Gender Differences in Balance of College-aged Students

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Abstract. Nearly 8 million American adults have reported experiencing problems with balance. However, there have been few studies on balance among the young adult, and even fewer studies found on gender difference. PURPOSE: To determine if balance differences exist between males and females at the college level. METHODS: Sixteen college students, seven males and nine females, 21-26 years of age, participated in a CTSIB test. The Clinical Test of Sensory Interaction and Balance (CTSIB) is standardized test for balance assessment on a static surface. The test provides a generalized assessment of how well an individual can integrate various senses with respect to balance and compensate when one or more of those senses are compromised. The CTSIB with consist of four, 30 second tests; Condition 1 – eyes open firm surface, Condition 2 – eyes closed firm surface, Condition 3 – eyes open on a dynamic surface, Condition 4 – eyes closed on dynamic surface. Of the two tests on a firm surface, both genders scored the worse on condition 1. However, females demonstrated 47.50 % more sway, then the males. Results from this study suggest that college males have superior balance to females.

1. Introduction

Balance is defined as the ability to maintain the center of gravity of a body within the body of support with minimal postural sway. Nearly 8 million American adults have reported experiencing problems with balance. Maintaining balance involves complex coordination & integration of multiple sensory, motor and biomechanical components. Body position is sensed in relation to gravity and environmental surroundings. The sense must detect changes of body position with respect to the base, regardless of whether the body moves or the base moves.

The nervous system accesses preprogrammed strategies to simplify movement, like a database for motor memories. The central nervous system works with groups of muscles that respond in a repeatable sequence that have been successful to maintain stability in the past. A person's ability to access these stored repeatable sequences allows the nervous system to determine a motor reaction in response to sensory input. These reactions are automatic and sometimes referred at as muscle memory.

Balance in older adults and those with neurological conditions have been widely studied [1], with very few publications assessing healthy college-aged individuals. Several publications looking at balance have suggested there may be a significant difference between males and females [2,3,4], with females displaying better balance that there male counterparts. However, the participants in these studies are primarily children [2] or older adults [3]. The purpose of this study was to follow similar balance protocols as the previous publications and assess whether the results are the same for college-aged individuals.

2. Experiment, Results, Discussion and Significance

Sixteen college students, seven males and nine females, 21-26 years of age, participated in a CTSIB test. The same sixteen volunteer, college student were informed of all experimental procedures and risks involved. Subjects completed a current health status questionnaire and an informed consent form approved by Wichita State University IRB. Demographic and anthropometric data including subject's age, height, and body mass were collected. Next, students participated in a familiarization of the CTSIB test on balance, with the Balance System SD (Biodex). The Clinical Test of Sensory Interaction and Balance (CTSIB) is standardized test for balance assessment on a static surface. The test provides a generalized assessment of how well an individual can integrate various senses with respect to balance and compensate when one or more of those senses are compromised. The CTSIB consists of four, 30 second tests; *Condition 1* – eyes open firm surface (baseline: incorporates visual, vestibular and somatosensory inputs), *Condition 2* – eyes closed firm surface (eliminate visual input to evaluate vestibular and somatosensory inputs), *Condition 3* – eyes open on a dynamic surface (used to evaluate somatosensory interaction with visual input), *Condition 4* – eyes closed on dynamic surface (used to evaluated somatosensory interaction with vestibular

input). Standard instructions were provided for each of the four CTSIB tests. Results were presented relative to the upper limit of the "normal" reference data. All subjects' results will be superior, equal, or inferior to normal.

Sway index is the standard deviation of the stability index. The higher the sway index, the move unsteady the person proved to be during the test. The Sway Index is an objective quantification of what commonly is done with a time-based pass/fail for completing the CTSIB stage in 30 seconds without falling, or assigning a value of 1 to 4 to characterize the sway (1= minimal sway, 4 = a fall). The Stability Index is the average position from center. The Stability index does not indicate how much the person swayed, only their position. By utilizing sway index, we were able to calculate the outcomes for each of the subjects' four CTSIB tests.

Results show that both males and females illustrated inferior skills, under condition 3, in which, males performed 23.93 % superior to the females. Of the two, firm surface tests, both genders scored inadequately on condition 1. Females demonstrated 47.50 % inferior to the males. In addition, results indicated that both, males and females, illustrated their peak test scores under condition 2, with only a 23.30% difference between the two.

3. Conclusions

Results from this study suggest that college males have superior balance to college females based on the CTSIB tests, subjects performed. These findings are different from the previous published studies using young and older adults. When compared to similar studies, results suggest that females have greater balance during childhood and as older adults and males may have better balance during there 20's. However, this study was only able to assess 16 subjects and many more would be necessary to confirm these conclusions. Additional research of balance in college-aged, male and female students is needed to support an equivalent baseline for future studies.

References

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