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ORIGINAL ARTICLE

# MEASURING CAPACITY AND PERFORMANCES OF AMBULATION IN CLINICAL SETTING AND COMMUNITY SETTING IN PATIENTS WITH STROKE

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## ABSTRACT:

**Background**: Stroke is the leading cause of long-term disability among adults. Its consequences can be described in the context of impairments, activity limitations, and participation restriction as well as personal and environmental factors according to the International classification of functioning, disability and health (ICF formulated by the WHO). It is a common assumption that patients with stroke differ in their clinical & community setting performances, the latter being more challenging. However, this difference in performance is not quantified & documented. Hence this study is taken up to investigate the difference in capacity & performance of walking ability in patients with stroke with the help of the most commonly used scale of functioning mobility, i.e. Timed up & Go Test & 5 domains of ICF coding. **Method:** 45 samples were selected for the study by the purposive sampling method, who were ambulatory and able to walk a minimum 3 metres distance with or without assistance. The study design was an observational study. After approval of the ethical committee, the consent form was collected from the patients. Timed Up and Go Test was administered in two setups, clinical and community; time required to cover the distance was observed and recorded. 5 domains of ICF were also administered on patients. **Conclusion:** We conclude that there is no significant difference between capacity and performance of ambulation in a clinical setting and community setting in patients with stroke. But it was commonly observed that clinical setup time taken was slightly more compared to community setup.

**Keywords:** Timed Up and Go scale, ICF Domains, Stroke patients, ambulation, clinical set up and community set up

## INTRODUCTION:

Stroke is the leading cause of death and the leading cause of long-term disability among adults.[1] Its consequences can be described in the context of impairments, activity limitations, and participation restriction as well as personal and environmental factors according to the International classification of functioning, disability, and health (ICF formulated by the WHO).[2]

The prevalence of stroke has been reported to be high and approximately 90% of stroke survivors have some type of disability. According to WHO, 15 million people suffer from stroke worldwide each year; out of 5 million died and 5 million are permanently disabled. The estimated prevalence of stroke range, 84-262/1, 00,000 in rural & 334-424/1, 00,000 in the urban area in India. The prevalence of stroke in men (46.78/1, 00,000) was higher than in women (41.52/1, 00,000). It was similar in urban & rural area in Maharashtra. The incidence of decreases by 42% in high-income countries and greater than 100% increases in low middle-income countries. The rate of incidence on recent population in India is 119-145/1, 00,000.[3]

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Walking function in those who have sustained a stroke may range from complete dependence to independent walking ability. During the first week after a stroke, only a third of persons can walk unaided [4], but at 3 weeks or at hospital discharge, 50–80% of survivors can walk unaided and by 6 months, approximately 85% of stroke survivors are able to walk independently without physical assistance from another person. [5] Interestingly, while up to 85% of individuals with a stroke regain independent walking ability [5-6], only about 7% of persons discharged from inpatient rehabilitation could manage steps and inclines and walk the speeds and distances required to walk competently in the community.[6]

Postural instability is a common finding and is cited as the leading cause of falls and limited functional independence in stroke patients [7-8]. Posture or balance deficits are common mainly because the unaffected limb bears a greater proportion of the body weight.[9-10]

In hemiparetic patients, postural oscillation while standing upright is characterized by an asymmetric profile with larger oscillations on the paretic side than the nonparetic side and low temporal synchronization between oscillations of the lower limbs and the pelvis and between the lower limbs. Difficulty in stabilizing the pelvis and the distal segments of the lower limb on the affected side is reflected in the increase in the postural oscillation of hemiparetic patients.[11]

The correlations of balance and gait parameters are important for the assessment and rehabilitation of patients because a reliable correlation could mean that resources used to improve balance could also influence gait. In clinical practice, delay in therapy leads to poorer postural control among the left hemiparetic patients, but after one year has passed, and rehabilitation is finished, monitoring and comparing with right side hemiparetic is difficult. It would be interesting to discover the possible mechanisms involved in the control of posture, the regulation of skeletal muscle during gait, and the oscillations of the COG that maintain stability in hemiparetic patients. As the stroke sufferer's balance is impaired and can lead to consequences such as falls, knowing the questions related to balance and gait will be important in order for these two physical capabilities to be better understood in hemiparetic subjects. It is also believed that this will lead to a better direction regarding the rehabilitation of these patients.

Gait deviation is the most common symptom after stroke. An asymmetrical gait pattern increases muscular efforts. Community walking is the ability of the individual to walk in various Environment. Most of the Test performed in the clinical Environment does not reflect the different Environment in which the stroke patient usually ambulates daily. Also, the various gait training program of stroke patients includes treadmill walking, task-oriented training, obstacle walking. Such exercises are only done in the clinical setting, and the various environmental factors which are required in the community are not taken into consideration. Considering the goal of rehabilitation to be independent, functional ability during gait, it is important to understand the difference in capacity and performance.

Capacity and performance Lower extremity muscle strength and aerobic capacity are related to walking performance, which suggests a potential for endurance and resistance training in rehabilitation of walking performance in chronic hemiparesis after stroke. Correction for the influence of age, weight, and height providing normalized values improves the interpretation of the severity of impairments and enables comparisons between patients.[13]

It is a common assumption that patients with stroke differ in their performances in the clinical & community setting, the latter being more challenging. However, this difference in performance is not quantified & documented. Hence this study is taken up to investigate the difference in capacity & performance of walking ability in patients with stroke with the help of the most used scale of functioning mobility, i.e., Timed up & Go Test & 5 domains of ICF coding.

**METHODS**:

This is an Observational study with a duration was of 12 months. A total of 55 participants were recruited using the purposive sampling method from the Vikhe Patil Medical Hospital, Department of Neuroscience & Puntamba Centre. The Test used in this study is the "Timed Up & Go" Test. The inclusion criteria patients with stroke, patients who can walk for a minimum 3 meters with or without assistance, patients with normal higher mental functions. At the same time, the exclusion criteria were patients with cardiovascular and musculoskeletal problems.

**PROCEDURE:**

After approval from the Ethical Committee, a screening for exclusion & inclusion criteria was carried out. The patients of stroke were taken from the Vikhe Patil Medical Hospital, Department of Neuroscience, Ahmednagar, and Puntamba Stroke Centre. The consent form was taken from the patients. Orientation was given regarding the purpose, procedure and benefits of the study to the patients. The Test was conducted in two different setups one clinical setting to measure the capacity which was inside the clinic and the second was a community setting for measuring the performance, which was outside the clinic in an open Environment on the level surface of the ground. Instructions to the patient before the commencement of the Test was to walk barefoot in both setups and must turn from the affected side only while returning to the start point. The distance of 3 metres was marked in both the setups i.e. in the clinical setting and community setting on the ground surface level. The chair was placed at the starting point, and the cone was placed at the endpoint. The Test was started by instructing the patient with 'GO' and ended when the patient returned to the start point and seated in the chair Patient was instructed to turn at the endpoint from the affected side only, no rest period was given in between. The distance covered was recorded using a stopwatch, and meantime required was calculated. In case of any difficulty felt by the patients, the Test was terminated there itself and no test was performed further.The Test used in this study is the "Timed Up & Go" Test. The timed "Up & Go" Test, it is used to examine functional mobility deficits in patients with stroke. Healthy adults can complete the Test in less than 10 seconds; older adults (age 60 to 80) have also been shown to average scores less than 10 seconds (mean of 8). Scores of 11 to 20 seconds are considered typical for frail elderly or individuals with a disability; scores over 30 seconds are indicative of impaired functional mobility and high fall risk.

**Fig.no 1:** Clinical setup

**Fig.no 2:** Community setup

**RESULT:**

From data collected, we have analysed the capacity and performance of ambulatory patients with/without assistance by using TUG scores. Statistical analysis was done by Graphpad instant software. The data was entered into an excel spreadsheet, tabulated, and subjected to statistical analysis. Various statistical measures such as mean, SD and Pearson's correlation test were utilized to analyse the data.

**TABLE 1:**

| Gender | %(No of patients) |
|---|---|
| Male | 53% (24) |
| Female | 47% (21) |

The above table shows the demographics of A total 45 ambulatory participants of stroke with/without assistance were screened for considering the inclusion and exclusion criteria. Out of this gender-wise distribution, there was 53% male patients and 47% female patients. Also, 10 patients were walking with assistance, and 35 patients were walking without assistance and were eligible for study.

**TABLE 2:**

| GAIT PATTERN | % (No of patients) |
|---|---|
| With Assistance | 10 |
| Without Assistance | 35 |

The above table depicts the percentage values of gait pattern i.e with/without assistance in the study group.

**Graph No 2:** Shows the mean percentage of gait pattern i.e with/without assistance in the study group.

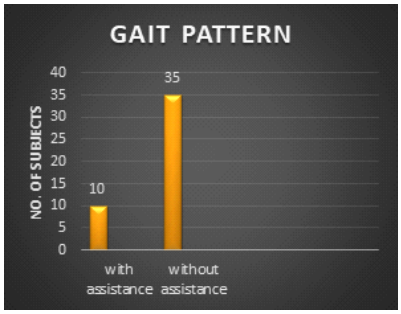
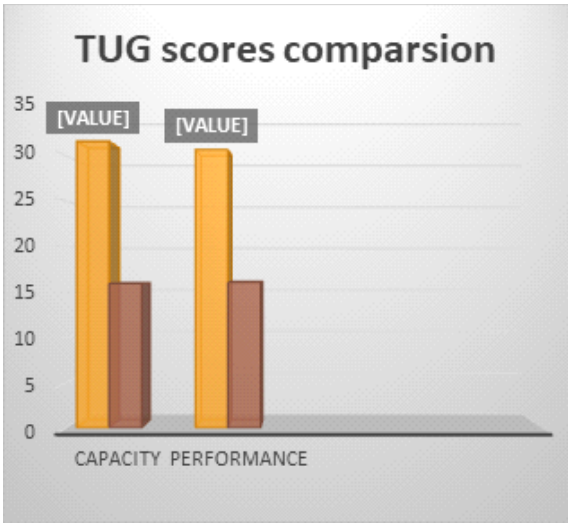



**TABLE 3 :** shows Mean ± SD and p-value of Capacity and Performance.

| Sr.No | | Mean ± SD | P-value | Significance |
|---|---|---|---|---|
| 1 | Capacity | 31.59±15.92 | 0.95 | Not Significant |
| 2 | Performance | 30.69±16.07 | | |

**Graph No. 3:** Shows the comparison between the capacity and performance of ambulation of patients with stroke in clinical and community setup.




**DISCUSSION:**

This study aimed at finding out the difference between the capacity and performance of ambulation in the clinical and community set up among patients with stroke. To accomplish the aim, the TUG scores were measured between the two setups was compared by calculating the difference. The difference was not related to hemiparesis but to the fear of falling; patients were asked to perform the Test with barefoot. Problem faced in clinical setting, the subject had a fear of fall due to presence of tiled flooring, as stated by the subjects, hence it was commonly observed in most of the patient's time required was more compared in clinical setup. In a community setting, the subject claimed of

having a better grip due to slightly uneven ground level surface, also less fear of fall compared to smooth tiled flooring of clinical setting, hence time required was less. As a result, it was found that the capacity of ambulation was slightly more than that of the performance of ambulation among the subjects.[15]

Also, it was observed that the patients with assistance walked a bit faster in clinical setting compared to the community setting. Hence their capacity measured was less than performance. It was commonly observed that more time was taken in the clinical setup.[16] It was observed that the patients had significantly more spastic and weaker plantar flexors, slower walking speed and poor walking endurance.[17-18] Tug scores were reliable and were able to differentiate.

The patients who walked with assistance in both the setups already had a fear of fall; hence due to the simulated Environment in the clinical setup they had less fear of fall compared to the open Environment i.e., community setup. As a result, the capacity of ambulation was less, and the performance of ambulation was more.

The probable reason for fear of fall in the clinical setting was the smooth tiled flooring as stated by the subjects, they didn't get a fine grip on the flat tiled floor due to that they walked slowly compared to the outside community environment. In community setup, the subjects walked on the uneven ground level surface due to that reason they got slight grip to their feet and walked a bit faster than the clinical setup. The patents walked with barefoot in both the setting. Also, most of the patients were from rural areas they had a habit of walking barefoot.

Strength studies also predict gait performance in patients with stroke, measurement of muscles strength has been clearly established as predictors of gait performance.[21]

Also, there is the effect of whole-body vibration on ankle plantarflexion spasticity and gait performance in patients with stroke.[19-20] Whole body vibration can significantly improve gait velocity. The uneven body posture on bilateral feet was also improved after vibration. Therefore, in some of the studies it has suggested that whole-body vibration training can reduce ankle plantarflexion spasticity in chronic stroke patients, thereby increases ambulatory capacity. [22]

It was observed that the patients had significantly more spastic and weaker plantar flexors, slower walking speed and poor walking endurance. [23]

But it was commonly observed that clinical setup time taken was more compared to community setup.

**LIMITATION:**

The major limiting factor in the present study was the smaller sample size. So further study can be done by taking a larger study group. In this study, the walkway used in the clinical and community set up was of 3m distance. Further studies can be done by increasing the walking distance or by changing the community environment instead of just an uneven level ground surface. Also, patients walking with footwear on and not with barefoot.

**CONCLUSION**:

From this study, we conclude that there is no significant difference between capacity and performance of ambulation in clinical setting and community setting in patients

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