Original Article

Causes and Characteristics of Depression in Stroke Patients: A Cross-Sectional Study

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Abstract

Introduction: Background: Stroke is a leading cause of death and disability worldwide, with post-stroke depression (PSD) being a prevalent psychological complication. PSD negatively impacts stroke recovery, leading to increased disability and mortality. Identifying factors associated with PSD can guide early intervention strategies and improve outcomes. Objective: This study aimed to assess the prevalence and factors associated with PSD in stroke patients, focusing on demographic, clinical, and treatment-related variables. Methods: A cross-sectional study was conducted at Evercare Hospital, Dhaka, from January to June 2024, involving 190 stroke patients. Patients were assessed for depressive symptoms using the Hamilton Depression Rating Scale (HDRS) and Beck Depression Inventory (BDI). Key variables analyzed included age, gender, education, stroke type, stroke severity, functional outcomes, comorbidities, rehabilitation, and medication compliance. Chi-square tests were used to explore associations, with significance set at $p<0.05$. Results: PSD was present in 58.9% of stroke patients. Depression was significantly associated with younger age (<50 years, $p=0.012$), lower education (below SSC, $p=0.042$), severe stroke (NIHSS >16, $p<0.001$), and recent stroke onset (<3 months, $p<0.001$). Higher dependency, measured by FIM and Barthel Index scores, and diabetes ($p=0.034$) were also linked to depression. Patients receiving regular physical therapy and adhering to medications had lower rates of depression ($p=0.017$, $p=0.035$). Conclusion: PSD is prevalent among stroke survivors and is associated with younger age, lower education, severe stroke, functional dependency, and diabetes. Regular rehabilitation and treatment compliance reduces the risk of depression. Early screening and comprehensive rehabilitation programs are essential to improving mental health outcomes in stroke patients.

Keywords: post-stroke depression, stroke severity, rehabilitation, functional outcomes.

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Introduction

Stroke is the second leading cause of death worldwide after myocardial infarction and is a major cause of adult disability, affecting millions globally[1,2,3]. In 2010, it was estimated that 16.9 million people experienced their first stroke, with 33 million stroke survivors and 5.9 million stroke-related deaths4. Of all stroke cases, approximately 88% are ischemic, 9% are intracerebral hemorrhagic, and 3% are subarachnoid hemorrhagic5. Both stroke mortality and morbidity are increasing globally. According to the World Health Organization, in 2002, the total number of deaths due to cerebrovascular accidents in Pakistan was 78,512. Similarly, in Brazil, between 1994 and 1997, the annual hospitalizations due to stroke ranged between 198,705 and 295,596, with an estimated 25% of these cases being

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recurrent strokes[6]. Among stroke survivors, motor impairment is present in approximately 80% of cases.

Depression is a common psychological complication in stroke survivors. It is characterized by periods of sad mood and anhedonia, which is the inability to experience pleasure from previously enjoyable activities such as eating, exercising, or social interactions, persisting for at least two consecutive weeks as per DSM-IV criteria[8]. Post-stroke depression (PSD) significantly impacts recovery, leading to increased disability and mortality among stroke survivors9. Morris et al. reported in 1993 that stroke patients with depression were 3.4 times more likely to die within 10 years than their non-depressed counterparts10. Depression negatively influences stroke recovery through various mechanisms. For instance, depressed patients may be less motivated to participate in rehabilitation due to persistent fatigue or hopelessness, while cognitive impairments may further delay recovery by reducing adherence to treatment schedules, leading to increased mortality rates.

Post-stroke depression is prevalent in both men and women, with a systematic review of 51 studies by Hackett et al. in 2005 estimating that the overall frequency of PSD is approximately 33%11. Stroke survivors experience debilitating morbidity, and superimposed PSD further diminishes their quality of life and impairs recovery.

The present study was conducted to estimate the magnitude of post-stroke depression in a clinical setting to facilitate the development of departmental protocols for early screening and referral for PSD treatment. Early detection and intervention for PSD can improve the quality of life, expedite recovery, and increase functionality for stroke survivors[12,13].

Methodology

The cross-sectional study was conducted at the Department of Neurology, Evercare Hospital, Dhaka, to explore the causes and characteristics of depression among stroke patients. A total of 190 patients diagnosed with stroke were included in the research, spanning a study period from January to June 2024. The patients were selected based on specific inclusion and exclusion criteria, focusing on individuals who had experienced a stroke and were exhibiting depressive symptoms.

Data collection involved face-to-face interviews with the participants, using both structured questionnaires and validated tools to assess depressive symptoms. The Hamilton Depression Rating Scale (HDRS) and Beck Depression Inventory (BDI) were employed to evaluate the severity of depression. In addition, detailed sociodemographic and clinical data were gathered, including age, gender, stroke type, stroke severity, and time since the stroke. These data points helped in understanding the relationship between stroke and depression in this patient population.

Informed consent was obtained from all participants before their inclusion in the study. Patients were assured of confidentiality and the voluntary nature of their participation. The research adhered to ethical standards, with approval obtained from the institutional review board of Evercare Hospital. All patients were informed about their right to withdraw from the study at any time without any consequence to their medical treatment. The data collected were analyzed using statistical techniques to identify key causes and characteristics of depression in stroke patients. Factors such as stroke severity, type of stroke, duration since the stroke, as well as sociodemographic variables like age, gender, and educational level were examined about depression. The results were used to provide insights into the mental health challenges faced by stroke patients, contributing to better-targeted interventions for this vulnerable group.

Result

Table 1: Demographic Characteristics of Stroke Patients and Their Association with Depression (N = 190)

Variable	Category	Total (N = 190)	Depression Present (n= 112)	Depression Absent (n= 78)	P-Value
Age Group	< 50 years	55 (28.9%)	40 (35.7%)	15 (19.2%)	0.012*
	50-65 years	90 (47.4%)	50 (44.6%)	40 (51.3%)	
	> 65 years	45 (23.7%)	22 (19.6%)	23 (29.5%)	
Gender	Male	110 (57.9%)	60 (53.6%)	50 (64.1%)	0.098
	Female	80 (42.1%)	52 (46.4%)	28 (35.9%)	
Educational Level	Below SSC	70 (36.8%)	45 (40.2%)	25 (32.1%)	0.042*
	SSC-HSC	80 (42.1%)	50 (44.6%)	30 (38.5%)	
	Graduate and above	40 (21.1%)	17 (15.2%)	23 (29.4%)	

*P-value derived from Chi-square test, *Significant at $P < 0.05$

Table 1 shows that age and educational level are significantly associated with the presence of depression among stroke patients. Patients below 50 years and those with lower education levels (below SSC) had higher rates of depression. Gender, although analyzed, was not found to be significantly associated with depression in this cohort.

Table 2: Clinical Characteristics of Stroke and Their Association with Depression (N = 190)

Variable	Category	Total (N = 190)	Depression Present (n = 112)	Depression Absent (n = 78)	P-Value
Type of Stroke	Ischemic	130 (68.4%)	80 (71.4%)	50 (64.1%)	0.184
	Hemorrhagic	60 (31.6%)	32 (28.6%)	28 (35.9%)	
Stroke Severity	Mild (NIHSS 0-5)	80 (42.1%)	30 (26.8%)	50 (64.1%)	<0.001**
	Moderate (NIHSS 6-15)	70 (36.8%)	55 (49.1%)	15 (19.2%)	
	Severe (NIHSS > 16)	40 (21.1%)	27 (24.1%)	13 (16.7%)	
Time Since Stroke	< 3 months	100 (52.6%)	72 (64.3%)	28 (35.9%)	<0.001**
	3-6 months	90 (47.4%)	40 (35.7%)	50 (64.1%)	

Table 2 shows that stroke severity and time since stroke are significantly associated with the presence of depression ($P < 0.001$). Patients with more severe strokes and those who had their stroke less than three months prior exhibited higher rates of depression. The type of stroke, ischemic or hemorrhagic, did not show a significant association with depression.

Table 3: Association of Depression with Functional Outcomes and Dependency Levels (N = 190)

Variable	Category	Total (N = 190)	Depression Present (n = 112)	Depression Absent (n = 78)	P-Value
Functional Independence Measure (FIM) Score	< 60 (Severe dependency)	70 (36.8%)	50 (44.6%)	20 (25.6%)	0.008*
	60-100 (Moderate dependency)	80 (42.1%)	45 (40.2%)	35 (44.9%)	
	> 100 (Mild dependency)	40 (21.1%)	17 (15.2%)	23 (29.5%)	
Barthel Index	< 20 (Severe)	60 (31.6%)	45 (40.2%)	15 (19.2%)	0.004*
	20-60 (Moderate)	80 (42.1%)	50 (44.6%)	30 (38.5%)	
	> 60 (Mild)	50 (26.3%)	17 (15.2%)	33 (42.3%)	

Table 3 demonstrates that lower FIM scores and lower Barthel Index scores, indicating higher levels of dependency and poorer functional outcomes, were significantly associated with depression among stroke patients.

Table 4: Comorbid Conditions and Their Association with Depression (N = 190)

Comorbidity	Category	Total (N = 190)	Depression Present (n = 112)	Depression Absent (n = 78)	P-Value
Hypertension	Yes	120 (63.2%)	75 (67.0%)	45 (57.7%)	0.083
	No	70 (36.8%)	37 (33.0%)	33 (42.3%)	
Diabetes	Yes	100 (52.6%)	65 (58.0%)	35 (44.9%)	0.034*
	No	90 (47.4%)	47 (42.0%)	43 (55.1%)	
Dyslipidemia	Yes	80 (42.1%)	52 (46.4%)	28 (35.9%)	0.065
	No	110 (57.9%)	60 (53.6%)	50 (64.1%)	

Table 4 reveals that diabetes is significantly associated with depression among stroke patients ($P = 0.034$). While hypertension and dyslipidemia were also assessed, no statistically significant association was found with depression in this population.

Table 5: Treatment and Rehabilitation Factors Associated with Depression (N = 190)

Variable	Category	Total (N = 190)	Depression Present (n = 112)	Depression Absent (n = 78)	P-Value
Rehabilitation Type	Physical Therapy	140 (73.7%)	90 (80.4%)	50 (64.1%)	0.017*
	None	50 (26.3%)	22 (19.6%)	28 (35.9%)	
Medication Compliance	Regular	130 (68.4%)	70 (62.5%)	60 (76.9%)	0.035*
	Irregular	60 (31.6%)	42 (37.5%)	18 (23.1%)	

Table 5 shows that stroke patients who received regular physical therapy and adhered to their medication regimen were less likely to suffer from depression. Both rehabilitation type and medication compliance were significantly associated with depression status ($P < 0.05$).

Discussion

This study aimed to identify the causes and characteristics of depression in stroke patients. Based on the analysis, 58.9% (112 out of 190) of stroke patients exhibited symptoms of depression, indicating that depression is a prevalent comorbidity in stroke survivors. This finding is consistent with previous studies, which reported depression rates ranging from 30% to 60% among stroke patients depending on the population studied and assessment methods[14].

Our results indicate that age and education are significantly associated with depression among stroke patients. Specifically, depression was more common among patients younger than 50 years (35.7%) compared to those aged over 65 years (19.6%) ($P = 0.012$). This aligns with the findings of Choi et al., who also reported that younger stroke survivors were at higher risk for depression. The higher incidence of depression in younger patients may be attributed to the profound impact stroke has on their quality of life, as they are more likely to be in their working years and may experience greater psychological distress due to sudden loss of independence[15].

The educational level also emerged as a significant predictor of depression, with 40.2% of patients having education below SSC experiencing depression, compared to only 15.2% of those with a graduate or postgraduate degree ($P = 0.042$). Lower educational attainment may be associated with poorer coping mechanisms and reduced access to healthcare resources, both of which can contribute to higher rates of depression, as noted in studies conducted in developing countries[16].

Stroke severity, as measured by the National Institutes of Health Stroke Scale (NIHSS), was a strong predictor of depression. Among patients with severe strokes (NIHSS > 16), 24.1% were depressed, while only 26.8% of those with mild strokes (NIHSS 0-5) exhibited depression ($P < 0.001$). These findings corroborate those of Hackett et al., who demonstrated that stroke severity is one of the most significant clinical predictors of post-stroke depression. Severe strokes often result in greater physical disability and functional dependency, which can lead to increased emotional distress[17].

Additionally, the time since the stroke was a significant factor. Depression was more prevalent among patients who had experienced a stroke within the past three months (64.3%) compared to those who had a stroke three to six months prior (35.7%) ($P < 0.001$). This early onset of depression may be due to the acute psychological trauma and adjustment challenges immediately following a stroke, as supported by other studies showing that depression is most prevalent in the early months post-stroke[14].

Functional outcomes, measured using the Functional Independence Measure (FIM) and the Barthel Index, were also closely associated with depression. Patients with severe dependency (FIM < 60) showed a 44.6% depression rate, while those with mild dependency (FIM > 100) had a lower depression rate of 15.2% ($P = 0.008$). Similarly, a Barthel Index score below 20, indicating severe disability, was associated with a 40.2% rate of depression ($P = 0.004$). These findings are consistent with the work of Shewangizaw et al, who noted that poor functional recovery is a major risk factor for depression in stroke survivors19. Patients who experience significant physical limitations and dependency on caregivers are likely to feel a loss of autonomy, which can contribute to feelings of hopelessness and depression[18].

Diabetes was the only comorbid condition significantly associated with depression in this study. Among patients with diabetes, 58.0% experienced depression, compared to 42.0% without diabetes ($P = 0.034$). This is in line with findings by Yang et al., who reported that stroke patients with diabetes have higher rates of depression due to the compounded effects of managing a chronic disease along with stroke recovery20. Hypertension and dyslipidemia, although common in the study population, were not significantly associated with depression, suggesting that the presence of these conditions may not be as impactful on the psychological health of stroke patients as diabetes.

Rehabilitation and treatment adherence were key factors in reducing the likelihood of depression. Patients who received regular physical therapy had an 80.4% depression rate, compared to 64.1% among those who did not receive therapy ($P = 0.017$). This suggests that physical therapy can alleviate depression by improving functional recovery and fostering a sense of progress and control over the recovery process. Similar results were observed by Lavu et al., who found that active rehabilitation programs are associated with lower depression rates in stroke survivors[21].

Moreover, regular compliance with medication was associated with lower rates of depression, with 62.5% of compliant patients being depressed compared to 37.5% of those with irregular compliance ($P = 0.035$). This highlights the importance of ensuring that patients adhere to their prescribed treatment regimens, as poor compliance may worsen stroke outcomes and, in turn, increase the risk of depression.

Conclusion

This study highlights several demographics, clinical, and treatment-related factors associated with depression in stroke patients. Younger age, lower education levels, severe stroke, early post-stroke period, functional dependency, diabetes, and lack of rehabilitation or medication compliance are all significantly linked to depression. These findings underscore the importance of early intervention and comprehensive rehabilitation programs to address the mental health challenges faced by stroke survivors. Future studies should aim to explore long-term outcomes and the impact of psychological support services on post-stroke depression.

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