

Relationship between Physical Elements and Locomotive Ability in Elderly

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Context: Locomotive abilities such as walking speed and/or step length in elderly is shown to be related to the length of health expectancy. Walking is a complex movement involving several systems, primarily musculoskeletal and nervous systems, and investigating their relationship with locomotive ability may help develop the effective training program to improve such ability. Our purpose is to reveal the physical elements related to the locomotive ability in elderly by conducting the series of tests that measures physical fitness including locomotive ability.

Design: Cross-sectional study. Participants were over 65 years old who have no restrictions to perform physical activity. All the measurement was done in indoors.

Setting: All works were conducted in a strength and conditioning room.

Subjects: Twenty-one elderly (72.4±4.0 years old; 8 men and 13 female) had participated in the study.

Interventions: Maximum walking speed (MWS) and 2-step test (maximum distance (2STMD) and 2-step score) were measured to determine participant's locomotive ability. In addition, we conducted a series of tests to determine the physical fitness elements that may be related to the locomotive ability are; body composition (body weight, body fat percentage, muscle mass from individual parts), flexibility (sit-and-reach (SR), hip extension), lower-body strength (chair stand test), lower-body power (broad jump). Muscle mass is standardized with subject's height. In order to exclude the influence of age width in the result, partial correlation coefficient with age as a control variable was calculated and the correlation of each corresponding value was examined. P value was set at 0.05.

Main Outcome Measures: We examined the variables that are related to the locomotive ability.

Results: Significant positive correlations were found between following measurements related to the locomotive abilities; 2STMD and muscle mass from

individual parts ($r = 0.547-0.653$, $p = 0.002-0.013$), 2STMD and MWS ($r = 0.459$, $p = 0.042$), and MWS and broad jump ($r = 0.607$, $p = 0.005$). Significant negative correlations were found between following measurements related to the locomotive ability; 2STMD and SR ($r = -0.564$, $p = 0.010$). In addition, significant positive correlations were found between SR and 1-leg chair stand test from right and left leg ($r = 0.488$, $p = 0.029$ and $r = 0.454$, $p = 0.045$, respectively),

Conclusion: From our results, it was suggested that powerful movement such as broad jump is moderately related to the locomotive ability, especially walking speed. Also, the positive relationship between SR and 1-leg chair stand test score implies the decreased hip range of motion and the lack of postural control that suggest the deficiency of gluteus muscle activation. To improve locomotive ability in elderly, they may need to improve flexibility and balance in addition to the muscle strength, suggesting the importance of strength and conditioning program.