

THE RELATIONSHIPS BETWEEN POSTURAL STABILITY AND FUNCTIONAL ACTIVITY IN OLDER ADULTS

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INTRODUCTION: Good postural stability is critical for excellent performance, injury prevention, and independent living quality in older adults. The purpose of this study was to investigate the relationships between postural stability and functional activity in the elderly.

METHOD: Thirteen healthy elderly adult males (74.2 ± 5.5 yrs, 159.9 ± 6.6 cm, 62.6 ± 8.6 kg) were recruited and screened for lack of any physical impairments or acute musculoskeletal disorders. Postural stability was measured using a portable three-axis force plate (Accusway Plus, AMTI, Watertown, MA, USA), for which the sample rate was set at 100 Hz and the mean velocity, radius and the sway area of the center of pressure (COP) displacement were collected in an eyes-opened condition. Functional activities were evaluated by 6 meter up-and-go and 30 second chair sit-and-up tests. The subject sat on a chair without arm rests (height 46 cm) with their feet shoulder width apart, flat on the floor. The arms were to crossed at the wrists and held close to the chest. From the sitting position, the subject stood completely up, then completely back down; this was repeated for 30 seconds. The total number of complete chair sit-and-up (up and down equaled one stand) was counted. If the subject completed a full stand from the sitting position when the time was elapsed, the final stand was counted in the total. In up-and-go test, a marker was placed 6 meters in front of the chair. The subject started fully seated, hands resting on the knees and feet flat on the ground. On the command, "Go," timing was started, the subject stood and walked (running was disallowed) as quickly and safely as possible to and around the marker (cone), returning to the chair to sit down. Timing stopped as soon as they sat down. The subjects underwent all the tests twice with random order, and the best performance in each activity was recorded. Pearson product moment correlations were calculated to assess the linear relationships among variables and the statistical significances were set at $p < .05$.

RESULTS: Table 1 presents the results of each testing. Table 2 showed that significant correlations were found between up-and-go and the mean velocity, radius and the sway area of center of pressure (COP) displacement, respectively ($r = .44-.61$, $p < .05$). However, no significant correlation was found between 30 seconds chair sit-and-up and static balance control.

Table 1. Results of balance control and functional activities testing

	COP Radius (cm)	COP Velocity (cm/s)	COP Sway Area (cm ²)	30s Sit & Up (repetitions)	6m Up & Go (minutes)
Mean	0.59	1.28	4.64	12.0	9.0
S.D.	0.14	0.33	2.30	3.0	2.1

Table 2. The correlation among variables

COP displacement	30 seconds chair sit-and-up	6 meter up-and-go
Radius	-.31	.49*
Velocity	-.05	.44*
Sway area	-.37	.61*

* significant correlations between variables.

DISCUSSION: Preventing the elderly from falling and evaluating the falling risk are critical. Measuring the balance control and functional activities of lower extremities to evaluate the risk of falling are suggested assessments. It is believed that 30 seconds chair sit-and-up and up-and-go tests could be used to measure the abilities of lower extremities in the elderly (Jones, 2002). This study demonstrated that there were positive correlations between static balance control and up-and-go but not for the 30 second chair sit-and-up. The nature of these functional activities might be the main reason for the differences in correlations with balance control. The chair sit-and-up performance is an indicator of the strength and endurance of legs; however, the 6 meter Up-and-go test may be a better way to measure the postural control ability in the older adults. The cause-effect relationship between postural control and other functional activities still need further study.

CONCLUSION: The functional activity, up-and-go has positive relationship with postural stability indicates that the elderly with better postural stability intend to have better performance in 6 meter up-and-go test.

REFERENCES:

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