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Functional Problems After Acute Stroke And The Recovery Status After 3 Months - A Cross-Sectional Study

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ABSTRACT

Introduction: Stroke survivors experience limitations in Basic and Instrumental activities of Daily living (ADLs), which have a significant impact. Over 50 % have motor problems but are not seeking physiotherapy. The independence of individuals is impacted by limiting activities like eating, walking, dressing, etcetera. Commonly used Functional Outcome measures have not been validated in India. So, we have taken the Indian Stroke Scale (ISS) (Gujarati Version) as an outcome measure.

Materials and Methods: A cross-sectional study was conducted in Anand city of Gujarat state, including 27 patients diagnosed with stroke. The initial assessment and pre-data (ISS) were taken within 7 days of incident of stroke and the post- data was taken after 3 months.

Results: We have found that 52 % of the patients have taken physiotherapy after getting discharged from the hospital. The patients who have not taken the therapy improved 35.38 % and those who have taken the therapy improved 42.5 % on ISS.

Discussion: The study revealed a 40% improvement in walking outside the home score at 3 months post stroke, confirming the recovery findings of in Literature. Additionally, 52% of subjects underwent physiotherapy treatment, resulting in functional improvement in walking, stair climbing, etc. indicating the benefits of physiotherapy.

Conclusion: The study found that patients initially faced functional problems such as standing without support, walking outside, climbing stairs, toileting, and attending social functions. The improvement in functional problems include getting out of bed, standing without support, walking, bathing, dressing, eating, and participating in social functions.

Keywords: Stroke, Functional Recovery, Indian population

INTRODUCTION

The World Health Organization (WHO) defines “Stroke” as a rapidly developing signs of focal (or global) disturbance of cerebral function with symptoms lasting for ≥24 hours or leading to death with no apparent cause other than vascular origin. The stroke is a collection of clinical syndromes which can result from ischemia in the cerebrum to intracranial hemorrhage. (1) In 2016, the Global Burden of Disease project in India recorded an estimated 1,175,778 new cases of stroke. The annual stroke incidence in India is estimated to be between 105 and 152 cases per 100,000 individuals, according to a recent systematic review that primarily relied on cross-sectional data. (2) Over the past decade, the incidence of stroke in India has significantly risen. This increase can be linked to various socio-economic changes that have influenced lifestyles, including reduced physical activity, higher consumption of processed foods, and greater workplace stress.

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These shifts have also contributed to the rise in risk factors such as type-2 diabetes, hypertension, obesity, and hyperlipidemia. Approximately 80% of all strokes in India are ischemic in nature. Additionally, strokes affect around 10% to 15% of individuals under the age of 40. Based on community survey data, Dalal et al. reported a crude prevalence rate of 200 cases per 100,000 population for stroke-induced hemiplegia in various parts of India. (3). Statistics indicate that in 2019, India experienced 1.29 million stroke incidents (95% UI 1.15–1.45) and 699,000 stroke-related deaths (95% UI 594,000–807,000). (4) The consequences of stroke can significantly limit survivors' independence and activity levels, reducing their ability to perform daily tasks and meet societal responsibilities. More than half of stroke survivors in India suffer from motor impairments yet do not receive physiotherapy services, presenting a major challenge. These impairments restrict activities such as dressing, walking, bathing, eating, cooking, shopping, and managing household chores, which impacts not only personal autonomy but also the overall quality of life for families. (5) The temporal progression following a stroke is often classified into specific phases as outlined by the Stroke Roundtable Consortium. These phases include the hyper-acute phase (first 24 hours), acute phase (first 7 days), early sub-acute phase (first 3 months), late sub-acute phase (months 4–6), and chronic phase (beyond 6 months). Shortly after the onset of cerebral ischemia, a series of plasticity-enhancing mechanisms occurs, resulting in dendritic growth, axonal sprouting, and the formation of new synapses. The most significant recovery typically occurs within the first few weeks' post-stroke, with progress often plateauing after three months, particularly for motor symptoms. (6) Ordinal scales are frequently used in Indian stroke rehabilitation research to assess body structure and function as outcome measures.

The reliability and validity of these scales range from 0.37 to 1.00 and 0.65 to 0.96, respectively. Among the most used outcome measures are the Modified Rankin Scale (m-RS) and Barthel Index. Nevertheless, there is a need to adapt and validate scales that assess activity limitations and participation to ensure they are culturally appropriate. It is worth noting that certain items on these scales may be understood differently in the Indian context. (7) According to earlier research, the common participation measures in stroke rehabilitation do not adequately address the unique post-stroke concerns of patients in non-Western countries like India. Indian stroke patients (38%–50%) reported that the information in these measures was "not a problem" or "not relevant" for them. Disparities in regional customs, lifestyles, and architectural settings have been blamed for this disparity. It is crucial to remember that non-Western cultural contexts, such as India, were not initially considered when developing these outcome measures. (8)

The Indian Stroke Scale (ISS) is a patient-reported outcome measure designed specifically to evaluate limitations experienced by stroke patients in India. It focuses on assessing activities that are both meaningful and culturally relevant to the patients' daily lives. With Cronbach's alpha score of 0.94, the scale has demonstrated excellent internal consistency. Additionally, confirmatory factor analysis results have demonstrated an acceptable goodness of fit. The scale has also shown robust construct validity and a high test-retest reliability, with an intraclass correlation coefficient of 0.80. It effectively distinguishes between patients with varying levels of disability severity, showing a mean difference of 34 (95% CI = 27 to 39).The ISS has shown a moderate correlation with the Barthel Index ($r = 0.59$, $p < .001$), the social participation domains of the Stroke Impact Scale ($r = 0.44$, $p < .001$), and the physical and instrumental activities of daily living ($r = 0.64$, $p < .001$). Originally created in English, the questionnaire was subsequently translated and field-tested in Tamil and Gujarati, two Indian languages. (8)

Aim:

- To find Functional problems faced by the patient after acute stroke and the recovery status after 3 months

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Objectives:

1. To observe and evaluate the chief functional problems in patients with stroke in acute phase of incident.
2. To know the prevalence of the population who take the physiotherapy rehabilitation after discharge from hospital.
3. To observe and evaluate the chief functional problems felt at the 3 months of the incident.
4. Comparing the severity of functional problems from the point of incident to 3 months post incident.

REVIEW OF LITERATURE

1. **Stephanie P Jones et.al. (2022)**, have done a **systematic review of the incidence, prevalence, and case fatality of stroke in India.** They examined prospective, consecutive recruitment studies with a predetermined sampling strategy that were conducted between January 1997 and August 2020. Studies included if participants met clinical criteria or the World Health Organization's (WHO) definition of a confirmed history of stroke. Nine studies have been selected for inclusion. There were 22,479,509 people in the total population, and 11,654 (mean 1294 SD 1710) of them had an incident stroke. The crude annual incidence rate varied from 108/100,000 to 172/100,000 individuals annually in seven studies. (2)
2. **V Prakash and Mohan Ganesan (2020)** The Indian Stroke Scale was created and validated to assess stroke patients' involvement in everyday activities in India. Psychometric testing and scale development were the two stages of the scale's development. The items emerged from a conceptual framework of stroke patients' involvement in everyday activities in an Indian setting. There were twenty-five items in the scale's definitive version. In all, 377 stroke patients were selected from five physiotherapy outpatient rehabilitation facilities and two tertiary care hospitals in India. Internal consistency, one-dimensionality, construct validity (known group and convergent validity), and test-retest reliability were all examined during the scale's psychometric testing. The scale's items showed good internal consistency, according to their findings (Cronbach's alpha =.94).
3. **V. Prakash and Mohan Ganesan (2019)** studied what matters to patients with stroke in India and why? Which was a qualitative study, in which they have taken 30 patients who were diagnosed with stroke for the first time and aged > 45 years from the rural areas of Gujarat and Tamilnadu states of India.
4. **B. Bonnera, R. Pillai et al. (2015)** investigated the factors predicting return to work after stroke in India. The study included patients aged 18–60 with mild to moderate disability following a first-ever stroke. The findings showed that 52.5% of patients returned to work, with 86.5% returning to their previous employer. The average time from stroke to return to work was 3.9 to 4.6 months, with 59% returning within 3 months. Among those unable to return to work, 94% expressed a desire to do so. Fatigue (74%) and feeling of not having fully recovered (77%) were reported as major concerns among those who returned to work. (13)

MATERIALS AND METHODS

Methodology:

- Study Design: - cross - sectional
- Sample size: - 48
- Study population: - Stroke patients.
- Source of data: - Shree B.G. Patel College of Physiotherapy, Jeevandeep Hospital, Anand., Lifeline Hospital, Anand
- Sampling Method: - Purposive
- Study Duration: - 1 year

Criteria for sample selection:

- **Inclusion Criteria: -**
  - Patients are diagnosed with and are in acute phase of stroke (< 7 days)
  - Ischemic and hemorrhagic stroke
  - Patients with MMSE >23
  - Age > 40
  - Patients who are willing to participate.

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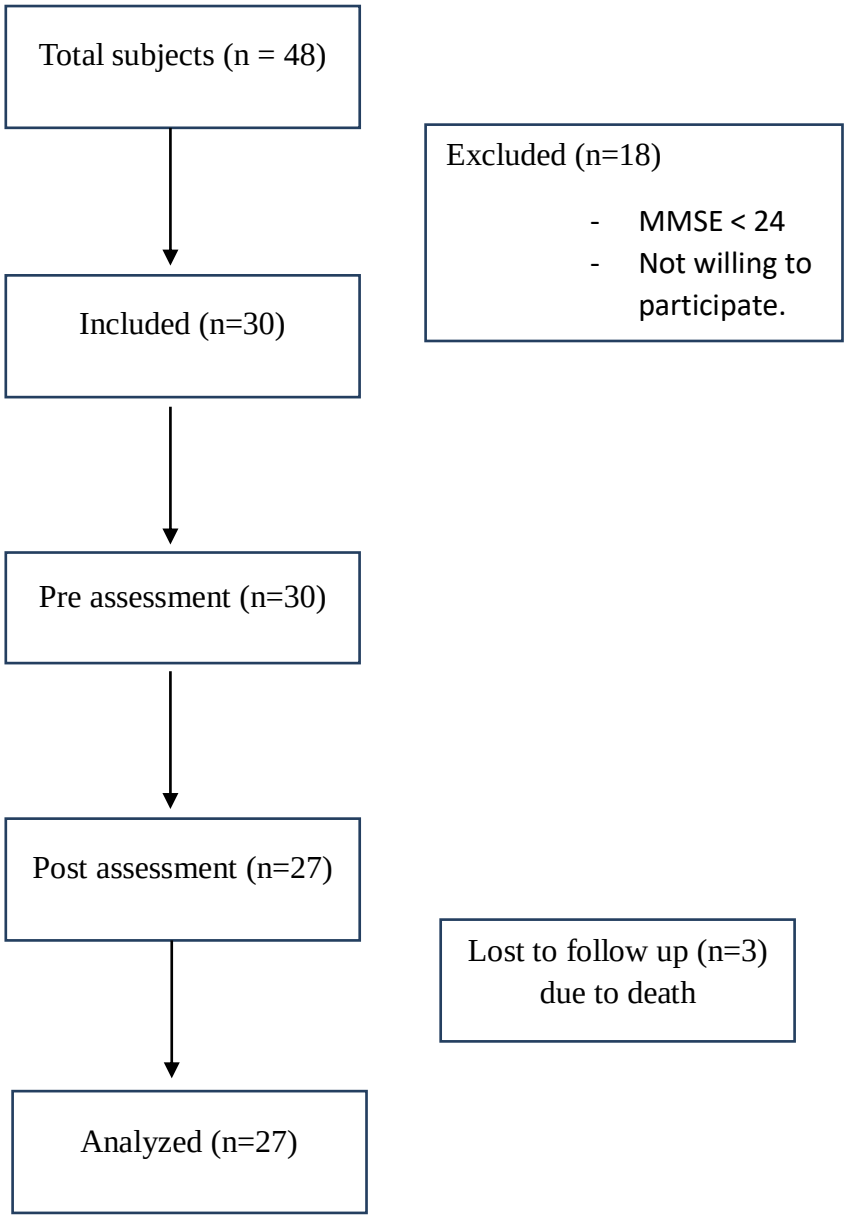
- **Exclusion Criteria: -**
  - Patients with previous history of any neurological disorders.
  - Patients who had undergone any major surgical procedures within 6 months of the incident.

Materials used: -

- Consent form
- Assessment form and Mini Mental State Examination (MMSE) scale
- Indian Stroke Scale
- Pen and paper

Procedure:



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RESULTS

Statistical analysis was done in SPSS version 25.

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
AGE	27	40.00	80.00	60.6667	12.44990
Duration of hospital stay (days)	27	2.00	40.00	11.0000	8.43071
MMSE	27	23.00	30.00	26.5185	2.60724
ISS pre	27	.00	100.00	48.4815	36.14540

Table 1 Descriptive Statistics

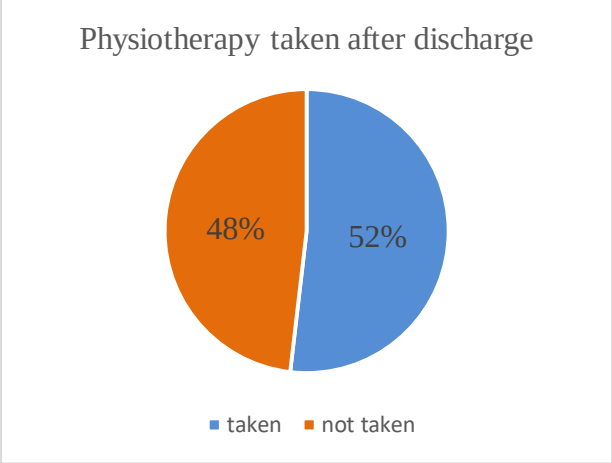

Chart 1 represents the sex distribution that is Male 74 % (n=20) and Female 26 %(n=7)

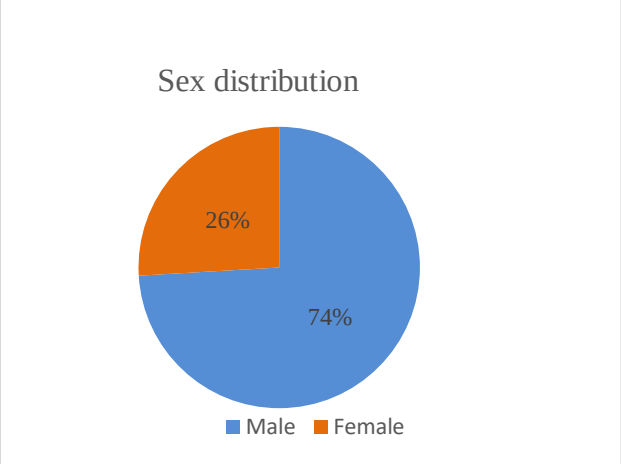

Chart 2 Distribution of patients who have taken physiotherapy after hospital discharge.

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Tests of Normality						
	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Difference	.154	27	.101	.907	27	.019
a. Lilliefors Significance Correction						

Table 2. Test for Normality of the data (Pre-Post 3 months): the test of normality done for the difference of the ISS pre and Post 3 months score and according to Shapiro wilk test of normality significance is 0.019 which is <0.05 concluding that the data is not normally distributed.

	Pre	Post 3 months	Difference	P.value
Mean (SD)	48.4074(36.17)	87.4815(19.48)	39.0741(28.17)	P<0.001
Median (IQR)	31.000(20.00-91.000)	99.000(85.00-100.000)	43.00(9.00-64.00)	P<0.001

Table 3. Mean with Standard deviation, Median with Interquartile Ranges and of pre post scores of ISS and its difference. (p<0.001)

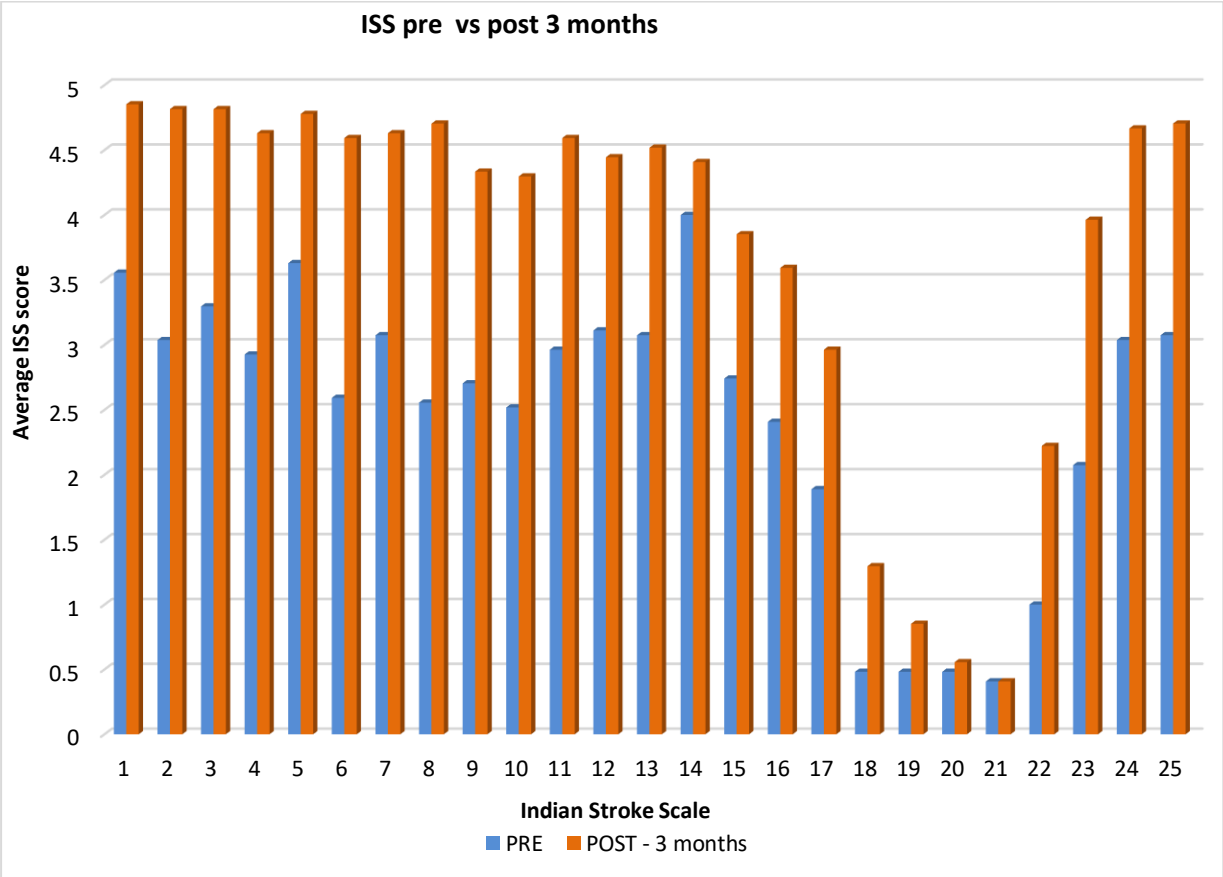

Figure 1 Indian stroke scale pre- post comparison

Figure 1 is a representation of all 25 questions' responses' average, of all 27 subjects' pre- and post-3 month's functional status. As ISS is a 5-point scale ranging from "not limited at all" to "completely limit", the bar graph shows each question's separate response to identify the actual status at the time when the data is taken.

	Patients who have not taken physiotherapy			**Patients who have taken the Physiotherapy**	
ISS Initial	**ISS post 3 months**	**Difference**	**ISS Initial**	**ISS post 3 months**	**Difference**
100	100	0	91	100	9
0	44	44	56	89	33
15	85	70	100	100	0
71	100	29	25	100	75
54	99	45	6	33	27
91	100	9	21	94	73
99	100	1	99	100	1
26	100	74	22	93	71
18	100	82	10	71	61
31	95	64	31	90	59
92	100	8	1	64	63
100	100	0	36	90	54
66	100	34	20	63	43
58.6923	**94.0769**	**35.385±30.31**	26	52	26
			38.85714	**81.35714**	**42.5 ± 26.63**

Table 4 Initial and post total scores of ISS in with difference of patients who have taken physiotherapy and those who have not.

DISCUSSION

The study aimed to identify the functional challenges faced by stroke patients during the acute phase and at 3 months post-stroke. These challenges cover physical, cognitive, and social functioning and are commonly measured using the World Health Organization International Classification of Functioning, Disability and Health framework. This framework suggests assessing activity limitations and participation restrictions across various functional subdomains to gauge health and disability. The Modified Rankin Scale and Barthel Index measure functional status but do not assess cognitive or social function. Our study used the ISS as an outcome measure, which includes social function inquiries. Patients' average ISS score was 3.00 during the acute phase, indicating limitations, but exceeded 4.5 after 3 months, signifying no limitations. This suggests improvement in social function over time, due to sustained support from family and caregivers.

We have found that some functions such as stair climbing were limited, with an average score of 4, while bathing and dressing showed statistically better improvement with an average score of 4.5 according to the ISS. This was part of a study by Rhoda A. et al. (9) on 76 stroke patients, using The Rivermead Motor Assessment and Barthel Index as outcome measures. The ISS describes 5 levels of independence in functions, as reported by the patient, providing valuable insights into the

limitations experienced. This differs from the Rivermead Motor Assessment and Barthel Index, which may not accurately reflect the patient's experience, leading to varied results in function and recovery status between studies. In our study, we observed an average 40% change in walking ability outside the home at 3 months compared to pre-stroke status. A study by DERICK T WADE, et al. (10) found that 64% of patients initially dependent on walking had regained independence within the first 3 months post-stroke, supporting our findings. Our study also showed a 29% recovery for dressing and 30% for transferring activities, compared to 61% recovery for transferring activities reported in the literature. The differences in findings are due to population size and pre-stroke status heterogeneity. The secondary goals were to determine the proportion of the population that receives physiotherapy treatment, as well as the amount of recovery in various functions in both those who received treatment and those who did not. We discovered that 52% of the subjects in our study received physiotherapy treatment. We identified functional problems with walking, stair climbing, bathing, and so on. Sanghamitra Patil et al. (11) conducted a national survey that supported our findings of similar movement impairments. It also supports our findings that in India, more than half of stroke survivors with motor problems do not receive physiotherapy or occupational therapy services, which is concerning.

CONCLUSION

In conclusion, the functional problems faced initially by the patients were getting up from bed, standing unsupported, walking inside or outside home, bathing, wearing clothes, stair climbing, participating in a social function and to go and meeting family members or neighbors. The functional recovery was seen statistically in both the groups, those who have taken physiotherapy and those who have not, but improvement was seen more in the patients who have taken physiotherapy.

LIMITATIONS AND FURTHER SCOPE

1. To take a larger sample size was out of the scope of the study, so future studies should include larger sample size.
2. Due to the limitation of study duration this study focuses on the recovery of stroke after 3 months which is till sub-acute phase only, the further recovery status of chronic stages can be evaluated in future studies with the help of same outcome measure.
3. This study includes samples from only a few hospitals of Anand city and one outpatient center which may not be representative of general population, hence future studies should consist of a multi-center sample from various geographical locations.
4. The age range is quite large in this study, so a study with narrowed age range should be done which can differentiate the prognosis.
5. The initial assessment was taken in the form of an in-person interview while the post status was taken via telephonic interview which can lead to biases in the results, so future studies can be done with in person interviews only.
6. Limitations and Future Directions: This study focused on examining functional recovery in stroke patients, regardless of the brain areas affected. However, the time constraint of this study (1 year) limited the exploration of long-term recovery patterns. Future research should investigate recovery trajectories beyond 1 year to provide a more comprehensive understanding of stroke rehabilitation outcomes.

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