

SHORT ARTICLE

A Cross-Sectional Study Among Stroke Survivors of the Indian Himalayan Region Assessing Motor Function, Quality of Life, Depression, and Anxiety

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ABSTRACT

Stroke impacts 16 million people annually worldwide, often resulting in lasting disabilities and psychological complications such as depression and anxiety, affecting the quality of life. This study assessed the motor function, depression, anxiety, and quality of life among stroke survivors in the Indian Himalayan region, with their sociodemographic profile. 164 stroke patients were examined at a tertiary teaching hospital. The sample was predominantly male (70%), with an average age of 50.61 years. Motor Assessment Scale scores indicated poor motor function (mean = 12.05), while Stroke-Specific Quality of Life Scale scores revealed low quality of life (mean = 91.71). On Beck Depression Inventory and Beck Anxiety Inventory, 36% of participants had severe depression while, 20.7% had moderate anxiety levels. As the study indicated a high prevalence of severe depression and anxiety, affecting also the motor functions and quality of life, addressing the psychological issues is critical for improving rehabilitation outcomes and overall well-being among stroke survivors.

KEYWORDS

Stroke; Depression; Anxiety; Quality of Life; Motor Assessment; Physical Disability

INTRODUCTION

Stroke remains a leading cause of long-term disability worldwide. According to the WHO, 16 million people suffer a first stroke annually, and five million are left with persistent disability. (1) In India, the National Stroke Registry Programme estimates 1.44 to 1.66 million new stroke cases annually, with a mortality rate of 86.5 per lakh population. (2) Motor dysfunction, depression, anxiety, and reduced quality of life (QoL) are key challenges following stroke, especially in underserved regions like the Indian Himalayan belt.

Historically, stroke rehabilitation focused on compensatory strategies, but recent advances in neuroplasticity have shifted the approach towards early, intensive rehabilitation within the first 3–6 months' post-stroke. (3) Concurrently, psychiatric

issues such as depression and anxiety further hinder recovery and must be addressed alongside physical rehabilitation. (4) QoL, a multifaceted construct influenced by physical, psychological, and social factors, has not been adequately explored in the Indian Himalayan region. (5) So, this study was done to assess the motor function, depression, anxiety, and quality of life in stroke survivors in the region and to explore their associations with sociodemographic variables.

MATERIAL & METHODS

This was a cross-sectional study performed at a tertiary care teaching hospital. The ethical permission was granted by the Institutional Ethical Committee (IEC). Participants who satisfied the inclusion and exclusion criteria were enrolled in the

study by the physicians of PMR & Internal Medicine departments. Diagnosed stroke patients with age between 30 to 65 years of either sex were included in the study. Unstable patients and those not willing to give consent were excluded. The demographic and clinical data were collected, and the patients were examined by the following validated tools:

- **Motor Assessment Scale (MAS):** This is a quick and simple tool to evaluate eight different motor functions and tone. All eight domains are scored from 0 (most impaired) to 6 (optimal), total score varies from 0–48. Higher scores equate to better motor function.
- **Beck Depression Inventory (BDI):** Used for measuring depression. The score varies from 0 to 63, and for easy interpretation, it is further classified into various categories: Normal (0–10), Mild (11–16), Borderline (17–20), Moderate (21–30), Severe (31–40), and Extreme (>40).
- **Beck Anxiety Inventory (BAI):** The score ranges from 0 to 63, which is further categorized for measuring the severity of anxiety: Low (0–21), Moderate (22–35), and High (36+).
- **Stroke-Specific Quality of Life Scale (SS-QOL):** It is a continuous scale with a score ranging from 49 to 245, and the higher scores indicate better quality of life. This has 49 items across 12 domains.

Data analysis was conducted using SPSS version 23.0. Descriptive statistics were used for demographic and outcome variables. Categorical variables were presented as frequencies and percentages. Continuous variables were expressed as means and standard deviations. Associations between sociodemographic variables and depression or anxiety were assessed using chi-square tests, with a significance level set at $p < 0.05$.

RESULTS

The study included 164 stroke survivors, 115 (70.1%) males and 49 (29.9%) females. The most common age group was 50–59 years (35.4%), followed by the 60–69 age group (23.2%). Most patients (89.6%) were within one year of stroke onset. Ischemic strokes were more common (66.5%) compared to hemorrhagic strokes (33.5%).

Motor Function: The mean total MAS score was 12.05 ± 11.1 , indicating moderate-to-severe motor impairment. Advanced hand activities had the lowest mean score (0.58 ± 1.08), followed by hand movement (0.77 ± 1.32), highlighting that fine motor function was most affected. Upper arm functional use scored 1.14 ± 1.69 , lower than lower limb functions like sitting to standing (1.45 ± 1.38) and walking (1.35 ± 1.62). These findings suggest relatively better gross mobility preservation than distal upper limb control.

Quality of Life: The mean SS-QOL score was 91.7 ± 35.9 (range 49–245), indicating poor quality of life. The most affected domains were work/productivity (3.98 ± 2.78), energy (4.48 ± 2.77), and family roles (5.22 ± 3.48). In contrast, better scores were observed in domains like vision (11.73 ± 4.75) and language (10.19 ± 7.11). These findings suggest that, individuals struggle more with social and occupational reintegration post-stroke than sensory or communication domains.

Depression and Anxiety: Regarding psychological health, 36% of participants reported extreme depression, 18.3% had moderate, and 15.2% had severe depression. Only 6.7% had high anxiety, 20.7% had moderate, and 72.6% had very low levels of anxiety. Depression showed a statistically significant association with the type of stroke ($p = 0.004$), suggesting that hemorrhagic strokes may carry a higher psychological burden. No significant association was found between depression or anxiety and age, gender, education, or place of residence.

Table 1 Participants Demographic, Clinical Characteristics and Outcome Scores (n = 164)

Variables	Category	Frequency	Percentage
Age (years)	30–39	30	18.3%
	40–49	38	23.2%
	50–59	58	35.4%
	60–69	38	23.2%
	70–79	10	6.1%
Gender	Male	115	70.1%
	Female	49	29.9%
Education	Illiterate	50	30.5%
	Primary	14	8.5%
	School		
	Middle School	25	15.2%
	High School	31	18.9%
	Intermediate	17	10.4%
	Graduate	21	12.8%
Degree	Professional	6	3.7%
	Postgraduate		
Habitat	Rural	63	38.4%
	Urban	101	61.6%
Type of Stroke	Hemorrhagic	55	33.5%
	Ischemic	109	66.5%
Disease Duration	<1 year	147	89.6%
	>1–<3 years	17	10.4%
	>3 years	0	0%
Depression	Normal		11.0%
	Mild		11.0%
	Borderline		7.9%
	Moderate		18.3%
	Severe		15.2%
	Extreme		36.0%
Anxiety	Very Low		72.6%
	Moderate		20.7%
	High		6.7%
		Mean	SD

Variables	Category	Frequency	Percentage
Depression Score		32.99	17.62
Anxiety Score		15.68	11.64
MAS Score		12.06	11.10
SS-QOL Score		91.71	35.91
Age (years)		50.62	9.68

Table 2 Domain scores of MAS and SS – QOL Scores

Domain / Activity	Mean Score	Standard Deviation
Motor Assessment Scale (MAS) Activities		
Supine to Side Lying	1.55	1.43
Supine to Sitting over Side of Bed	1.96	1.65
Balance While Sitting	1.78	1.32
Sitting to Standing	1.46	1.38
Walking Ability	1.35	1.62
Upper Arm Use	1.15	1.69
Hand Movement	0.77	1.32
Coordination		
Advanced Hand Activities	0.59	1.08
General Muscle Tone	2.77	0.08
Stroke-Specific QOL Domains		
Energy	4.48	2.77
Family Roles	5.23	3.48
Language	10.20	7.11
Mobility	9.55	6.81
Mood	8.85	5.49
Personality	5.68	3.88
Self-Care	7.76	5.01
Social Roles	7.70	5.67
Thinking	9.09	4.05
Upper Extremity Function	7.95	5.44
Vision	11.74	4.75
Work / Productivity	3.99	2.78

DISCUSSION

This study evaluated motor function, quality of life (QOL), depression, and anxiety among stroke survivors in the Indian Himalayan region in relation to their sociodemographic profiles. The most commonly affected age group was 50–59 years (35.4%), with males (70.1%) more affected than females, aligning with global stroke demographics. Educational background revealed that 30.5% of patients were illiterate, and only 3.7% had professional qualifications. A majority (61.6%) belonged to urban areas. Ischemic strokes were more common (66.5%) than hemorrhagic strokes (33.5%), and nearly 90% presented for

rehabilitation within the first year of stroke onset. These patterns are consistent with findings from the National Stroke Registry Programme of India (6).

Motor function assessment using MAS revealed severe limitations across domains. Bed mobility and transitions, with mean scores below 2, indicated high dependency for daily activities. Hand function and advanced fine motor skills were particularly impaired (mean scores 0.77 and 0.59, respectively), while upper limb scores were generally lower than those for lower limb mobility. These results emphasize the need for targeted upper limb rehabilitation.

The SS-QOL results demonstrated poor quality of life, with an average score of 91.7 out of 245. The most affected domains included work/productivity, energy, family roles, and personality, reflecting substantial psychosocial limitations. These findings are similar to those of a recent meta-analysis on Indian stroke survivors, which highlighted greater deficits in the physical domain of QOL.(5) Compared to international studies, mean SS-QOL scores in our cohort were significantly lower than those from Pakistan (164.18), Brazil (139.7), and Nigeria (156.71). (7,8,9)

Depression was highly prevalent, with 36% experiencing extreme depression and 18.3% and 15.2% experiencing moderate and severe depression, respectively. Anxiety levels were relatively low, with only 6.7% having high anxiety. These figures align with Indian systematic reviews that estimate post-stroke depression at approximately 55%.(10) Notably, depression had a significant association with stroke type ($p = 0.004$), but not with age, gender, education, or habitat.

These findings underscore the importance of early, comprehensive rehabilitation strategies focusing on motor recovery, especially upper limb function, and integrated psychological screening and management to improve long-term outcomes in stroke survivors of this region.

CONCLUSION

A total of 164 patients evaluated in the Indian Himalayan region showed significant motor impairment, particularly in the upper limb and hand functions, with mean scores of 1.14 for upper arm function and 0.58 for advanced hand activities on the Motor Assessment Scale. Quality of life was also notably affected, with the mean SS-QOL score being 91.7 out of a possible 245. Psychological comorbidities were highly prevalent: 51.2% of participants had severe and extreme depression, while 27.4% had moderate to high levels of anxiety. These findings highlight the critical need for early and comprehensive multidisciplinary rehabilitation

in stroke survivors, particularly focusing on upper limb recovery, psychological support, and quality of life improvement. Targeted screening and early management of depression and anxiety should be an integral part of stroke rehabilitation protocols in this region.

RECOMMENDATION

The study population of stroke survivors in the Indian Himalayan region had a significant amount of depression and anxiety, in addition to motor abnormality, thus affecting the overall quality of life. The screening for depression and anxiety should be added as a routine affair in the examination of stroke patients.

LIMITATION OF THE STUDY

This is a hospital based study. Similar study in the overall population should be done for the generalization of our results.

RELEVANCE OF THE STUDY

Integrated rehabilitation methods addressing both the physical and psychological issues, will be needed for enhancing the quality of life of the stroke survivors.

AUTHORS CONTRIBUTION

Suman collected the clinical information and prepared the manuscript. Raj Kumar Yadav conceptualized and designed the script, and edited it. He is also the guarantor of the manuscript. Ajeet Singh Bhadoria has done the analysis of the data and helped in preparing the discussion of the manuscript. Hrishikesh Das has done the literature search and helped in preparing the manuscript. Osama Neyaz has defined the intellectual content and edited the final manuscript. All the authors reviewed it for the publication.

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CONFLICT OF INTEREST

There are no conflicts of interest.

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DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors haven't used any generative AI/AI assisted technologies in the writing process.

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