

176

RELATIONSHIP BETWEEN MUSCLE STRENGTH AND POSTURAL STABILITY IN OLDER ADULTS DURING GAIT: PRELIMINARY RESULTS

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Background: During functional tasks such as walking, there is a disturbance of postural stability, which can result in falls, which bring functional impairment to the older adults. It is attributed that muscle strength can contribute to postural stability in gait, but it is unclear which muscle groups contribute most to postural stability in gait when it is assessed using the Functional Gait Assessment (FGA).

Objectives: The purpose of the study was to investigate whether handgrip, trunk extensor, hip extensor and abductor, knee extensor, and plantar flexor muscle strengths are related to postural stability in gait in community-dwelling older adults people assessed using the FGA.

Methods: A cross-sectional observational study with community-dwelling older adults (60 years or older) of both sexes, with independent gait and recruited by convenience. Muscle strength (maximum isometric contraction) of handgrip (Jamar dynamometer), trunk extensors, hip extensors and abductors, knee extensors and plantar flexors, normalized by body weight (microFET2 hand dynamometer) on the dominant side was evaluated. Postural stability during gait was assessed by the Functional Gait Assessment (FGA) scale. Pearson (r) and Spearman (rho) analyses were used to verify the correlation between variables considering data distribution. The significance level was set at 5%.

Results: Sixty-six older adults subjects were evaluated with a mean age of 73.70 (± 7.8) years. The descriptive characteristics of the sample were mean $\pm$ standard deviation: FGA (21.71 $\pm$ 5.37) score, grip strength (21.56 $\pm$ 8.43 kilogram-force), muscle strength of trunk extensors (2.32 $\pm$ 0.93 Newton/weight), hip extensors (1.10 $\pm$ 0.56 Newton/weight), hip abductors (2.27 $\pm$ 0.87 Newton/weight), knee extensors (2.56 $\pm$ 1.18 Newton/weight) and plantar flexors (3.22 $\pm$ 1.52 Newton/weight). All muscle strength variables showed moderate and positive correlation with postural stability in gait, being palmar grip strength ($p=0.001$, $r=0.43$), trunk extensor muscle strength ($p=0.001$, $r=0.50$), hip extensors ($p=0.001$, $\rho=0.56$), hip abductors ($p=0.001$, $r=0.51$), knee extensors ($p=0.001$, $\rho=0.56$) and plantar flexors ($p=0.001$, $\rho=0.44$).

Conclusion: According to the results, the higher the muscle strength parameters, the greater the postural stability during gait. Thus, muscular strength should be evaluated in this population as a modifiable factor, and the continuity of the study with an increased sample is necessary to confirm the results.

Implications: From the results, we highlight the importance of the relationship between muscle strength and postural stability in the gait of community-dwelling older adults when it is assessed by a reliable and valid instrument. Future studies need to investigate whether changes in muscle strength can generate improvements in postural stability when it is assessed by FGA.

Keywords: Muscle strength, Postural stability, Older adults

Conflict of interest: The authors declare no conflict of interest.

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177

ASSOCIATION BETWEEN LOWER LIMB STRENGTH AND TRUNK STABILITY IN UPPER LIMB FUNCTIONAL CAPACITY

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Background: The pursuit of better athletic performance has become frequent in sports practice. Therefore, it is fundamental to use functional tests in the evaluation process to assess functional capacity and implement more assertive interventions. The Closed Kinetic Chain Upper Extremity Stability Test (CKCUEST) is a test that evaluates upper limb performance and is consolidated as a reliable measure for clinical application. It is known that various factors such as muscle activation, flexibility, trunk stability, and lower limb strength can influence shoulder complex movement efficiency. However, the relationships between functional tests in identifying or measuring factors related to upper limb performance have not been clarified in the literature.

Objectives: To identify whether trunk and lower limb strength factors predict upper limb functional capacity.

Methods: The database of the Physiotherapy Assessment Tool (PHAST) application was used for the development of this study. Thirty-six healthy participants of both sexes, aged between 25 and 62 years, were included, containing evaluation records with information on performance in CKCUEST, Scapulohumeral Rhythm, Shoulder Strength External, Lateral Rotation Range of Motion, Prone Bridge Test, Pelvic Elevation, Latissimus Dorsi Flexibility and Pectoralis Minor Muscle Tightness, and Torque Knee Isokinetic. Multiple linear regression analysis was performed to identify whether trunk stability and lower limb strength could explain upper limb performance and functional capacity.

Results: The results revealed a statistically significant model for, Scapulohumeral Rhythm, Shoulder Strength External, Lateral Rotation Range of Motion, Prone Bridge Test, Pelvic Elevation, Latissimus Dorsi Flexibility and Pectoralis Minor Muscle Tightness, and Pelvic Elevation predicting 46% of CKCUEST performance ($F=7.28$, $R=0.684$, $R^2=0.468$, $P=0.008$). Additionally, the inclusion of Hamstring Torque in the model ($F=8.27$, $R=0.735$, $R^2=0.541$, $P=0.003$) predicted 54% of CKCUEST performance. No other associations were observed.

Conclusion: Scapulohumeral Rhythm, Shoulder Strength External, Lateral Rotation Range of Motion, Prone Bridge Test, Pelvic Elevation, Latissimus Dorsi Flexibility and Pectoralis Minor Muscle Tightness, and Pelvic Elevation with Hamstring Torque Strength, partially predicted performance in CKCUEST.

Implications: The findings of this study suggest that clinicians should use lower limb strength and trunk and pelvis stability tests as a complement to shoulder evaluation. Additionally, future studies should investigate the influence of other factors associated with these functional tests.

Keywords: Injury Prevention, Upper Limb, Kinetic Chains

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