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Embong, J.^a, Justine, M.^b, Mustapa, A.^c, Bukry, S.A.^a, Rosadi, R.^d, Manaf, H.^{b e}

CORRELATIONS BETWEEN FUNCTIONAL BALANCE AND GAIT PARAMETERS DURING TIMED UP AND GO TEST UNDER DUAL-TASK CONDITIONS AMONG OLDER ADULTS

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^a Department of Physiotherapy, Hospital Kuala Lumpur, Kuala Lumpur, Malaysia

^b Centre for Physiotherapy Studies, Faculty of Health Sciences, Universiti Teknologi MARA, Puncak Alam Campus, Selangor, Puncak Alam, 42300, Malaysia

^c Department of Physical Rehabilitation Sciences, Kulliyah Allied Health Sciences, International Islamic University Malaysia, Pahang, Kuantan, 25200, Malaysia

^d Physiotherapy Department, University of Muhammadiyah Malang, Indonesia

^e Integrative Pharmacogenomics Institute, Universiti Teknologi MARA, Puncak Alam Campus, Selangor, Puncak Alam, 42300, Malaysia

Abstract

The combination of physical, cognitive, and sensory challenges can make outdoor walking difficult for older adults. This study aimed to determine whether the gait parameters during the Timed Up and Go (TUG) test under dual-task conditions correlate with the functional balance level. A total of 255 older persons participated in this cross-sectional study. Functional balance was assessed using the Berg Balance Scale (BBS) before the TUG test. The TUG test was conducted under single- and two dual-task conditions (dual-motor and dual-cognitive). The time and number of steps were used to quantify gait parameters. Spearman's rank correlation coefficient was used to assess the relationship among variables. The gait parameters (time and number of steps) of the TUG test were significantly different between task conditions (both, $p = 0.001$). Post hoc analysis with the Wilcoxon signed-rank test showed that the gait parameters in dual-motor and dual-cognitive tasks were significantly longer than in single-task conditions ($p = 0.001$). A strong negative rank correlation was found between the time and the number of steps taken to complete the single task condition and functional balance ($p = 0.001$). There was a low negative correlation between the time taken to complete the dual-motor task and dual-cognitive task conditions and functional balance. These findings suggest that functional balance may be an influential domain of successful dual-task TUG in older adults. © 2023, Faculty of Medicine, University of Malaya. All rights reserved.

Author Keywords

Aged; Attention; Gait; Postural Control

Index Keywords

aged, article, attention, Berg Balance Scale, cognition, controlled study, correlation coefficient, cross-sectional study, female, gait, human, human experiment, male, post hoc analysis, quantitative analysis, timed up and go test, Wilcoxon signed ranks test

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References

- (2007) *WHO Global Report on Falls Prevention in Older Age*, Geneva: World Health Organization; Accessed 3 January 2023
- Yokota, M, Fujita, T, Nakahara, S, Sakamoto, T.
Clarifying differences in injury patterns between ground-level falls and falls from heights among the elderly in Japan
(2020) *Public Health*, 181, pp. 114-118.
- Lee, YG, Kim, SC, Chang, M
Complications and socioeconomic costs associated with falls in the elderly population
(2018) *Ann Rehabil Med*, 42 (1), pp. 120-129.

- Susilowati, IH, Nugraha, S, Sabarinah, S, Peltzer, K, Pengpid, S, Hasiholan, BP.
Prevalence and risk factors associated with falls among community-dwelling and institutionalized older adults in Indonesia
(2020) *Malaysian Fam Physician*, 15 (1), pp. 30-38.
- Lee, JH, Ahn, EM, Kim, GE
The Effects of Falling and Fear of Falling on Daily Activity Levels in the Elderly Residing in Korean Rural Community
(2009) *J Korean Geriatr Soc*, 13 (2), pp. 79-88.
- Kioh, SH, Rashid, A.
The prevalence and the risk of falls among institutionalised elderly in Penang, Malaysia
(2018) *Med J Malaysia*, 73 (4), pp. 212-219.
- Sahril, N, Shahein, NA, Yoep, N
Prevalence and factors associated with falls among older persons in Malaysia
(2020) *Geriatr Gerontol Int*, pp. 33-37.
Suppl 2
- Romli, MH, Tan, MP, Mackenzie, L, Lovarini, M, Suttanon, P, Clemson, L.
Falls amongst older people in Southeast Asia: a scoping review
(2017) *Public Health*, 145, pp. 96-112.
- Manaf, H, Justine, M, Omar, M.
Functional balance and motor impairment correlations with gait parameters during timed up and go test across three attentional loading conditions in stroke survivors
(2014) *Stroke Res Treat*,
- Viswanathan, A, Sudarsky, L.
(2012) *Balance and Gait Problems in the Elderly*, 103.
1st ed. Elsevier B.V
- Manuel, L, Sousa, M, Maria, C
Revista Gaúcha de Enfermagem Systematic Review Risk for falls among community-dwelling older people: systematic literature review
(2016) *Rev Gaúcha Enferm*, 37 (4), pp. 1-9.
- Lee, S, Lee, C, Ory, MG.
Association between recent falls and changes in outdoor environments near community-dwelling older adults' homes over time: Findings from the NHATS study
(2019) *Int J Environ Res Public Health*, 16 (18).
- Neuls, PD, Clark, TL, Van Heuklon, NC
Usefulness of the Berg balance scale to predict falls in the elderly
(2011) *J Geriatr Phys Ther*, 34 (1), pp. 3-10.
- Shumway-Cook, a, Brauer, S, Woollacott, M.
Predicting the probability for falls in community-dwelling older adults
(2000) *Phys Ther*, 80 (9), pp. 896-903.
- Muir, SW, Berg, K, Chesworth, B, Speechley, M.
Use of the Berg Balance Scale for predicting multiple falls in community-dwelling elderly people: A prospective study
(2008) *Phys Ther*, 88 (4), pp. 449-459.
- Nightingale, CJ, Mitchell, SN, Butterfield, SA.
Validation of the timed up and go test for assessing balance variables in adults aged 65 and older
(2019) *J Aging Phys Act*, 27 (2), pp. 230-233.

- Tomas-Carus, P, Biehl-Printes, C, Pereira, C, Vieiga, G, Costa, A, Collado-Mateo, D.
Dual task performance and history of falls in community-dwelling older adults
(2019) *Exp Gerontol*, 120, pp. 35-39.
(January)
- Manaf, H, Justine, M, Ting, G, Latiff, L.
Comparison of gait parameters across three attentional loading conditions during timed up and go test in stroke survivors
(2014) *Top Stroke Rehabil*, 21 (2), pp. 128-136.
- Lima, CA, Ricci, NA, Nogueira, EC, Perracini, MR.
The Berg Balance Scale as a clinical screening tool to predict fall risk in older adults: a systematic review
(2018) *Physiother (United Kingdom)*, 104 (4), pp. 383-394.
- Viveiro, LAP, Gomes, GCV, Bacha, JMR
Reliability, Validity, and Ability to Identify Fall Status of the Berg Balance Scale, Balance Evaluation Systems Test (BESTest), Mini-BESTest, and Brief-BESTest in Older Adults Who Live in Nursing Homes
(2019) *J Geriatr Phys Ther*, 42 (4), pp. E45-E54.
- Sheridan, PL, Solomont, J, Kowall, N, Hausdorff, JM.
Influence of Executive Function on Locomotor Function: Divided Attention Increases Gait Variability in Alzheimer's Disease
(2003) *J Am Geriatr Soc*, pp. 1633-1637.
- Dubost, V, Kressig, RW, Gonthier, R
Relationships between dual-task related changes in stride velocity and stride time variability in healthy older adults
(2006) *Hum Mov Sci*, 25 (3), pp. 372-382.
- Hausdorff, JM.
(2005) *Gait variability: methods, modeling and meaning Example of Increased Stride Time Variability in Elderly Fallers Quantification of Stride-to-Stride Fluctuations*, 9, pp. 1-9.
- Beavers, KM, Beavers, DP, Houston, DK
Associations between body composition and gait-speed decline: Results from the Health, Aging, and Body Composition study1-4
(2013) *Am J Clin Nutr*, 97 (3), pp. 552-560.
- Commandeur, D, Klimstra, MD, MacDonald, S
Difference scores between single-task and dual-task gait measures are better than clinical measures for detection of fall-risk in community-dwelling older adults
(2018) *Gait Posture*, 66, pp. 155-159.
- Allali, G, Kressig, RW, Assal, F, Herrmann, FR, Dubost, V, Beauchet, O.
Changes in gait while backward counting in demented older adults with frontal lobe dysfunction
(2007) *Gait Posture*, 26 (4), pp. 572-576.
- Al-Yahya, E, Dawes, H, Collett, J
Gait adaptations to simultaneous cognitive and mechanical constraints
(2009) *Exp Brain Res*, 199 (1), pp. 39-48.
- Valkanova, V, Esser, P, Demnitz, N
Association between gait and cognition in an elderly population based sample
(2018) *Gait Posture*, 65, pp. 240-245.
- Lin, MIB, Lin, KH.
Walking while performing working memory tasks changes the prefrontal cortex hemodynamic activations and gait kinematics

(2016) *Front Behav Neurosci*, 10.
(MAY)

- Vance, RC, Healy, DG, Galvin, R, French, HP.
Dual tasking with the timed “Up & Go” test improves detection of risk of falls in people with Parkinson disease
(2015) *Phys Ther*, 95 (1), pp. 95-102.
- Manaf, H, Justine, M, Ting, G, Latiff, L.
Comparison of gait parameters across three attentional loading conditions during timed up and go test in stroke survivors
(2014) *Top Stroke Rehabil*,
- Almeida, OP, Hankey, GJ, Yeap, BB, Golledge, J, Hill, KD, Flicker, L.
Depression Among Nonfrail Old Men Is Associated With Reduced Physical Function and Functional Capacity After 9 Years Follow-up: The Health in Men Cohort Study
(2017) *J Am Med Dir Assoc*, 18 (1), pp. 65-69.
- Manaf, H, Justine, M, Goh, HT.
Effects of Attentional Loadings on Gait Performance Before Turning in Stroke Survivors
(2015) *PM&R*, 7 (11), pp. 1159-1166.
- Herman, T, Mirelman, A, Giladi, N, Schweiger, A, Hausdorff, JM.
Executive control deficits as a prodrome to falls in healthy older adults: A prospective study linking thinking, walking, and falling
(2010) *Journals Gerontol-Ser A Biol Sci Med Sci*, 65 A (10), pp. 1086-1092.

Correspondence Address

Manaf H.; Centre for Physiotherapy Studies, Puncak Alam Campus, Selangor, Malaysia; email: haidzir5894@uitm.edu.my

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