SIT-TO-STAND PERFORMANCE WITH YOUNG AND ELDERLY SUBJECTS

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INTRODUCTION

Sit-to-stand is an often performed functional task in daily life and an important requirement for other functional movements. Among the elderly, the difficulty to stand is common and has been considered as a risk factor for institutionalization and falls [1,2,3].

The aim of this study was to evaluate the sit-to-stand task with gender-matched healthy young and elderly individuals at three distinct seat height conditions.

METHODS

Fourteen young (28.14± 5.91 yrs.) and 14 elderly individuals (68.71± 2.49 yrs.) were included. The sit-to-stand task was investigated using an accelerometer, electromyography (EMG), and force platforms. Investigated variables included: reaction times, movement times, latencies, and EMG activity of the tibialis anterior, erector spinal, hamstrings, and soleus muscles, as well as the body elevation index. Conditions were determined according to subjects` knee height, with the seat adjusted to 80, 100, and 115% of knee height. Three within-factor repeated measure ANOVA (2X2X3) was used to investigate age, gender, and seat height effects

RESULTS AND DISCUSSION

Reaction time did not differ between conditions, however, both reaction and movement times were greater for the elderly (Figure 1) and the latencies were slower for all muscles (p<0.01), except for the tibialis anterior. The elderly increased their movement times when the seat was lowered and decreased it when it was elevated (p<0.01). This demonstrated that regardless of gender, increases in seat height affected functional performance for elderly individuals. Significant interactions between age and gender for the young subjects were found, indicating that men were faster than women.

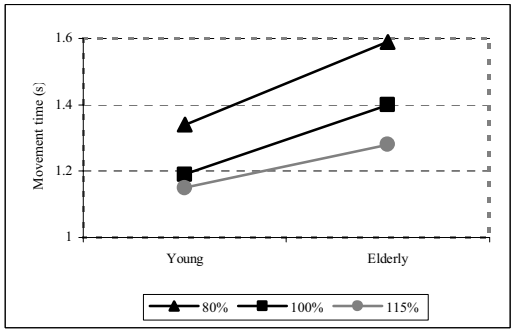

Figure 1: Effect of seat heights on movement time (s)

When the seat was lowered (80% condition), there was observed greater EMG activity for the tibialis anterior and quadriceps muscles (p<0.01), but no differences between the other conditions. In addition, the tibialis anterior was recruited earlier in the 80% condition (p<0.05), demonstrating its function as a preparatory muscle for the sit- to-stand task [3].

When the seat was elevated, decreases in EMG activity were found for all muscles, with the quadriceps being the main generator in the sit-to-stand task. Large variability was observed for the erector spinal muscles, probably indicating different individual strategies [3]. Hamstring activity was not influenced by seat heights

The body elevation index was determined by the amount vertical force generated, when standing from a chair. Differences in the body elevation index were found between groups and were gender-related, indicating that for young subjects, men showed a higher index (Figure 2).

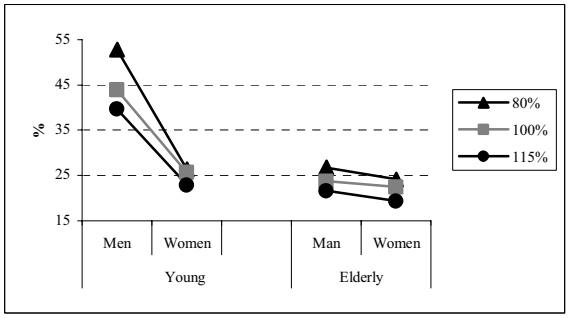

Figure 2: Body elevation index (% body weight) for the young and elderly groups across conditions

CONCLUSIONS

The present findings showed that increases in seat height were associated with decreases in movement time for the elderly and for EMG activation of the tibilais anterior and quadríceps for both young and elderly subjects. When the seat was lowered, movement time and EMG muscle activity increased for both groups. Based upon these findings, these strategies may be adopted by rehabilitation professionals to train the sit-to-stand task, especially with elderly subjects

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