Original Article

The Time Up & Go Test to Evaluate the Change in Functional Mobility in Post-Stroke Patients

Mehwish Khan[1], Muhammad Fahad Khan[1], Dr Barirah Muneer[1], Amber Shakoor[2], Muhammad Ammar Naveed[3], Muhammad Shahid Shabbir[4], Hanaz Azfar[5].

[1]Jinnah Sindh Medical University, Lahore, Pakistan.
[2]University of Lahore, Gujrat Campus, Pakistan.
[3]Shaheed Zulfiqar Ali Bhutto Medical University, Islamabad, Pakistan.
[4]Zohra Institute of Health Sciences, Rawalpindi, Pakistan.
[5]Al-Shifa Future Hospital, Gujranwala, Pakistan.

ARTICLE INFO

*Corresponding Author:

Mehwish Khan
Jinnah Sindh Medical University, Lahore, Pakistan
Mehwishkhan1212@gmail.com

ABSTRACT

Responsiveness depends on properties of statistical analysis, commonly referred to being as, distribution-based responsiveness. Time Up and Go Test (TUG) is a common assessment to evaluate the mobilization in patients with complications pertaining to stroke. **Objective:** The major emphasis of this study was to analyse the improvement in functional mobility of the patients with symptoms related to stroke. **Methods**: This study is carried out in Fauji Foundation Hospital and National Institute of Rehabilitation Medicine (NIRM), Islamabad Pakistan. Sample size consisted of 116 patients including both genders, with age ranging between 45-65 years. Clinically, the diagnosis of stoke can be concluded in compliance with reported criteria and standards of World Health Organization (WHO). Out of total 116 sample size 25 were excluded and 91 patients were assessed to detect mobility response by using TUG test, pertaining to four different intervals. The overall procedure implemented for the conclusion of TUG test included the following points; a) patients were advised to stand on toes, b) walk 3 meters, c) turn around and walk back to the chair from which they initially started, and d) asked to sit down quickly. **Results:** Between the first 7 days and 12 weeks the median of TUG test, time (mobility) was reduced from 17s to 12s. The improvement in mobility is most seen in 1st week to 3rd month. **Conclusion:** Findings indicate that the TUG test is capable to evaluate the change in functional mobility in patients with stroke. Hence, the outcomes justify the use of TUG in stroke rehabilitation.

INTRODUCTION

After suffering from stroke, patients tend to suffer with limitations of physical activities resulting in restriction in daily physical motion [1, 2]. Numerous effective scenarios and mediums are required to evaluate the post-stroke patient movement for the provision of effectual stroke rehabilitation. The Time Up and Go Test (TUG) is considered to be a common assessment applied for the evaluation of complete patient mobilization with complications related to mobilization. The fundamental function of the test is to comprehend, whether there is any post-stroke mobility improvement in patients after three months or not [3]. While talking about physical performance evaluative systems, including gait speed, 4-minute walk, and TUG, with the last one being the most reliable and valid as compared to others. The TUG test has also been reported for the treatment of Cognitive Impairment (CI) in elderly personnel. Upon performing a walking activity to establish balance and avoid falls, numerous cognitive domains, including awareness, memory, visual spatial capacity, and executive capabilities are all contested. Even though, the

309

TUG test in considered to be simple, the conclusion of the test requires consolidation of multiple bodily systems, making it a complicated procedure. The utilization of normative data pertaining to a specific population is required for more validated and authentic interpretation of the TUG results [4, 5, 6]. Based on multiple studies, the risk of fall and the physical mobility of the patients with post-stroke symptoms have been assessed by using different mobility assessment procedures. TUG was reported to be one of the most effective process that can be used for this purpose [7, 8]. The primary focus of the study was to assess the improvement in functional mobility through the TUG test during the early three-months of evaluation and the secondary objective was to analyse the longitudinal change in mobility within one year.

METHODS

This study was carried out in Fauji foundation Hospital and National Institute of Rehabilitation Medicine (NIRM), Islamabad Pakistan. Total Sample size was 116 stroke patients, out of which 25 patients were excluded. Both genders male and female were included with age ranging between 45-65 years. Clinically, the diagnosis of stoke can be concluded in compliance with reported criteria and standards of World Health Organization (WHO) [9]. A couple of patients were excluded in adherence to the exclusion criteria, which included other pathologies like leg amputation and complications that can interfere with mobilization and assessment process. Consent form was signed by patients and they were informed about the study objectives and study tool [10]. Out of total 116 sample size 91 patients were assessed to detect mobility by TUG test on four different time intervals. 1st measurement was taken during 1st week after stroke [11]. The overall procedure implemented for the conclusion of TUG test included the following points; a) patients were advised to stand on toes, b) walk 3 meters, c) turn around and walk back to the chair from which they initially started, and d) asked to sit down quickly [12]. Those patients who need walking assistance provided walking aid but no physical aid was given. Follow-up time for assessment by using Time up and Go test at 3rd, 6th and 12 months after stroke [13]. Analysis was done via SAS, 9.3 version. P <0.05 was considered to be significant. Analysis for assessment was carried out for one year, from 1st week post-stroke to 1-year post stroke. The non-parametric sign-test, the parametric t-test, and a mixed typical method to linear regression for repetitive quantities (Proc mixed) were used for the statistical analysis.

RESULTS

Between the first 7 days and 12 weeks, the median of TUG time (mobility) reduced from 17s to 12s. The improvement in mobility is most seen in 1st week to 3rd month. After 3rd month TUG test time didn't show any notable significance.

Results	Impact	0-3 Months	3-6 Months	6-12 Months
Improved	Decrease Time up and Go test time (improvement)	51	28	24
	Unable to perform Time up and Go test	15	1	0
Unchanged	No change seen in Time up and Go test time	13	23	15
Increase Time up and Go test time (Detoriation)	Increased time taken to perform Time up and Go test	7	19	27

Table 1: Findings on TUG test, since first week to 3 months, 3 – 6 and, from 6 – 12 months' post-stroke

Results	1st week	12 weeks	24 weeks	48 weeks
	N=68	N=77	N=71	N=70
Mean+SD	17.0 + 11.0	14.5 + 10.0	14.2 + 9.4	14.7 + 9.8
Median (IQR)	13.0 (10.6-18.0)	11.0 (10.0-16.3)	11.5 (10.0-16.0)	12.0 (9.0-17.0)

Table 2: TUG stint, in moments, aimed at the stroke patients capable to do the assessment for every of the 4 intervals for valuation

DISCUSSION

Outcomes of current study indicate that TUG test is reactive assessment for detecting progress in functional movements after 3 months of stroke. Another factor which is important in stroke patients' assessment of mobility is responsiveness time [14]. Researches have revealed that patients by slow time of mobility in TUG test have an upper chance of fall afterward the stroke [15]. Current study findings by multiple model approach to liner deterioration indicated longitudinal changes in TUG period for diverse age clusters in post-stroke patients [16]. Primary factor is the resistance to initiate functional movement from three to twelve months in post stroke patients with age 80 years or older. After 12 months the patients showcased decline to the time level associated with TUG test as it was at first week of stroke. These findings justify the implication of time up and Go test in data of stroke rehabilitation [17]. Moreover, Knorr et al conducted a research on sensitivity to change TUG test time during three to eight months in 44 post-stroke patients with an age around 63 years. The outcomes of their study were significantly improved TUG test time with p value <0.010. Our research findings also indicate significant improvement in TUG test time in first week to 3 months [18]. Furthermore, duration of follow-up and time can mark the outcome. In a research with extended experimental time, usually patients suffer with bad health specifically if they are at an older age. Other factors are related to activity level and the therapy they received. These factors might be able to change the outcomes of current study and previous researches. 36% patients needed further rehabilitation at the time of

discharge. Intense training in rehabilitation of different ages of stroke patients can have great impacts on outcomes [19]. There are few limitations that confine the generalization of the outcomes. 22% patients in this study were excluded because they did not participate in the assessment of follow-up intervals. There could be biasness because most disable patients could not contribute in continuation. And, it is difficult to distinguish that the progress is due to sudden neurological recovery or improvement due to rehabilitation. TUG time also rely upon the strength of muscles and will power [20]. On the contrary side, current study had patients with stroke examined in the moderate stage and follow up was for 12 months. Furthermore, sample size was larger as compared to the previous studies. Findings of current study provide advance knowledge regarding to TUG in clinical rehabilitation of stroke patients. Outcomes also add knowledge in terms of retrieval in movement in stroke patients, generally and for different ages. As previous studies showed no significant impact of age on recovery and change in different age groups, presented as TUG time in post stroke patients.

CONCLUSION

Findings indicate that Time up and Go test is capable to evaluate the change in functional mobility in patients with stroke. Hence, the outcomes justify the use of TUG in rehabilitation of stoke.

REFERENCES

[1]   Hollands KL, Hollands MA, Zietz D, Wing AM, Wright C, van Vliet P. Kinematics of turning 180 degrees during the timed up and go in stroke survivors with and without falls history. Neurorehabilitation and Neural Repair. 2010 May; 24(4):358-67. doi: 10.1177/1545968 309348508.

[2]   Persson CU, Hansson PO, Sunnerhagen KS. Clinical tests performed in acute stroke identify the risk of falling during the first year: postural stroke study in Gothenburg (POSTGOT). Journal of Rehabilitation Medicine. 2011 Mar; 43(4):348-53. doi: 10.2340/165019 77-0677.

[3]   Buck D, Jacoby A, Massey A, Ford G. Evaluation of measures used to assess quality of life after stroke. Stroke. 2000 Aug; 31(8):2004-10. doi: 10.1161/01.str. 31.8.2004.

[4]   Ibrahim A, Singh DKA, Shahar S. 'Timed Up and Go' test: Age, gender and cognitive impairment stratified normative values of older adults. PLoS One. 2017 Oct; 12(10):e0185641. doi: 10.1371/journal.pone.0185641.

[5]   Schepker CA, Leveille SG, Pedersen MM, Ward RE, Kurlinski LA, Grande L, et al. Effect of Pain and Mild Cognitive Impairment on Mobility. Journal of American Geriatrics Society. 2016 Jan; 64(1):138-43. doi: 10.1111/jgs.13869.

[6]   Faria CD, Teixeira-Salmela LF, Neto MG, Rodrigues-de-Paula F. Performance-based tests in subjects with stroke: outcome scores, reliability and measurement errors. Clinical Rehabilitation. 2012 May; 26(5):460-9. doi: 10.1177/0269215511423849.

[7]   Batool S, Soomro N, Amjad F, Fauz R. To compare the effectiveness of constraint induced movement therapy versus motor relearning programme to improve motor function of hemiplegic upper extremity after stroke. Pakistan journal of medical sciences. 2015 Sep; 31(5):1167. Doi: 10.12669/pjms. 315.7910.

[8]   Sahin IE, Guclu-Gunduz A, Yazici G, Ozkul C, Volkan-Yazici M, Nazliel B, et al. The sensitivity and specificity of the balance evaluation systems test-BESTest in determining risk of fall in stroke patients. Neuro Rehabilitation. 2019; 44(1):67-77. doi: 10.3233/ NRE-182558.

[9]   Revicki D, Hays RD, Cella D, Sloan J. Recommended methods for determining responsiveness and minimally important differences for patient-reported outcomes. Journal of Clinical Epidemiology. 2008 Feb; 61(2):102-9. doi: 10.1016/j.jclinepi.2007.03.012.

[10]   Terranova TT, Simis M, Santos ACA, Alfieri FM, Imamura M, Fregni F, Battistella LR. Robot-Assisted Therapy and Constraint-Induced Movement Therapy for Motor Recovery in Stroke: Results From a Randomized Clinical Trial. Frontiers in Neuroro-botics. 2021 Jul; 15:684019. doi: 10.3389/fnbot.2021. 684019.

[11]   Craik RL. In Tribute: Janet H. Carr. Physical therapy. 2015; 95(1):6.. doi: 10.2522/ptj.2015.95.1.6.

[12]   Singha R. Motor Relearning Program versus Proprioceptive Neuro-Muscular Facilitation Technique for Improving Basic Mobility in Chronic Stroke Patients-A Comparative Study. International Journal of Physiotherapy and Research. 2017; 5(6):2490-500.

[13]   Min GU, Si-Wei LI, Bao-Jin LI, Cheng LI, Yun QU. Effect of motor relearning programme on motor function recovery of acute stroke patients with hemiplegia. Chinese Journal of Contemporary Neurology & Neurosurgery. 2017; 17(3):197. doi: 10.3969/j.issn. 1672-6731.2017.03.007

[14]   Farqalit R, Shahnawaz A. Effect of foot position during sit-to-stand training on balance and upright mobility in patients with chronic stroke. Hong Kong Physiotherapy Journal. 2013 Dec; 31(2):75-80. Doi:

10.1016/j.hkpj.2013.06.001.

[15] Balpande S, Qureshi MI, Iratwar S, Kovela R, Dadgal R, Phansopkar P, et al. Effectiveness of Motor Re-Learning Programme along with Functional Electrical Stimulation on Functional Mobility and Quality of Life in Subjects with Sub-Acute Stroke-An Experimental Study. Research square. 2021 Jun. doi.org/10.21203/rs.3.pex-1538/v1.

[16] Janssen W, Bussmann J, Selles R, Koudstaal P, Ribbers G, Stam H. Recovery of the sit-to-stand movement after stroke: a longitudinal cohort study. Neurorehabilitation Neural Repair. 2010 Oct; 24 (8):763-9. doi: 10.1177/1545968310363584.

[17] Viosca E, Lafuente R, Martínez JL, Almagro PL, Gracia A, González C. Walking recovery after an acute stroke: assessment with a new functional classification and the Barthel Index. Archives of Physical Medicine and Rehabilitation. 2005 Jun; 86(6):1239-44. doi: 10.1016/j.apmr.2004.11.015.

[18] Knorr S, Brouwer B, Garland SJ. Validity of the Community Balance and Mobility Scale in community-dwelling persons after stroke. Archives of Physical Medicine and Rehabilitation. 2010 Jun; 91(6):890-6. doi: 10.1016/j.apmr.2010.02.010.

[19] Yashin A, Akushevich I, Ukraintseva S, Akushevich L, Arbeev K, Kulminski A. Trends in survival and recovery from stroke: evidence from the National Long-Term Care Survey/Medicare data. Stroke. 2010 Mar; 41(3):563-5. doi: 10.1161/STROKEAHA.109.5723 39.

[20] Langhammer B, Stanghelle JK, Lindmark B. An evaluation of two different exercise regimes during the first year following stroke: a randomised controlled trial. Physiotherapy Practice. 2009 Feb; 25(2):55-68. doi: 10.1080/09593980802686938