

Perceived Stress and Functional Dependence as Predictors of Quality of Life among Brain Stroke Survivors

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Abstract

Stroke is a major global health concern and a leading cause of mortality and long-term disability. Beyond its physical effects, stroke significantly impacts psychological well-being and quality of life (QoL). This study examines the relationship between functional dependence, perceived stress, and QoL among Brain stroke survivors in Visakhapatnam. A cross-sectional, correlational research design was employed, with 114 stroke survivors recruited from hospitals and rehabilitation centres. Standardised measures, including the Barthel Index (BI) for daily functioning, the Perceived Stress Scale (PSS-10), and the WHO Quality of Life BREF Scale (QoL- BREF), were used to assess key variables.

Results indicated a significant positive correlation between daily functioning and QoL ($r = .250, p < .05$) and a strong negative correlation between perceived stress and QoL ($r = -0.832, p < .01$). Multiple regression analysis revealed that while daily functioning alone accounted for 6.2% of the variance in QoL, the inclusion of perceived stress improved the model's predictive power significantly, explaining 75.9% of the variance. These findings highlight the crucial role of psychological factors in post-stroke recovery, suggesting that physical rehabilitation alone is insufficient for improving survivors' overall well-being.

Given the strong association between stress and QoL, integrating psychological interventions alongside traditional rehabilitation is imperative. This study underscores the need for a holistic approach to stroke care, incorporating stress management and emotional support strategies to enhance long-term recovery outcomes. Future research should explore culturally tailored interventions to address the unique needs of stroke survivors in developing countries.

Keywords: Stroke, Quality of Life, Perceived Stress, Functional Dependence, Psychological Well-being, Rehabilitation.

Introduction:

Stroke is a major public health concern and a leading cause of mortality and long-term disability worldwide. According to the World Health Organization (WHO, 2008), stroke is the second leading cause of death globally, responsible for approximately 5.7 million deaths annually, with a disproportionate burden in low- and middle-income countries. It is also a significant contributor to disability-adjusted life years (DALYs) lost, as many survivors experience long-term physical, cognitive, and emotional impairments. A stroke occurs due to an interruption in cerebral blood flow, either from an arterial blockage (ischemic stroke) or bleeding in the brain (haemorrhagic stroke), resulting in brain tissue damage. Although medical advancements in stroke prevention, treatment, and rehabilitation have improved survival rates, the overall impact on an individual's quality of life (QoL) remains substantial (WHO, 2005b).

Burden of Stroke and Its Consequences

Beyond its physiological effects, stroke has profound psychological and social consequences. Many survivors struggle with functional dependence, cognitive impairment, and emotional distress, which significantly impact their ability to reintegrate into society. Studies indicate that post-stroke depression (PSD) is one of the most common neuropsychiatric complications, affecting approximately one-third of survivors (Duncan, Blankenship, & Bitensky, 2009). Psychological distress, including anxiety and stress, can further hinder rehabilitation, delaying recovery and diminishing overall well-being. Moreover, the burden of caregiving often falls on family members, particularly in countries like India, where joint family systems are prevalent. Caregivers frequently experience heightened stress and emotional exhaustion, which, in turn, affects the recovery trajectory of stroke survivors.

Stroke and Quality of Life (QoL)

Quality of life (QoL) is a crucial metric in stroke rehabilitation, encompassing physical, psychological, and social well-being. Research suggests that even in the absence of severe physical impairment, stroke survivors often report a substantial decline in QoL, with psychological factors playing a crucial role in their post-stroke experience. Studies from developed countries have explored various psychosocial aspects of stroke recovery, but there remains a lack of comprehensive data from developing nations, particularly India, where the cultural and familial dynamics of caregiving differ significantly. Understanding the determinants of QoL in stroke survivors is essential for designing holistic rehabilitation programs that address both physical and psychological needs.

Theoretical Perspectives

Transactional Model of Stress and Coping

The Model proposed by Lazarus and Folkman (1984) gives the framework for the study. According to this model, Stress is not just a functional aspect of external events; it is determined by individual cognitive appraisal of the event and their coping style. In the context of stroke survivors, functional limitations serve as stressful events, which influence the individual's emotional well-being and their quality of life.

International Classification of Functioning, Disability and Health (ICF)

Proposed by the World Health Organization (2001), the model conceptualizes health and disability as outcomes of interactions between:

- Body functions and structures (neurological impairment due to stroke),
- Activities (functional dependence in daily living), and
- Participation (social involvement and quality of life).

Functional dependence directly reflects mobility limitations, while perceived stress can be understood as a psychological response influencing participation in activities and well-being. Further, quality of life emerges as an outcome of these interactions.

Neurorehabilitation Theory

Neuroplasticity is the brain's ability to reorganize and adapt to an injury. Rehabilitation interventions aim to enhance functional recovery through repetitive practice, task-specific training, and environmental support. In this process, psychological factors such as stress influence the proactivity in rehabilitation and recovery outcomes.

Review of literature

Brain Stroke is a leading cause of long-term disability worldwide, significantly affecting physical, psychological, and social functioning. According to Feigin *et al.* (2015), the global burden of stroke continues to rise, placing a substantial burden on individuals and healthcare systems. Post-stroke recovery is a multidimensional process involving physical, cognitive, and psychosocial adaptation (Duncan *et al.*, 2000).

Rehabilitation is central to improving functional outcomes among stroke survivors. Langhorne, Bernhardt, and Kwakkel (2011) emphasized that early, intensive, and multidisciplinary rehabilitation significantly enhances recovery and independence in activities of daily living (ADLs). Similarly, Kwakkel *et al.* (2002) highlighted that the effectiveness of rehabilitation is strongly influenced by therapy intensity and timing. Functional dependence, therefore, serves as a crucial indicator of recovery and long-term adjustment.

Quality of life (QoL) has become an important outcome measure in stroke research. The WHOQOL Group (1994) conceptualized QoL as a multidimensional construct encompassing physical health, psychological well-being, social relationships, and environmental factors. Research by Mayo *et al.* (2002) demonstrated that limitations in activity and participation significantly reduce QoL among stroke survivors, even six months post-stroke.

Psychological factors, particularly perceived stress, play a significant role in post-stroke outcomes. Gläser *et al.* (2013) reported that stress can affect both neurological recovery and overall well-being. Ostwald *et al.* (2009) found that stroke survivors experience high levels of stress during and after rehabilitation, which may persist over time. Furthermore, Yu *et al.* (2015) identified a negative relationship between perceived stress and quality of life, with resilience acting as a mediating variable.

Emotional disturbances such as depression and anxiety are also prevalent among stroke survivors. Hackett *et al.* (2005) reported a high frequency of post-stroke depression, while Cumming *et al.* (2016) emphasized the importance of addressing depression, anxiety, and apathy to improve rehabilitation outcomes. These psychological conditions can reduce motivation, limit participation in therapy, and negatively impact overall quality of life.

Functional assessment tools have been widely used to evaluate recovery and quality of life. Carod-Artal *et al.* (2009) demonstrated the reliability and validity of the Stroke Impact Scale in assessing functional and QoL domains. Such measures highlight the strong relationship between physical impairment and broader psychosocial outcomes.

A systematic review by Dhandapani *et al.* (2022) found that quality of life among stroke survivors in India remains moderately low across physical, psychological, and social domains, with considerable variability across studies. The review also highlighted that most studies were hospital-based and conducted within 3–6 months post-stroke, indicating the importance of early rehabilitation.

A longitudinal study conducted in India by Rajan *et al.* (2019) reported that stroke survivors experience significant impairments in physical and psychological domains of quality of life over time, emphasizing the long-term impact of stroke on daily functioning.

Further, qualitative research by Tiwari *et al.* (2021) revealed that stroke survivors in India face challenges not only in physical recovery but also in emotional adjustment, social participation, and financial burden, all of which significantly affect quality of life.

Research Gap

Despite extensive literature on stroke rehabilitation, functional dependence, and psychological factors, there is a relative lack of studies examining their combined predictive role on quality of life, particularly within the Indian context. Most existing research has explored these variables independently. Therefore, the present study seeks to bridge this gap by examining perceived stress and functional dependence as predictors of quality of life among stroke survivors.

Study Rationale

Given the high prevalence of brain stroke and its profound impact on survivors' lives, there is a need to explore the interplay between daily functioning, perceived stress, and QoL. While physical rehabilitation remains a cornerstone of post-stroke care, growing evidence suggests that psychological interventions are equally vital in enhancing recovery. This study aims to examine the relationship between functional dependence, psychological stress, and QoL among stroke survivors, using correlation and multiple regression analyses. By identifying key predictors of QoL, this research highlights the necessity of incorporating psychological support mechanisms alongside physical therapy to improve overall well-being. The findings of this study will contribute to a better understanding of stroke rehabilitation needs, particularly in the Indian context, and inform the development of integrated care models that address both physical and psychological health.

METHODOLOGY

Research Design

The present study employs a quantitative, cross-sectional correlational research design to examine the relationship between functional dependence, perceived stress, and quality of life (QoL) among brain stroke survivors.

Participants

The study sample consists of 114 stroke survivors receiving medical care and rehabilitation at hospitals and rehabilitation services. Participants are selected using **purposive sampling**, ensuring that they meet eligibility criteria:

Inclusion Criteria:

- Adults aged 21 years and above.
- Diagnosed with a stroke at least six weeks prior to data collection.
- Currently undergoing or having completed rehabilitation.

- Capable of completing a questionnaire independently or with minimal assistance.

Exclusion Criteria:

- Presence of severe cognitive impairment (e.g., dementia).
- Patients with other major neurological disorders (e.g., Parkinson's disease).
- History of significant head injury
- Individuals unwilling to participate or unable to provide informed consent

Measures

1. **Functional Dependence - Barthel Index (BI)** (Mahoney & Barthel, 1965) – A widely used scale measuring the ability to perform daily living activities. Assesses performance in activities of daily living (ADLs) such as feeding, mobility, and self-care. High internal consistency (Cronbach's alpha, 0.85–0.95)
2. **Perceived Stress Scale (PSS-10)** (Cohen, Kamarck, & Mermelstein, 1983) – A 10-item self-report scale measuring the degree to which situations in life are appraised as stressful. Cronbach's alpha ranges from 0.78 to 0.91
3. **WHO – Quality of Life – Brief (WHOQOL-BREF)** (The WHOQOL Group, 1994) – The scale is designed to measure the impact of disease and impairment on daily activities and behaviour, perceived health, disability and functional capacity. Assesses QoL across four domains: physical health, psychological health, social relationships, and environment.

Data Collection Procedure

Data collection is conducted in hospital and rehabilitation settings. After obtaining permission from the respective institutions, eligible participants are approached and briefed about the study.

Participants complete the questionnaires either:

- Independently, or
- With minimal assistance (in cases of physical limitations)

The administration is conducted in a structured manner to ensure consistency. Adequate time is provided to participants to respond comfortably.

Ethical Considerations

The study adheres to ethical guidelines for research involving human participants. Ethical approval is obtained from the relevant institutional review board.

- Participants are provided with detailed information about the study
- Informed consent is obtained prior to participation
- Confidentiality and anonymity of responses are strictly maintained
- Participants are informed of their right to withdraw at any stage without any consequences

Statistical Analysis

Data was analyzed with statistical software SPSS 27.0, using appropriate statistical techniques:

- **Descriptive statistics** (mean, standard deviation) to summarize demographic and study variables
- **Pearson correlation analysis** to examine relationships between perceived stress, functional dependence, and QoL
- **Multiple regression analysis** to assess the predictive role of perceived stress and functional dependence on quality of life

Results & discussion

Table 1: Correlation Analysis

	Mean	Std. Deviation	QoL	Daily Functioning	Perceived Stress
QoL	50.68	7.63	1		
Daily Functioning	40.53	18.63	.250*	1	
Perceived Stress	27.75	7.90	-.832**	.012	1

Table 1 presents the means, standard deviations, and correlation coefficients between Quality of Life (QoL), Daily Functioning, and Perceived Stress in stroke patients.

The mean QoL score is 50.69 (SD = 7.63), while the mean daily functioning score is 40.53 (SD = 18.63), and the mean perceived stress score is 27.75 (SD = 7.90). Daily functioning is positively correlated with QoL ($r = .250$, $p < .05$), indicating that better daily functioning is associated with higher QoL. Perceived stress is negatively correlated with QoL ($r = -0.832$, $p < .01$), suggesting that higher perceived stress significantly reduces QoL. There is no significant relationship between daily functioning and perceived stress ($r = .012$, $p > .05$), implying that functional abilities may not directly impact perceived stress levels in stroke patients.

The positive correlation between daily functioning and QoL suggests that stroke patients with better mobility and independence experience higher life satisfaction. Previous studies by Carod-Artal *et al.* (2000) emphasize that functional limitations after stroke significantly reduce QoL due to dependency on caregivers and decreased engagement in meaningful activities.

The strong negative correlation between perceived stress and QoL indicates that psychological distress plays a crucial role in determining post-stroke life satisfaction. Research by Kim *et al.* (2013) suggests that brain stroke survivors experiencing higher levels of stress are more likely to report lower well-being, increased anxiety, and depressive symptoms, all of which negatively impact QoL.

The non-significant correlation between daily functioning and perceived stress suggests that functional recovery alone does not necessarily reduce stress levels. Factors such as cognitive appraisal, financial burden, fear of stroke recurrence, and social isolation may contribute to stress levels independently of physical recovery (Harrison *et al.*, 2021).

Table 2: Regression Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	Sig. F Change
1	.250 ^a	.062	.054	7.42407	.062	7.443	.007
2	.871 ^b	.759	.755	3.78042	.697	320.939	.000

a. Predictors: (Constant), Daily Functioning

b. Predictors: (Constant), Daily Functioning, Perceived Stress

Table 2 presents a multiple regression analysis examining the influence of daily functioning and perceived stress on QoL.

The regression analysis examined the predictive role of daily functioning and perceived stress on quality of life (QoL). In Model 1, where daily functioning was entered as the sole predictor, the results indicated a weak positive correlation with QoL ($R = .250$). The model explained only 6.2% of the variance in QoL ($R^2 = .062$), suggesting a limited contribution of daily functioning alone. However, the model was statistically significant ($F = 7.443$, $p = .007$), indicating that daily functioning is a significant, albeit modest, predictor of QoL among stroke survivors.

Daily Functioning as a Predictor of Quality of Life (Model 1)

The weak correlation between daily functioning and quality of life (QoL) can be attributed to several key factors. Many stroke patients develop compensatory mechanisms to adapt to their physical limitations. Assistive devices, rehabilitation programs, and strong social support systems enable individuals to maintain independence despite impairments. These adaptive strategies help mitigate the direct impact of functional deficits on QoL (Lutz *et al.*, 2017). Additionally, psychological adjustment plays a crucial role in shaping well-being. Some stroke survivors develop resilience, accepting their limitations while focusing on aspects of life that remain fulfilling, such as relationships and personal growth. This adaptive mindset reduces the negative impact of functional impairments on their overall well-being (Mayo *et al.*, 2002).

Another critical factor is the role of social and emotional support. Studies indicate that stroke survivors with strong family bonds and community engagement tend to report better QoL, regardless of their level of physical functioning. Emotional support can buffer the psychological distress associated with disability, enhancing overall satisfaction with life (Cumming *et al.*, 2014). These findings suggest that while daily functioning is important, other factors, such as emotional resilience and social networks, may have a greater influence on QoL in stroke patients.

In Model 2, perceived stress was added as an additional predictor alongside daily functioning. The results showed a substantial increase in the strength of the relationship ($R = .871$), indicating a strong combined association with QoL. The explained variance increased dramatically to 75.9% ($R^2 = .759$), demonstrating that the inclusion of perceived stress significantly enhances the model's predictive capacity. Furthermore, the F-change value ($F\text{-change} = 320.939$, $p < .001$) confirmed that the addition of perceived stress contributed significantly to the model. These findings suggest that while daily functioning has a role in predicting QoL, perceived stress emerges as a much stronger predictor, substantially improving the overall explanatory power of the model.

Strong Impact of Perceived Stress on Quality of Life (Model 2)

The substantial improvement in model performance when perceived stress is added as a predictor underscores the crucial role of psychological factors in determining QoL. One explanation for this effect is the neuropsychological impact of stroke, which often leads to increased anxiety, depression, and cognitive impairments. These mental health challenges contribute to elevated stress levels, which, in turn, negatively affect QoL (Robinson & Spalletta, 2010). In addition, chronic stress is linked to neuroinflammation, which can further impair brain function and hinder recovery. Prolonged stress leads to increased cortisol levels, exacerbating health problems and reducing overall well-being (McEwen, 2017).

Many stroke survivors also experience learned helplessness, a psychological state in which individuals feel powerless over their condition and recovery process. This sense of helplessness can increase stress and further reduce QoL (Kendall *et al.*, 2006). Moreover, stroke often results in social isolation and emotional distress, as individuals may lose their jobs, experience changes in family dynamics, and struggle to maintain social connections. These factors collectively contribute to higher stress levels and poorer QoL (Hilari *et al.*, 2012).

Table 3: The comparison of mean scores of daily functioning, perceived stress, and quality of life (QoL) between males and females using an independent samples t-test.

	Gender	N	Mean	SD	t	Sig.
Daily Functioning	Male	68	41.32	19.15	.554	.581
	Female	46	39.35	17.96		
Perceived Stress	Male	68	27.56	07.80	-.306	.760
	Female	46	28.02	08.11		
QoL	Male	68	50.74	07.38	.107	.915
	Female	46	50.59	08.06		

For daily functioning, males ($M = 41.32$, $SD = 19.15$) and females ($M = 39.35$, $SD = 17.96$) showed no significant difference ($t = 0.554$, $p = .581$). This suggests that gender does not significantly influence functional abilities in daily life. Similar findings have been reported by Ryff and Keyes (1995), who noted that despite differences in emotional experiences, overall functioning remains comparable across genders. Additionally, McDonough and Walters (2001) highlighted that factors such as socioeconomic status and access to resources play a more substantial role than gender in determining functional outcomes.

For perceived stress, males ($M = 27.56$, $SD = 7.81$) and females ($M = 28.02$, $SD = 8.11$) did not differ significantly ($t = -0.306$, $p = .760$). This indicates that both genders experience similar levels of stress following stroke. Supporting this, Matud (2004) found that although women may report higher stress, their coping outcomes remain comparable to men. Furthermore, Liu *et al.* (2020) emphasized that post-stroke stress is more strongly associated with functional impairment and coping mechanisms rather than gender differences.

Regarding quality of life (QoL), males ($M = 50.74$, $SD = 7.38$) and females ($M = 50.59$, $SD = 8.07$) showed nearly identical scores, with no significant difference ($t = 0.107$, $p = .915$). This suggests that QoL among stroke survivors is not significantly influenced by gender. Previous studies support this finding, indicating that QoL is more dependent on rehabilitation, social support, and functional independence (Opara & Jaracz, 2010). Similarly, Helgeson (2011) reported that adaptation to chronic illness does not significantly differ by gender, reinforcing the present results.

Table 4: The comparison of daily functioning, perceived stress, and quality of life (QoL) between stroke patients based on brain lateralization (right vs. left hemisphere).

	Lateralization	N	Mean	SD	t	Sig.
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Daily Functioning	Right	57	39.74	18.21	-.451	.653
	Left	57	41.32	19.16		
Perceived Stress	Right	57	28.37	06.70	.841	.402
	Left	57	27.12	08.95		
QoL	Right	57	50.08	07.16	-.846	.400
	Left	57	51.29	08.09		

For daily functioning, individuals with right-hemisphere stroke ($M = 39.74$, $SD = 18.21$) and left-hemisphere stroke ($M = 41.32$, $SD = 19.16$) did not differ significantly ($t = -0.451$, $p = .653$). This indicates that stroke laterality does not significantly influence functional abilities. Evidence from Automated Cortical Thickness Analysis (ACTA) suggests that functional recovery involves bilateral cortical reorganization, with both hemispheres contributing to rehabilitation outcomes (MVR Raju & Meghanaa, 2024). Although left-hemisphere strokes often affect language and right-hemisphere strokes impact visuospatial and emotional processing, daily functioning appears to depend on integrated cognitive and motor recovery across both hemispheres.

For perceived stress, right-hemisphere stroke patients ($M = 28.37$, $SD = 6.70$) and left-hemisphere stroke patients ($M = 27.12$, $SD = 8.95$) showed no significant difference ($t = 0.841$, $p = .402$). This suggests that stress levels are comparable regardless of stroke laterality. While right-hemisphere damage is associated with emotional dysregulation and left-hemisphere damage with communication difficulties, both conditions can produce similar psychological distress. Supporting this, Santos *et al.* (2021) found that emotional distress in stroke patients is more strongly related to functional disability than to lesion lateralization. Additionally, Lincoln *et al.* (2019) emphasized the role of coping strategies and social support in reducing stress, irrespective of the affected hemisphere.

Regarding quality of life (QoL), individuals with right-hemisphere stroke ($M = 50.08$, $SD = 7.16$) and left-hemisphere stroke ($M = 51.29$, $SD = 8.09$) also did not differ significantly ($t = -0.846$, $p = .400$). This indicates that stroke laterality does not significantly affect QoL. Consistent with this finding, Kauhanen *et al.* (2000) reported that although lesion location may influence specific impairments, overall QoL is more strongly determined by rehabilitation outcomes, social support, and adaptive coping mechanisms.

Conclusion

The present study examined the relationships between daily functioning, perceived stress, and quality of life (QoL) among stroke survivors, along with differences based on gender and brain lateralization.

The findings revealed that daily functioning is positively associated with QoL, indicating that greater independence in daily activities contributes to better life satisfaction. In contrast, perceived stress showed a strong negative relationship with QoL, emerging as the most influential factor affecting well-being. Regression analysis further confirmed that while daily functioning is a significant predictor, perceived stress substantially enhances the prediction of QoL, highlighting the dominant role of psychological factors in post-stroke adjustment.

Additionally, the study found no significant differences based on gender or brain lateralization in daily functioning, perceived stress, or QoL. These results suggest that recovery outcomes are not determined by biological factors alone but are more strongly influenced by psychosocial variables, including coping strategies, emotional resilience, rehabilitation, and social support systems.

References

1. Bhagavathy, M. G., Anniyappa, S., Thankappan, R., & Bharathi, B. (2022). Lived experiences of stroke survivors in India: A phenomenological study. *Belitung Nursing Journal*, 8(5), 405–413.
2. Bruns, J., & Hauser, W. A. (2003). The epidemiology of traumatic brain injury: A review. *Epilepsia*, 44(s10), 2–10.
3. Carod-Artal, F. J., Ferreira Coral, L., Trizotto, D. S., & Menezes Moreira, C. M. (2009). The stroke impact scale 3.0: Evaluation of acceptability, reliability, and validity of the Brazilian version. *Stroke*, 40(1), 118–125.
4. Cumming, T. B., Packer, M., Kramer, S. F., & English, C. (2016). The importance of addressing depression, anxiety, and apathy after stroke: A systematic review and meta-analysis. *Neurorehabilitation and Neural Repair*, 30(9), 795–807.

5. Dhandapani, M., Joseph, J., Sharma, S., Dabla, S., Varkey, B. P., Narasimha, V. L., Varghese, A., & Dhandapani, S. (2022). The quality of life of stroke survivors in the Indian setting: A systematic review and meta-analysis. *Annals of Indian Academy of Neurology*, 25(3), 376–382.
6. Duncan, P. W., Lai, S. M., & Keighley, J. (2000). Defining post-stroke recovery: Implications for design and interpretation of drug trials. *Neuropharmacology*, 39(5), 835–841.
7. Feigin, V. L., Krishnamurthi, R. V., Parmar, P., Norrving, B., Mensah, G. A., Bennett, D. A., ... & Murray, C. J. (2015). Update on the global burden of ischemic and hemorrhagic stroke. *Circulation Research*, 120(3), 439–448.
8. Gläser, S., Krüger, A., Witte, O. W., & Brunkhorst, R. (2013). Stress after stroke: A systematic review on animal models and treatment options. *Frontiers in Cellular Neuroscience*, 7, 19.
9. Hackett, M. L., Yapa, C., Parag, V., & Anderson, C. S. (2005). Frequency of depression after stroke: A systematic review of observational studies. *Stroke*, 36(6), 1330–1340.
10. Kwakkel, G., Kollen, B. J., & Wagenaar, R. C. (2002). Therapy impact on functional recovery in stroke rehabilitation: A critical review of the literature. *Physiotherapy*, 88(8), 529–542.
11. Langhorne, P., Bernhardt, J., & Kwakkel, G. (2011). Stroke rehabilitation. *The Lancet*, 377(9778), 1693–1702.
12. Mayo, N. E., Wood-Dauphinee, S., Côté, R., Durcan, L., & Carlton, J. (2002). Activity, participation, and quality of life 6 months poststroke. *Archives of Physical Medicine and Rehabilitation*, 83(8), 1035–1042.
13. Ostwald, S. K., Bernal, M. P., Cron, S. G., & Godwin, K. M. (2009). Stress experienced by stroke survivors and spousal caregivers during the first year after discharge from inpatient rehabilitation.
14. Rajan, B., Pruthvish, S., Lalitha, K., Tyloth, M., & Murthy, N. S. (2019). Assessment of quality of life among stroke survivors: A longitudinal study. *International Journal of Community Medicine and Public Health*.
15. Suman, S., Yadav, R. K., Bhadoria, A. S., Das, H., & Neyaz, O. (2025). A cross-sectional study among stroke survivors of the Indian Himalayan region assessing motor function, quality of life, depression, and anxiety. *Indian Journal of Community Health*.
16. The WHOQOL Group. (1994). The development of the World Health Organization Quality of Life Assessment Instrument (the WHOQOL). In J. Orley & W. Kuyken (Eds.), *Quality of Life Assessment: International Perspectives*. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-79123-9_4
17. Tiwari, S., Joshi, A., Rai, N., & Satpathy, P. (2021). Impact of stroke on quality of life of stroke survivors and their caregivers: A qualitative study from India. *Journal of Neurosciences in Rural Practice*, 12(4), 680–688.
18. Yu, L., Bu, L., Zhang, X., Zhou, H., Luo, Z., & Zhang, J. (2015). Perceived stress and quality of life among stroke survivors: The mediating role of resilience. *Journal of Clinical Psychology in Medical Settings*, 22(1), 34–44.