunk respond almost instantaneously to balance disturbances. Various cognitive, sensory, or motor impairments can cause a patient to have difficulties maintaining, achieving, or restoring equilibrium. Previous studies underlined the relationship between PS and anthropometric parameters as well as neurologic disorders [1,2]. In this study we aimed to evaluate the postural balance of healthy young adults in flat and sloped standing positions with eyes open and closed, and compare recorded COP values with the standing position on flat ground with open eyes (standard condition).

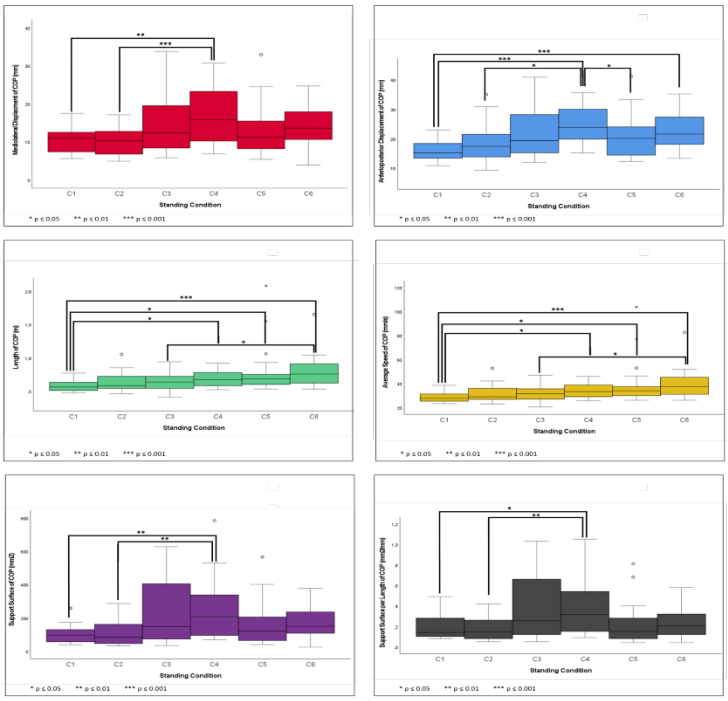
Methods

Twenty-two healthy young adults (11 female and 11 male) aged between 24 and 34 years were recruited. The COP parameters of the participants were measured in standing on flat, uphill, and downhill positions (with a 20° slope) with eyes open and closed.

Results

Significant differences were recorded between our standard standing condition and standing uphill with closed eyes for all COP parameters ($p<0.05$). The difference between standard condition and standing downhills with eyes open and closed were limited to the length, average speed and anteroposterior displacement of the COP ($p<0.05$).

There was a significant relationship between standing conditions and all COP parameters in this study ($p\leq 0.004$). The age of the participants had a significant effect on mediolateral and anteroposterior displacements of COP, support surface of COP, and support surface per length of the COP ($p\leq 0.001$). In addition, none of the COP parameters showed a relationship with the gender of the participants. With the exception of mediolateral displacement, body mass index also had a significant effect on all COP parameters ($p\leq 0.043$). The pairwise comparisons between the measurement conditions for each COP parameter are shown in Figure 1.



C1: standing on flat ground with eyes open (standard condition); C2: standing on flat ground with eyes closed; C3: standing uphill with eyes open; C4: standing uphill with eyes closed; C5: standing downhill with eyes open; C6: standing downhill with eyes closed

Figure 1: The pairwise comparisons between the measurement conditions for each COP parameter.

Conclusion

It can be deduced that in the studied population standing downhill leads to an impairment of balance and the loss of visual input increases this impairment. On the other hand, standing uphill only poses a challenge to balance in the absence of visual input in our study. The results of this study are currently being reviewed by the authors and will be presented in congress.

References

1. Alonso et al. Clinics 67:1433–1441, 2012.
2. Mesbah et al. Phys Ther 97:290–309, 2017.

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