Journal of Modern Rehabilitation

Research Article

# Functional Performance and Community Reintegration of Chronic Post-Stroke Survivors in Eastern India

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**Citation:** Mohakud K, Das SP, Sahoo S, Sahu S. Functional Performance and Community Reintegration of Chronic Post-Stroke Survivors in Eastern India. Journal of Modern Rehabilitation. 2023; 17(3):290-297. https://doi.org/10.18502/jmr.v17i3.13069

https://doi.org/10.18502/jmr.v17i3.13069

**Article info:**
**Received:** 17 Sep 2021
**Accepted:** 18 Jan 2022
**Available Online:** 01 Jul 2023

**Keywords:**
Stroke; Community reintegration; Functional performance; Rehabilitation

## ABSTRACT

**Introduction:** Stroke is the primary cause of functional dependency in daily activities leading to disability of the individual. It becomes an economic burden for the person and society. Post-stroke management in rehabilitation gives more emphasis on improving functional performance. The improvement in functional activities of post-stroke survivors makes them independent in their daily activities at home but, still an impediment exists to participate in society and reintegrating into the community. The objective of the study is to find the association of community reintegration with the functional performance of one-year post-stroke survivors in eastern India and to compare their functional independence, community reintegration, and participation in instrumental daily living activities between stroke affection side and stroke subtype of the study group.

**Materials and Methods:** A cross-sectional observational study was carried out on post-stroke survivors between 30 and 60 years of age without sex barrier. Ninety-four patients (mean age 54.38±12.06) were recruited for the study. The outcome was measured by the community integration questionnaire (CIQ), Lawton instrumental activities of daily living (LIADL), and functional independence measure (FIM).

**Results:** Spearman rank order correlation was used and found a significant positive correlation persists between FIM to CIQ as the r=0.565 (P=0.01, 95% CI, -0.40%-0.70%) and LIADL to CIQ r=0.687 (P=0.01, 95% CI, -0.55%-0.79%) FIM to LIADL r=0.532 (P=0.01, 95% CI, -0.36%-0.67%). Mann-Whitney U test was done to compare FIM, LIADL, and CIQ between stroke affection side (right vs left) and stroke sub-type (ischemic vs haemorrhagic), and no significant difference was found.

**Conclusion:** Functional independence, instrumental activities of daily living, and community reintegration are associated with each other. Hence, community reintegration should be incorporated into stroke rehabilitation to maintain a meaningful life as a part of society and family.

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## 1. Introduction

Stroke is a life-changing syndrome [1, 2] and the primary cause of functional dependency in daily living activities [3]. The post-stroke individual cannot fully participate in society [4] and loses their productivity as well. Paying for their management becomes a socioeconomic burden. The future prediction projects the incidence of stroke in India will be four fifth of all stroke incidences in the world [5, 6]. As the incidence of stroke occurs in greater magnitude in the younger age groups, it becomes a challenge in India [7, 8]. Rehabilitation of post-stroke survivors focuses on independence in the functional performance of daily activities [9-11]. Improving the functional activities of post-stroke individuals makes them independent in daily activities at home. But still, they have poor community reintegration or participation [12]. Functional performance is the basic and extensive instrumental daily activities or tasks that an individual performs to achieve their occupational and social live roles. According to the international classification of functioning and disability (ICF), occupation and participation are the central concept of health [13]. Therefore community participation or reintegration is an important stage of rehabilitation. It can be described as re-establishing or developing roles and individual's social, physical, and psychological presence within their communities [14]. Community reintegration is the neglected part of rehabilitation. The previous study reports about 40% of post-stroke survivors return to work (RTW) after the incidence [15-17]. The study conducted by Olaoye, et al. 2017 [18] described that post-stroke survivors in Southwest, Nigeria had better life satisfaction after community reintegration [18]. Previous studies report community reintegration is affected by various factors, such as clinical, functional, occupational, neuropsychological, and motor function [19, 20]. The study conducted in different communities of Netherland Japan and Nigeria found that these factors have a positive relationship with community reintegration of the post-stroke population [21-23]. The study conducted on the community-dwelling female post-stroke survivor of Ibadan found the interrelationship between physical functioning, participation restriction, and community reintegration [24]. Post-stroke patients' poor functional performance and community reintegration achievement is not due to physical problems but it is also affected by various factors, such as gender, laterality, and associated stroke subtype of the stroke survivor [24]. The transition to community reintegration remains a challenge for post-stroke survivors. As more emphasis is given to discrete physical tasks. Poor community reintegration or re-establishment of former roles difficulties leads to depression, social isolation, and poor quality of life of the post-stroke individual. Hence it is required to investigate the recovery process and factors affecting community reintegration after a stroke. Many studies are conducted in different populations of different communities to find the factors associated with community reintegration but limited study was conducted and no explicit understanding of the community reintegration of the post-stroke survivor after one year in the Eastern Indian population. This study was conducted to find the association of community reintegration with functional performance and to determine the association between functional performance and community reintegration of post-stroke survivors after one year of Eastern India.

## 2. Materials and Methods

Participants were recruited for a cross-sectional observational study attending a tertiary care hospital and a rehabilitation institute in Odisha. Ninety-four community-dwelling post-stroke survivors of the age group between 30 to 60 years were recruited through a convenient sampling method. The sample size is calculated according to the previous study of Hamzat et al. (2014) [24]. Considering the effect size between functional ability and community integration, the reported effect (r) is 0.54 with α of 0.05 and power is 95%, and the minimum sample size required for the study to achieve adequate power was 34. G power software, version 3.1 is used to calculate the sample size. The inclusion criteria for the study included first onset stroke of the age group between 30 and 60 years diagnosed by a neurologist. Participants should be medically stable and require no changes in their treatments within 48 hours before the evaluation. They can take adequate nutrition orally. Participants should have functional performance limitations in their daily activities and sufficient language skills to understand and reply to basic interviews and questionnaires. Functional performance limitations are investigated by the deficit in the functional ability of community-living patients after their stroke, or those discharged to another hospital for further rehabilitation.

Patients who were discharged to long-term care and had a history of recurrent stroke were excluded from the study. Stroke patients who reported comorbidities with neurological degenerative diseases (such as Parkinson's disease, motor neuron disease, and multiple sclerosis etc.), any psychiatric diseases, or any serious comorbidity (e.g. amputation, cancer, mobility-limiting arthritis) were excluded. Participants with cognitive impairment scored below 24 points on the mini-mental state exami-

nation, no adequate verbal communication (i.e. without evidence of receptive or expressive aphasia), and severe vision impairment were not considered for the study. Also, participants who were addicted to alcohol and substance abuse were excluded from the study.

The goals and purpose of the study were well explained to both the participants and their caregivers and those who filled up their written consent were included in our study. A semi-structured interview was conducted regarding the participant's demographic questionnaire for basic information and the information regarding stroke type and area of the lesion, the severity of the stroke, and previous medical charts was referred to for data collection purposes. The interview was done with close-ended questions to collect participant's data, such as age, gender, level of education, and employment status. The participant's education was 1-7 (1- Illiterate, 2- Primary education, 3- Middle school, 4- High school, 5- Higher secondary, 6- Graduation, 7- Post graduation and above), similarly employment was recorded on aetscale from 1-3 (1- Skilled job, 2- Unskilled job, 3- Unemployed). For the outcome measures, functional independence measure (FIM), Lawton instrumental activities daily living (LIADL), and community integration questionnaire (CIQ) were done to the participants. The interviews were conducted in Odia, the local language of Odisha for those who could not understand English. Therefore, all questions were converted to Odia from English by two linguists by back-translation methods. The participants were free to clarify their doubts or questions during the process. The study was conducted for 1 year and 6 months from July 2018 to December 2019.

The community integration questionnaire (CIQ) is developed to measure the individual's participation in the community. The CIQ consists of 3 primary components or domains, such as home integration, social integration, and productivity. These components are consonant with the concepts of handicap given by the World Health Organization (WHO). The total score of CIQ range from 0-29 which is found by the summation of 3 domain scores. The higher the score, the greater the integration of the individual in the community. For retired individuals, the score is 0-28. It has good internal consistency (Cronbach $\alpha$=0.75), excellent test-retest reliability, and acceptable construct validity for post-stroke individuals [25, 26].

The Lawton instrumental activities of daily living (IADL) is a tool to assess the instrumental activities of daily living involving more cognitive complex ADLs required for community living. It measures eight domains of function, such as the ability to use a telephone, shopping, food preparation, housekeeping, laundry, mode of transportation, responsibility for own medications, and the ability to handle finances. The scoring is done according to the individual's highest level of functioning in that category. The total score is the summation of scores of all components which ranges from 0 (low function, dependent) to 8 (high function, independent). The higher score indicates the greater abilities of the individual. The inter-rater reliability of Lawton IADL was 0.85 [27-30].

The functional independence measure (FIM) assesses and grades the individual's functional status. It is an 18-item questionnaire that measures the physical, psychological, and social function and the level of disability of an individual. It is a Likert type of 7-point scale and graded in descending order as 7. Complete independence to 1. Total assistance. FIM has high internal consistency ($\alpha$ coefficient B$\geq$0.84), high concurrent validity (Spearman's correlation coefficient, $r_s \geq 0.92$, intraclass correlation coefficient (ICC) $\geq$0.83), and high responsiveness (standardized response mea n$\geq$1.2, P<0.001) [31, 32].

### Data analysis

Data were tabulated and analyzed using SPSS software, version 20. Descriptive statistics were used to analyze the general characteristics of the study population. To find the association between community reintegration to functional ability and participation in instrumental daily living activities of the stroke survivors, the Spearman rank order correlation was used. Similarly, to find the association between participation in instrumental daily living activities, and the functional ability of the participants, Spearman rank order correlation was used. Mann-Whitney U test was used to compare community reintegration, participation in instrumental daily living activities and functional independence, between the stroke affection side and stroke subtype of our study group.

## 3. Results

Ninety-four patients with stroke were recruited and met the eligibility criteria of the study and were considered for the data analysis. The mean age of the participants was 54.38±12.06. Males were more likely to participate than females (75.5% vs 24.5%) in the study. Among the total population, the participants had the highest secondary education level (25.5%) and skilled sedentary type of job (51%). Among the participants, 53% had right hemiplegia and 47% had left hemiplegia. Also, 83% of the stroke was ischemic and the rest was haemorrhagic. All the participants in our study group

**Table 1.** Socio-demographic data

| Variables | | No. (%) |
|---|---|---|
| Sex | Male | 71(75.5) |
| | Female | 23(24.5) |
| Stroke type | Ischemic | 78(83) |
| | Haemorrhagic | 16(17) |
| Stroke affection side | Right | 44(47) |
| | Left | 50(53) |
| Education | Illiterate | 12(12.8) |
| | Primary | 10(10.6) |
| | Middle | 7(7.4) |
| | Higher school | 20(21.3) |
| | Higher secondary | 24(25.5) |
| | Graduation | 12(12.8) |
| | Post-graduation | 9(9.6) |
| Occupation | Skilled job | 48(51) |
| | Unskilled job | 26(28) |
| | Unemployed | 20(21) |
| Mean±SD | 54.38±12.062 | |

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were right-handed dominant depicted in Table 1. Table 2 presents the relationship between the variables functional independence, community reintegration and participation in instrumental daily living activities of post-stroke survivors, we found a significant association persists between FIM and CIQ r=0.565 (P=0.01, 95% CI, 0.40%-0.70%) and the LIADL to CIQ, r=0.687 (P=0.01, 95% CI, 0.55%-0.79%). Similarly, the correlation between FIM and LIADL is significant, r=0.532 (P=0.01, 95% CI, 0.36%-0.67%). The comparison between stroke affection side and stroke subtypes represents the mean rank score of FIM, LIADL, and CIQ for left hemiplegia

**Table 2.** Correlation between the variables

| Tools | r | | | P | 95% CI | |
|---|---|---|---|---|---|---|
| | FIM | LIADL | CIQ | | Upper | Lower |
| CIQ | 0.565 | 0.687 | | 0.01 | 0.40 | 0.70 |
| LIADL | 0.532 | | 0.687 | 0.01 | 0.55 | 0.79 |
| FIM | | 0.532 | 0.565 | 0.01 | 0.36 | 0.67 |

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Abbreviations: LIADL: Lawton instrumental activities of daily living; FIM: Functional independence measure; CIQ: Community integration questionnaire; CI: Confidence interval; LIAD: Lawton instrumental activities daily living.

Table presents inter-correlation between FIM, LIADL, and CIQ with a 95% confidence interval.

**Table 3.** Comparison between stroke affection side and stroke sub-types

| Measurements | Variables | | Mean Rank | Z | P |
|---|---|---|---|---|---|
| FIM | Stroke affected side | Left hemiplegia | 2225 | -0.787 | 0.431 |
| | | Right hemiplegia | 950 | | |
| LIADL | | Left hemiplegia | 1936 | -1.192 | 0.233 |
| | | right | 946 | | |
| CIQ | | Left hemiplegia | 2044 | -0.350 | 0.727 |
| | | Right hemiplegia | 1054 | | |
| FIM | Stroke sub-type | Ischemic | 518 | -0.930 | 0.352 |
| | | Haemorrhagic | 654 | | |
| LIADL | | Ischemic | 528 | -0.986 | 0.324 |
| | | Haemorrhagic | 664 | | |
| CIQ | | Ischemic | 608 | -0.162 | 0.872 |
| | | Haemorrhagic | 744 | | |

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Abbreviations: FIM: Functional independence measure; LIAD: Lawton instrumental activities daily living; CIQ: Community integration questionnaire.

Comparison of functional independence, community reintegration, and participation in instrumental daily living activities of stroke sub-type and stroke affected side participants-Mann-Whitney U test.

was 2225, 1936, and 2044, respectively. The mean rank score of FIM, LIADL, and CIQ for right hemiplegia was 950, 946 and 1054 respectively. The mean rank score for the left side stroke affection side was greater for all three variables than the right affection side but no significant difference was observed P>0.05. Compared tostroke subtype, the haemorrhagic stroke had a better mean rank score in FIM, LIADL, and CIQ as compared to ischemic stroke but no significant difference was observed between the scores as P>0.05 depicted in Table 3.

## 4. Discussion

From the result of our study, we found that community reintegration of the post-stroke participants after one year is significantly positively associated with their achieved functional performance ability, which is functional independence measure and participation in instrumental daily living activities. Also, the functional independence measure had a significant positive association with participation in extended instrumental daily living activities. The finding of our study corroborates the finding that basic daily activities or performance have a positive effect on the performance of complex instrumental activities [24, 33]. The reason for this the participants who are independent in their functional ability are more physically able and have better motor recovery [23]. They can use the affected extremities and perform their basic daily activities on their own. As a result, we also found that participation in instrumental daily living activities has more significance in community reintegration. This may be due to when an individual becomes independent in instrumental daily activities, such as shopping, use of cell phone, public transportation, and small financial management the individual requires a more complex cognitive component [23, 24]. It is the transition phase to basic daily living activities and community participation [24]. For community reintegration, the individual has to participate physically, socially, and psychologically [34]. This requires participant's high functioning of cognitive components or executive ability and motor recovery. Hence community reintegration is positively associated with functional independence measures and extended daily activities. Similarly, functional independence is also significantly associated with extended daily living activities.

No significant difference is observed between functional ability, instrumental daily living activities, and community reintegration between participants of ischaemic and haemorrhagic stroke subtypes. This may sug-

gest the stroke subtype does not affect functional performance and community reintegration. A previous study on post-stroke has suggested that the stroke subtype does not influence on the physical functioning and disability of an individual [24, 35]. This is contrary to the finding of the previous finding that haemorrhagic stroke has better and faster functional gain than ischemic stroke [36]. Though haemorrhagic stroke has better functional recovery early after the stroke than ischaemic stroke, no difference is found in the recovery in functional outcome or performance after 1 year after post-stroke [37, 38]. The recovery and gain of functional outcome and participation in the community of post stroke survivors depends on other prognostic factors, such as stroke severity, onset-admission interval, age, cognition, metacognition or executive function, and other social and personal factors [36, 20]. Thus functional performance and community reintegration were not significantly affected by stroke subtype after 1 year of onset.

Also, in our study group, no significant difference is found between the affection side of stroke in improvement in functional performance and community reintegration of the participant 1 year after stroke [23, 34] but the left hemiplegia has better recovery in functional ability and community reintegration. All the participants were right, handed dominant in our study group. The right hemiplegia also adopts the compensatory mechanism or shifted its dominancy in the long term [37, 38-41].

## 5. Conclusion

The major findings of the study suggest that functional independence in basic and instrumental daily activities is associated with the community reintegration of post-stroke survivors. It is also a crucial finding that no difference is observed in the improvement of functional independence and participation in instrumental daily activities and community reintegration by stroke subtype and affection side after one year of post-stroke. The rehabilitation professionals can use the information to create more effective rehabilitation programs for the post-stroke individual to successfully return home, participate in society and reintegrate into the community.

### Limitation

The limitation of the study was related to sampling bias due to the convenient sampling of the participants. This study was a hospital-based study, which can be recommended for further studies to overcome the problem of external validity. Other factors, such as cognition, executive function, and speech have not been considered for a successful return of community reintegration and can be recommended for further studies. In our study, all the participants were right-handed dominant. Therefore for future study, both the hand-dominant participants can be included to generalize the finding of stroke affection side. Further, our study is limited to the eastern zone of India, hence replication of a similar study in different communities in other regions of the country with different cultural backgrounds is suggested.

## Ethical Considerations

### Compliance with ethical guidelines

All of the ethical codes were considered (Code: No/DMR/IMS. SH/SOA/180294).

### Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

### Authors' contributions

Conceptualization and final approval: Kshanaprava Mohakud and Samir Sahu; Editing: Sakti Prasad Das; Data collection and drafting of the manuscript: Surjeet Sahoo.

### Conflict of interest

The authors declared no conflict of interest.

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