

Trial Reliability of Postural Stability Measures using the MatScan® System: A Platform Based Pressure/Force Measurement Tool

King, MA¹, Boucher, JP², Bowers, R¹: Plymouth State University, Plymouth, NH¹; University of Montreal, Quebec²

INTRODUCTION

Postural stability measures may reflect neuromuscular and biomechanical imbalances. The MatScan® System (Tekscan) is a pressure/force sensing floor mat capable of measuring the translation of the center of force over time. Two calculated variables, area (cm²) and distance (cm) have previously been used to discriminate between subject populations with different biomechanical presentations of pelvic neutral and anterior pelvic inclination (King and Boucher, 2003). Area represents the translation of the center of force (COF) using x and y excursions and the formula for an ellipse. Area is thought to reflect postural sway. Distance represents the total excursion of the center of force across a selected duration of time (calculated using the Pythagorean Theorem) and reflects overall postural adjustments.

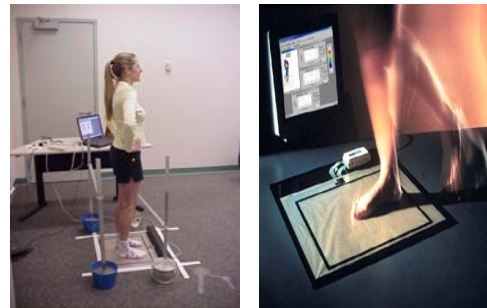
PURPOSE

Determine the trial reliability of the postural stability measures of area and distance during a two footed stance, using the MatScan® System (Tekscan).

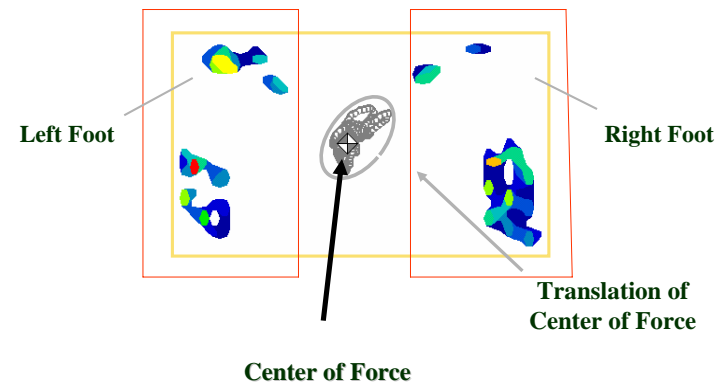
METHODS

A repeated measures design was used in this study with subjects in a two footed static stance for a total of 30 seconds. Testing occurred in a controlled laboratory setting in a single session.

Subjects: Twenty-one healthy subjects (11 males and 9 females; mean age = 22.75 ± 3.18 years, mean height = 170.35 ± 6.28 cm., mean weight = 70.66 ± 12.52 kg.) participated in this study.



Measurements: Subjects stood in static stance for three, 30 seconds trials, under two counter balanced conditions of eyes opened and eyes closed. The force data was collected at 40 Hz. using the MatScan® System (Tekscan). COF displacement was quantified and the two variables of area and distance were calculated. ICC's (2,1) were calculated according to Shrout and Fleiss (1979).



RESULTS

Results: The ICCs (2,1) for Area were 0.66 for eyes open and 0.45 for eyes closed. Distance reliability was 0.87 for eyes open and 0.84 for eyes closed.

DISCUSSION

The variable Distance demonstrated good reliability for both conditions of eyes opened and eyes closed. The variable Area showed poor reliability. However, the Area values appear to be fairly homogeneous, for example, with trial standard deviations (eyes closed) of 0.95, 1.49 and 2.25 cm² as compared to the trial standard deviations of Distance (eyes closed) of 15.56, 14.11 and 17.75 cm. Thus the reduced reliability for area may be due to the homogeneity of the sample population tested.

CONCLUSIONS

Further investigation is required. Increasing the heterogeneity and number of the subject is warranted. Additionally, establishing criteria for acceptable trials, perhaps based on the coefficient of variation should be explored.