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Impact of Post-Stroke Depression on functional independence in activities of daily living among stroke survivors

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Abstract
Background: Post-stroke depression (PSD) is one of the most common and serious psychological complications after stroke, affecting nearly one-third of survivors. Depression can negatively influence motivation, participation in rehabilitation, and performance of activities of daily living (ADLs), ultimately compromising functional outcomes and quality of life.
Aim: To assess the impact of post-stroke depression on functional independence in activities of daily living among stroke survivors.
Materials and Methods: An observational, cross-sectional study was conducted on 48 post-stroke patients aged ≥45 years attending the Neuro-Physiotherapy OPD at MIPT, Latur. Depression was assessed using the Hamilton Depression Rating Scale (HAM-D). Functional independence was evaluated using the Barthel Index and the Functional Independence Measure (FIM). Descriptive statistics were calculated, and Pearson's correlation coefficient was used to determine the relationship between depression and functional independence.
Results: The mean HAM-D score was 15.97 ± 7.05, indicating predominantly mild to moderate depression. The mean Barthel Index score was 65.36 ± 28.95, and the mean FIM score was 81.24 ± 33.63, reflecting overall moderate dependence in ADLs. A statistically significant negative correlation was found between depression and functional independence ($r = –0.544$, $p < 0.05$), indicating that higher levels of depression were associated with lower functional independence.
Conclusion: Post-stroke depression has a significant detrimental impact on functional independence in stroke survivors. Higher depression scores are associated with greater dependency in performing ADLs. Early screening, identification, and management of depressive symptoms should be integrated into stroke rehabilitation to optimize functional recovery, independence, and quality of life.

Keywords: Stroke, post-stroke depression, functional independence, activities of daily living, barthel index, functional independence measure, hamilton depression rating scale, quality of life

Introduction

Stroke, also referred to as a cerebrovascular accident, is defined as a rapidly developing clinical sign of focal (or global) disturbance of cerebral function lasting more than 24 hours or leading to death, with no apparent cause other than vascular origin. It is one of the leading causes of adult disability and a major public health problem worldwide.

The burden of stroke extends beyond motor and sensory impairments. Many survivors experience long-term physical, cognitive, and psychosocial consequences that affect their ability to perform activities of daily living (ADLs). Physical impairments related to upper limb function and walking are commonly reported, but psychosocial complications—particularly post-stroke depression (PSD)—may further limit functional independence.

PSD is one of the most frequent neuropsychiatric complications after stroke, affecting approximately one-third of stroke survivors. It is associated with reduced motivation, impaired participation in rehabilitation, poor adherence to treatment, and poorer functional outcomes. Risk factors for PSD include pre-stroke depression, lesion characteristics, cognitive deficits, sleep disturbances, social isolation, and inadequate family support.

Previous studies have shown that PSD is associated with poorer recovery, decreased participation in rehabilitation, lower quality of life, and increased disability. It can impair concentration, reduce effort during physiotherapy, and contribute to feelings of helplessness and dependency. Despite its clinical importance, PSD is often under-recognized and under-treated in routine stroke care.

Functional independence in stroke survivors is commonly assessed using standardized scales such as the Barthel Index and the Functional Independence Measure (FIM), which quantify a person's ability to perform ADLs (e.g., feeding, bathing, toileting, mobility, communication). Understanding the relationship between PSD and these functional measures can help clinicians plan comprehensive rehabilitation strategies that address both physical and psychological needs.

Research Question

How significantly does post-stroke depression impact the functional independence of stroke patients in performing activities of daily living?

Aim

To investigate how the severity of post-stroke depression affects the functional independence of stroke patients in performing activities of daily living.

Objectives

1. To determine the severity of post-stroke depression among patients recovering from stroke, using the Hamilton Depression Rating Scale (HAM-D).

2. To evaluate the impact of post-stroke depression on functional independence in activities of daily living using the Barthel Index and Functional Independence Measure (FIM).

Materials And Methods

Study Design
Observational, cross-sectional study.

Study Setting
Neuro-Physiotherapy Outpatient Department (OPD), YCRH, Maharashtra Institute of Physiotherapy (MIPT), Latur, Maharashtra, India.

Study Duration
Six months.

Study Population
Post-stroke patients attending the Neuro-Physiotherapy OPD.

Sample Size and Sampling
A sample of 48 post-stroke patients was included.

Sampling method: Convenience sampling based on eligibility and willingness to participate.

Materials
- Pen and paper
- Assessment sheets
- Chair for seating during interview
- Informed consent form

Inclusion Criteria
- Diagnosed post-stroke patients (ischemic or haemorrhagic)
- Age ≥ 45 years
- Both males and females
- Medically and mentally stable
- Able to attend physiotherapy OPD
- Willing to participate and provide informed consent

Exclusion Criteria
- Patients currently on antidepressant medication
- Stroke patients with dementia
- Severe communication problems (e.g., significant aphasia)
- Stroke patients with severe disability precluding participation in assessment
- Significant auditory or visual impairment affecting assessment

Procedure
Ethical approval was obtained from the Institutional Ethical Committee of Maharashtra Institute of Physiotherapy, Latur. Patients attending the Neuro-Physiotherapy OPD and fulfilling the inclusion criteria were approached. The purpose and procedures of the study were explained, and written informed consent was obtained.

Demographic and clinical data were collected, including age, gender, occupation, dietary habits, type and side of stroke, and duration since stroke. Each participant was then assessed using

1. Hamilton Depression Rating Scale (HAM-D)
2. Barthel Index
3. Functional Independence Measure (FIM)

All assessments were conducted in a quiet room, with the patient seated comfortably. Each session lasted approximately 20–30 minutes.

Outcome Measures

1. Hamilton Depression Rating Scale (HAM-D)
The HAM-D is a widely used clinician-administered scale for measuring the severity of depression. In this study, the first 17 items were used for scoring
- **0–7:** Normal (no depression)
- **8–13:** Mild depression
- **14–18:** Moderate depression
- **19–22:** Severe depression
- **≥23:** Very severe depression

Higher scores indicate more severe depressive symptoms.

2. Barthel Index
The Barthel Index assesses performance in 10 basic ADLs such as feeding, bathing, grooming, dressing, bowel and bladder control, toilet use, transfers, mobility, and stair climbing. Scores range from 0 to 100
- **0–20:** Total dependence
- **21–60:** Severe dependence
- **61–90:** Moderate dependence
- **91–99:** Slight dependence
- **100:** Independence

Higher scores indicate greater independence in ADLs.

3. Functional Independence Measure (FIM)
The FIM assesses physical and cognitive disability. It includes 18 items divided into
- **Motor domain (13 items):** e.g., self-care, sphincter control, transfers, locomotion
- **Cognitive domain (5 items):** communication and social cognition

Each item is scored from 1 to 7
- **7:** Complete independence
- **6:** Modified independence (uses a device; extra time)
- **5:** Supervision or setup
- **4:** Minimal assistance (patient ≥75%)
- **3:** Moderate assistance (patient ≥50%)
- **2:** Maximal assistance (patient ≥25%)
- **1:** Total assistance (<25% or not testable)

Total FIM scores range from 18 (complete dependence) to 126 (complete independence).

Statistical Analysis
Data were entered in Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS). Descriptive statistics (mean, standard deviation, frequencies, percentages) were used to summarize demographic data, depression levels, and functional scores.

The relationship between depression (HAM-D scores) and functional independence (Barthel Index and FIM scores) was analyzed using Pearson's correlation coefficient (r). A p-value < 0.05 was considered statistically significant.

Results

Participant Characteristics

A total of 48 post-stroke patients were included. The majority were male, and most participants were between 41–60 years of age. A large proportion were farmers or engaged in labor-intensive occupations. Many were non-vegetarian, and both right- and left-sided strokes were represented.

Sl.No	Demographic variables	Frequency	Percentage (%)
1.	Age		
	a. 30 -40 Yrs	05	10
	b. 41 –50 Yrs	14	28
	c. 51 -60 Yrs	18	36
	d. 61 – 70 Yrs	05	10
	e. 71 – 80 Yrs	07	14
2.	Gender		
	a. Male	41	82
	b. Female	09	18
3.	Occupation		
	a. Artist	01	02
	b. Banker	01	02
	c. Bussiness	06	12
	d. Driver	03	06
	e. Engineer	02	04
	f. Farmer	14	28
	g. Govt.Officer	04	08
	h. House Wife	07	14
	i. Labour	01	02
	j. Lawyer	01	02
	k. Mechanic	01	02
	l. Peon	01	02
	m. Pvt.Job	02	04
	n. Social Worker	01	02
	o. Teacher	04	08
4	Food- Habits		
	a. Vegetarian	19	38
	b. Non-Vegetarian	31	62
5	Storke		
	a. Left	24	48
	b. Right	26	52
6			
	Depression		18
	a. Mild Depression	09	38
	b. Moderate Depression	19	36
	c. Severe Depression	18	
6			
	Functionability		
	a. Severe Dependence	16	32
	b. Moderate Dependence	11	22
	c. Mild Dependence	04	08
	d. Independence	18	36

Depression Severity (HAM-D)

The mean HAM-D score of the sample was 15.97 ± 7.05, with scores ranging from 3 to 28. This indicates that most patients experienced mild to moderate levels of depression

- Many participants fell in the mild (8–13) and moderate (14–18) depression ranges.
- A notable proportion had severe depression (≥19), indicating substantial emotional distress.

Functional Independence (Barthel Index and FIM)

Barthel Index

- **Mean score:** 65.36 ± 28.95
- **Range:** 0–100

This indicates, on average, moderate dependence in activities of daily living. Some patients were totally dependent (0–20), whereas others achieved near independence.

Functional Independence Measure (FIM)

- **Mean score:** 81.24 ± 33.63
- **Range:** 18–126

This suggests that many patients required assistance in one or more domains, with a mixture of severe dependence, moderate dependence, and functional independence across the sample.

Relationship Between Depression and Functional Independence

Pearson's correlation analysis demonstrated a moderate, statistically significant negative correlation between depression severity and functional independence

- **Correlation coefficient:** r = –0.544
- **p-value:** p = 0.000 (<0.05)

This indicates that higher depression scores were associated with lower functional independence (i.e., higher dependency in ADLs). As depressive symptoms increased, Barthel and FIM scores tended to decrease.

Discussion

The present study examined the impact of post-stroke depression on functional independence in stroke survivors attending a Neuro-Physiotherapy OPD. The findings demonstrated a significant inverse relationship between depression severity and functional independence, meaning that patients with higher levels of depression showed greater dependence in ADLs.

The mean HAM-D score (15.97 ± 7.05) reflects that a considerable proportion of patients were experiencing mild to moderate depressive symptoms. This is consistent with previous studies reporting PSD prevalence rates of approximately one-third of stroke survivors. Depression can adversely affect motivation, energy levels, attention, and willingness to participate actively in rehabilitation, thereby hindering functional recovery.

The mean Barthel Index (65.36 ± 28.95) and FIM score (81.24 ± 33.63) indicate moderate functional limitations in ADLs. The negative correlation between depression and functional independence (r = –0.544) is in line with earlier research

- Ezema *et al*. reported that PSD significantly influenced independence in ADLs, as measured by the Barthel Index.
- Tsuchiya *et al*. found that PSD inhibited improvement in ADLs and rehabilitation outcomes in convalescent stroke patients.

These studies, along with the present findings, support the view that PSD is not merely an emotional complication but a critical determinant of functional outcome.

Depression likely reduces engagement in physiotherapy sessions, decreases effort during exercises, and may contribute to avoidance behaviors, resulting in slower recovery. In addition, depressed patients may perceive their disability as more severe, report more fatigue, and experience less satisfaction with progress.

The predominance of male participants in this study may reflect higher exposure to stroke risk factors (e.g., smoking, stress, cardiovascular risks) and sociocultural patterns of healthcare utilization in the local population. However, depression and functional limitations are clinically relevant for all genders and age groups.

Overall, the findings highlight the importance of integrating psychological assessment and management into standard stroke rehabilitation. Addressing PSD through counseling, family education, pharmacological treatment when indicated, and supportive interventions may enhance participation in therapy and promote better functional outcomes.

Conclusion

This study concludes that post-stroke depression significantly affects functional independence in activities of daily living among stroke survivors. Patients with higher levels of depression exhibited greater dependency, as reflected by lower Barthel Index and FIM scores.

Early detection and management of depressive symptoms should be considered an essential component of stroke rehabilitation. Comprehensive, multidisciplinary care involving physiotherapists, psychologists, physicians, and caregivers is crucial to promote optimal functional recovery, independence, and quality of life in stroke survivors.

Limitations

1. The sample size (n = 48) was relatively small, which may limit the generalizability of the findings.
2. The study was conducted in a single institution and included only OPD attendees, potentially introducing selection bias.
3. The cross-sectional design captures association but cannot establish causality between depression and functional independence.
4. Patients on antidepressants were excluded, so results may not reflect the full spectrum of PSD in treated populations.
5. Only questionnaire-based tools were used; no formal psychiatric diagnostic interview was conducted.

Future Directions

- Longitudinal studies are needed to explore how changes in depression over time influence functional recovery and long-term independence.
- Future research could compare the effects of different interventions (pharmacological vs non-pharmacological, e.g., cognitive behavioral therapy, mindfulness, group counseling) on PSD and functional outcomes.
- Larger, multi-centre studies involving diverse socioeconomic and cultural backgrounds would improve generalizability.
- The role of family support, social participation, lifestyle modifications, and tele-rehabilitation in reducing depression and enhancing independence should be further evaluated.

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