CHANGES IN CENTER OF PRESSURE DYNAMICS RELATED TO BASE OF SUPPORT TO QUANTIFY POSTURAL STABILITY

Emily Caswell

College of Engineering
Natural Sciences & Engineering Poster Presentation

Abstract: Postural stability can be assessed using a variety of observational tests, including the Romberg Static Balance Test. Such observational tests are subjective, relying on the visual observations of the test facilitator. In contrast, use of the force plate system provides a quantifiable method of recording the center of pressure (COP) trajectory during standing balance trials to assess postural stability. This study aims to assess the validity of the assumptions that during successful balance, the COP exists within the base of support (foot/shoe), and a COP deviation outside the base of support signifies a loss of postural control via a tap or step with the non-balancing foot. These assumptions are evaluated in attempt to provide another objective and quantifiable method of analyzing postural stability. For this study, 15 subjects performed a modified Romberg static balance test while the test facilitator recorded any instance and times of loss of postural control via taps or steps with the non-balancing foot. Balancing trials were performed while the force plate system collected quantitative ground reaction force data. Reflective markers placed on the perimeter of the subject's shoes outline the base of support within the force plate system. The COP is traced with respect to the area of base of support outlined by the markers, and using an opensource algorithm, times are identified for which the COP deviates outside the perimeter of the base of support. The results of this analysis will be compared to video footage of the balancing trials performed to determine if the derived times correspond to visually identified loss of balance. This study is a probative first step in evaluating the potential for further research on quantifying postural stability using the relationship between COP dynamics and base of support; such explorations could provide insight into neurological issues associated with postural control problems.

Faculty Mentor: *Dr. Nils Hakansson*