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The influence of compliant surface on postural sway in different age groups

France Sevšek, Darja Rugelj
Faculty of Health Sciences, University of Ljubljana, Ljubljana, Slovenia

INTRODUCTION

Standing and walking on soft carpets is a potential risk factor for unexpected falls, especially in elderly subjects, as the need to process the proprioceptive information increases while haptic information from sole is compromised.

The purpose of this study was to compare the centre of pressure (CoP) sway on a compliant surface between four age groups.

METHODS

The 104 subjects were assigned into four functional groups: young (<30), middle aged (30-64), elderly community dwelling (65-90) and elderly nursing home residents (65-90). A force platform (Kistler 9286AA) was used for recordings during 60 seconds of quiet barefoot standing with feet close together. All participants were tested on a firm and compliant surfaces, the later being a 7 cm thick Airex® mat.

RESULTS AND DISCUSSION

With age there was a noticeable increase in sway on both type of surfaces. The results clustered into two groups: young and middle aged subjects as opposed to both elderly groups. The correlation between medio-lateral sway and age was week on firm surface ($r=0.229$, $p=0.05$) and moderate on the compliant one ($r= 0.627$, $p=0.01$). Medio-lateral sway on firm surface was 0.48 cm ±0.16 for the young and middle aged groups, 0.58 cm ±0.19 for the community dwelling and 0.62 cm ±0.29 for the nursing home one. The later was significantly larger as compared to the young group ($p<0.001$). On the compliant surface the medio-lateral sway was 0.68 cm ±0.13 in the young group and significantly increased ($p<0.001$) in the community dwelling group (1.01 cm ±0.17) and nursing home group (1.32 cm ±0.50). The ratios of mean CoP velocities between the two surfaces were significantly different between all four groups ($p<0.01$) and ranged from 2.0 in the young group to 2.6 in the older ones.

CONCLUSIONS

Beside age, frailty proved to be a contributing factor to decreased steadiness of CoP during standing on a compliant surface.

CONTRIBUTION TO PRACTICE

These results enabled us to develop and monitor a specially targeted balance training on compliant surfaces that has been proposed to increase the balance skills in different elderly population groups.