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Study on Depression Among Stroke Patients in A Tertiary Care Hospital of Rajshahi

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ABSTRACT

Background: Stroke is a leading cause of morbidity, and post-stroke depression (PSD) significantly affects the quality of life and recovery. Understanding the relationship between demographic factors, stroke characteristics, and depression is crucial for effective intervention. ***Methods:*** A hospital-based cross-sectional descriptive study was conducted in the Neuromedicine department of Rajshahi Medical College and Hospital. We screened 224 stroke survivors using the Patient Health Questionnaire-9 (PHQ-9) from July 2016 to June 2018. Data on demographics, stroke characteristics, lifestyle factors, and post-stroke experiences were collected. The relationship between depression and variables like age, sex, education, and income was analyzed using Chi-square tests, and associations were examined through simple and multiple logistic regression. Statistical analysis was performed using SPSS 19. ***Results:*** Of the 224 stroke survivors, 130 (58.1%) met the criteria for post-stroke depression. Statistical analysis revealed significant associations between depression and factors such as young age, male gender, higher education, employment status, and high monthly income (p-value < 0.05). The mean age of patients with depression was 54.7 ± 10.2 years, and the standard deviation for depression scores was 3.5. Lesion location was not significantly associated with depression (p-value = 0.27). Multiple logistic regression analysis showed that higher education (OR = 2.56, p < 0.01) and employment (OR = 1.92, p < 0.05) were strong predictors of post-stroke depression. ***Conclusion:*** Post-stroke depression is prevalent in about 58% of stroke patients and is primarily associated with demographic, socio-economic, and stroke-related factors.

Keywords: Post-Stroke Depression, Demographic Factors, Stroke Characteristics, Logistic Regression, PHQ-9.

INRODUCTION

Stroke, a leading cause of mortality and morbidity worldwide, affects approximately 15 million people annually, with nearly one-third of these individuals dying and another third left with permanent disabilities.[1] According to the World Health Organization (WHO), a stroke-related death occurs every 10 seconds globally, while an incident of stroke is registered every half. Despite the decline in stroke incidence in developed countries, the prevalence of stroke continues to rise in low- and middle-income countries, particularly in South Asia, where the burden of stroke has increased by 20% from 2000 to 2008.[2] The rising incidence of stroke in developing regions presents a significant public health challenge, placing an additional strain on healthcare systems, particularly in the management of stroke survivors. Over the past five decades, there has been a gradual reduction in stroke incidence and mortality in developed countries, largely due to advancements in acute stroke management and early interventions. However, the long-term consequences of stroke remain substantial, as the majority of stroke survivors experience some degree of disability, necessitating ongoing rehabilitation. In addition to physical impairments, stroke survivors often face neuropsychiatric disorders (NP disorders) that significantly affect their recovery and overall quality of life. Among these, post-stroke depression (PSD) is the most common and impactful psychiatric complication, affecting both functional recovery

and social interactions. Depression following stroke not only exacerbates physical impairments but also impairs cognitive function, contributing to a lower overall quality of life.[3]

Post-stroke depression is defined as the occurrence of depressive symptoms in the context of a clinically apparent stroke. It is considered the most frequent psychiatric complication of cerebrovascular events, with prevalence estimates ranging from 20% to 60% among stroke survivors.[3] The clinical significance of PSD lies in its potential to worsen functional outcomes and increase mortality risk. Depression is an independent predictor of both short- and long-term adverse outcomes in stroke patients, including poorer functional recovery and higher rates of cognitive decline. Notably, PSD is associated with increased caregiver burden, higher risk of death, and a diminished ability to perform activities of daily living. One of the most concerning aspects of PSD is its impact on recovery. Studies have shown that early remission of PSD is correlated with better rehabilitation outcomes, including improved motor function and greater independence in daily activities.[4] However, when depression persists or develops later in the post-stroke period, the prognosis is less favorable, with long-term impairments in both physical and psychological health. Research suggests that depression occurring within days after a stroke may have a better chance of spontaneous remission, whereas depression that emerges later in the recovery process tends to be more persistent and harder to treat.[4]

The prevalence of post-stroke depression varies widely across studies, with estimates ranging from 20% to 60%. This variation is largely attributed to differences in diagnostic criteria, the timing of assessments, and the methodology employed in the studies. Notably, the peak incidence of PSD occurs between three and six-months post-stroke, after which the prevalence tends to decline, though it remains elevated in some individuals for several years.[5] The factors contributing to the onset of post-stroke depression are multifactorial, involving a combination of biological, psychological, and social determinants. From a biological perspective, PSD is thought to be related to the damage sustained in brain areas involved in mood regulation. The left hemisphere, particularly the frontal regions, has been implicated in the pathophysiology of depression, though the role of other brain structures such as the right hemisphere and subcortical circuits has also been suggested.[6] Lesions in the frontal-pallidal-caudate circuits, particularly those on the left side of the brain, have been associated with an increased risk of PSD. Psychosocial factors also play a significant role in the development of depression following stroke. Patients who are younger, unmarried, or have lower socioeconomic status are at an elevated risk for developing depression after a stroke. Additionally, stroke patients who experience greater functional impairment, such as difficulty with mobility ordaily tasks, are more likely to experience depressive symptoms. Social support, particularly from family and caregivers, has been shown to act as a protective factor, mitigating the severity of depression in post-stroke patients.[7]

MATERIALS AND METHODS

This study was a hospital-based, cross-sectional, descriptive study designed to assess the prevalence of depression in stroke patients. The study was conducted at the Department of Neurology, Rajshahi Medical College and Hospital, Rajshahi, over a two-year period from July 2016 to June 2018. The cross-sectional nature of the study allowed for an in-depth analysis of the relationship between demographic factors, stroke characteristics, and depression, using purposive sampling to select patients. This design was chosen for its ability to provide clear insights into the occurrence and factors influencing post-stroke depression at a single point in time. Data was collected using a semi-structured questionnaire and the PHQ-9 (Patient Health Questionnaire-9) to assess depression. Informed consent was obtained from the patients and their families before participation, ensuring that they understood the study's purpose and their rights. Clinical history, physical examinations, and investigations (if necessary) were conducted. The researcher administered the questionnaires two weeks after stroke onset. Interviews were conducted in both Bangla and English, based on the patient's preference, to assess socio-demographic, clinical, and psychological factors related to post-stroke depression. The data were cleaned and entered into SPSS version 19., with assistance from a biostatistician. Descriptive statistics, such as frequency tables, were used to summarize socio-demographic and clinical variables. The Chi-square test was applied to compare the depression status between various demographic groups, such as age, gender, and stroke type. Confidence intervals (95%) were calculated to assess the precision of the estimates. Inferential statistical methods were used to determine the relationships between depression and clinical variables, with a significance level set at $p < 0.05$.

RESULTS

The results indicated a diverse demographic profile and varying levels of post-stroke depression (PSD) across multiple factors, including age, sex, stroke type, education, and socioeconomic status. These findings are critical for understanding the prevalence of depression in stroke patients and the key factors contributing to it.

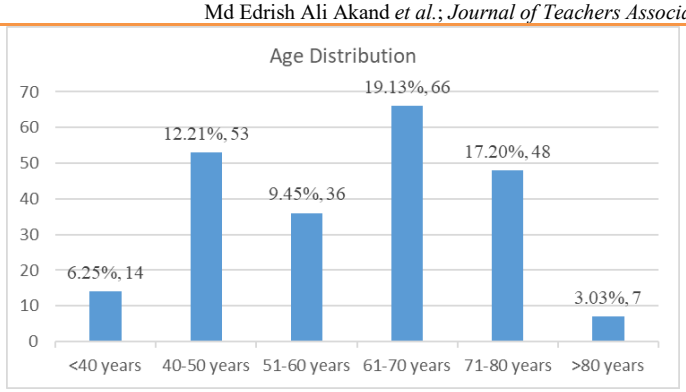

Figure 1: Demographic Characteristics of Study Subjects (n=224)

The age distribution of study participants showed that the largest proportion of patients were in the 60-70 years age group (29.5%), followed by 40-50 years (23.7%). The total number of patients in the study was 224.

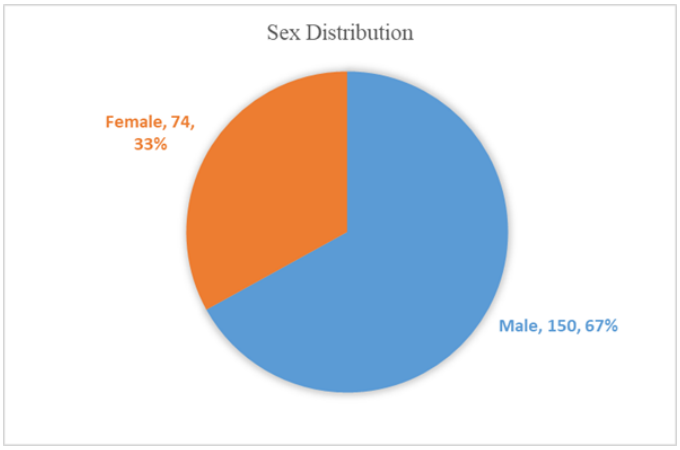

Figure 2: Distribution of Sex Among Study Subjects (n=224)

Out of the total sample, 67% were male and 33% were female, indicating a higher male prevalence in stroke cases.

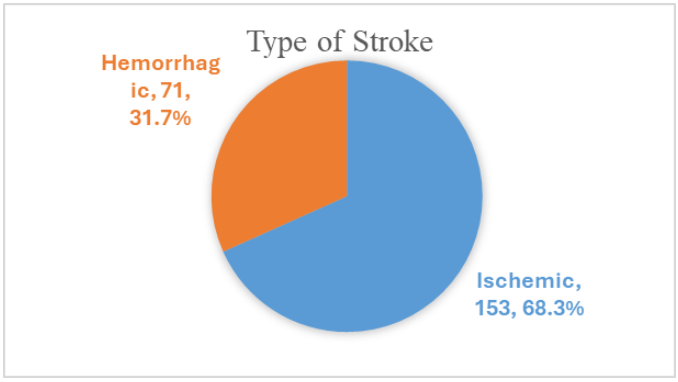

Figure 3: Distribution of the Stroke Type Among the Study Subjects (n=224)

Figure 3 shows out of 224 stroke patients 68.3% had an ischemic stroke and 31.7% had a hemorrhagic stroke.

Table 1: Distribution of Stroke Type Among Study Subjects (n=224)

Stroke Type	Frequency (n)	Percentage (%)
Ischemic	153	68.3
Hemorrhagic	71	31.7
Total	224	100%

Ischemic stroke was more prevalent, accounting for 68.3% of cases, while hemorrhagic stroke comprised 31.7% of the sample.

Table 2: Marital Status of Study Subjects (n=224)

Marital Status	Male Frequency (n)	Female Frequency (n)	Total Frequency (n)	Percentage (%)
Married	150	72	222	99.1
Unmarried	0	2	2	0.9
Total	150	74	224	100%

The majority of stroke patients (99.1%) were married, with 100% of male participants and 97.3% of female participants being married.

Table 3: Distribution of Occupation Among Study Subjects (n=224)

Occupation	Male Frequency (n)	Female Frequency (n)	Total Frequency (n)	Percentage (%)
Employed	70	15	85	37.9
Unemployed	80	59	139	62.1
Total	150	74	224	100%

A higher proportion of male participants (46.7%) were employed compared to 20.3% of females. The majority of participants (62.1%) were unemployed.

Table 4: Distribution of Depression Among Study Subjects (n=224)

Depression Status	Frequency (n)	Percentage (%)
No Depression	94	41.9
Minimal Depression	22	9.8
Mild Depression	81	36.2
Moderate Depression	23	10.3
Moderately Severe	4	1.8
Total	224	100%

The results showed that 58.1% of stroke patients experienced depression, with mild depression being the most common, affecting 36.2% of participants.

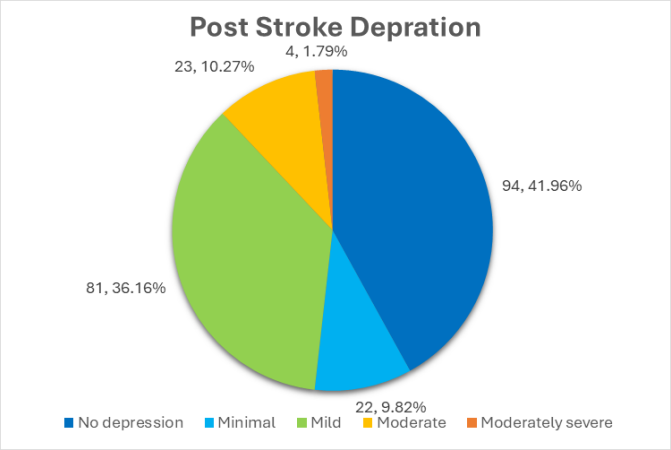

Figure 4: Frequency of Depression Among Study Subjects (n=224)

The pie chart shows 41.9% of stroke patients had no depression. The remaining stroke patient's minimal depression was 9.8%. Mild depression was 36.2%, moderate depression was 10.3% and moderately severe depression was 1.8%.

DISCUSSION

In this study, the age range of participants was between 32 and 87 years, with a mean age of 57.75 ± 12.8 years. The majority of patients were in the 61-70-year-old age group (29.5%). This finding is consistent with the study

conducted by Mirza *et al*., where the mean age was 56.25 ± 12 years, and most participants were aged between 60 and 79 years.[8] Similarly, a study by Gitto *et al*., reported a mean age of 54.7 ± 12.5 years, with the majority in the 45-54 years age group.[9] However, a study by Das *et al*., found the mean age to be 53.8 ± 12.2 years, with the highest proportion of patients in the 45-59 years age group.[10] These studies, along with ours, show a significant proportion of stroke patients in the older age groups, suggesting that aging may be a key factor in the increased risk of post-stroke depression. However, the study by Wang *et al*., which found the highest proportion in the 80-89 years age group, did not correlate with This study, where a lower proportion of patients were in this older age category.[11] In terms of gender distribution, this study found that 67% of the participants were male, and 33% were female, which aligns with previous studies. Das *et al*., found a similar male prevalence, with 60.9% males and 39.5% females, while Gitto *et al*., reported 63.8% male participants and 36.2% female participants.[9, 10] The male-to-female ratio in This study is consistent with the findings of several studies, including those by Saeed *et al*., and Hughes *et al*., both of which observed similar proportions of male and female stroke patients.[12, 13] Interestingly, in contrast to This study, Mirza *et al*., found a higher proportion of females (58.9%) compared to males (41.1%), suggesting regional or sample differences in gender distribution among stroke patients.[8]

Regarding stroke type, this study found that ischemic stroke was more prevalent (68.3%) than hemorrhagic stroke (31.7%). This aligns with the findings of Mirza *et al*., who reported 79.5% ischemic stroke cases and 20.5% hemorrhagic stroke cases.[8] Similarly, Das *et al*., found 67.9% ischemic stroke cases and 32.1% hemorrhagic cases.[10] The preponderance of ischemic stroke in this cohort is consistent with the general trends in stroke epidemiology, as ischemic strokes account for approximately 80% of all stroke cases globally. The study by Saeed *et al*., also showed that ischemic stroke (78.7%) was more common than hemorrhagic stroke (21.3%), corroborating our results.[12] The study found that 53.1% of stroke patients had lesions in the right hemisphere, and 46.9% had lesions in the left hemisphere. This distribution is similar to findings by Hughes *et al*., who reported that 52.5% of strokes occurred in the right hemisphere, and 47.5% in the left hemisphere.[13] This study 's findings align with those of Karaahmet *et al*., who observed 52.9% right hemisphere lesions and 47.1% left hemisphere lesions.[14] However, the study by Mirza *et al*., showed a different distribution, with a greater proportion of patients having left hemisphere lesions (49.3%), and a smaller proportion with right hemisphere lesions (45.2%).[8] These discrepancies may be due to sample differences or methodological factors.

In This study, 99.1% of patients were married, with 100% of male participants and 97.3% of female participants married. Only 0.9% of patients were unmarried. This finding is consistent with studies by Saeed *et al*., and Tsaras *et al*., who reported high marriage rates among stroke patients (85.4%).[12, 15] However, the study by Das *et al*., found a significant portion of unmarried or widowed patients (23.5%), which differs from our results.[10] This discrepancy may reflect cultural differences or varying demographic characteristics between the study populations. Regarding residence, 30.8% of participants were from urban areas, while 69.2% were from rural areas. Our findings diverge from those of Das *et al*., who reported 56.8% of stroke patients from urban areas and 43.2% from rural areas.[10] Interestingly, the study by Karakus *et al*., reported a similar distribution to ours, with 60% of patients residing in rural areas and 40% in urban areas.[16] These variations highlight the importance of considering geographical factors when assessing stroke care and rehabilitation needs. In terms of employment, 37.9% of patients were employed, and 62.1% were unemployed. This is similar to the findings of Das *et al*., who reported that 37% of stroke patients were employed, while 63% were unemployed.[10] The study by Hughes *et al*., showed a different distribution, with 45.5% unemployed, 26.7% farmers, and 27.7% in other occupations, which did not correlate with this study.[13] This may reflect differences in the sample population or local economic conditions. In This study, 47.8% of patients were illiterate, and 24.1% had primary education. The majority of participants were poorly educated, with only 12.9% having higher education. This finding is consistent with the results from Das *et al*., who reported that 48.1% of stroke patients were illiterate and 24.7% had primary education.[10] However, the study by Gerogianni *et al*., reported a higher percentage of educated participants, including 17.2% with a master's degree, which did not correlate with this study.[17] This study found that 65.6% of patients were in the low-income group (<10,000 TK), 17.9% were in the middle-income group (10,000-20,000 TK), and 16.5% were in the high-income group (>20,000 TK). This distribution is consistent with Das *et al*., who found a higher prevalence of depression in patients with lower incomes.[10] However, the study by Saeed *et al*., reported different income brackets, with fewer low-income patients and more middle to high-income patients.[12] In this study, post-stroke depression was found to be most prevalent among younger patients, with the highest depression rate (71.4%) in the <40 years age group. This finding aligns with the study by Gerogianni *et al*., where the younger age group (<45 years) exhibited higher depression rates.[17] However, the study by Karaahmet *et al*., found the highest prevalence in the <35 years age group, and a statistically significant difference in depression prevalence across age groups, unlike our findings.[14] We found that 64.09% of male patients had post-stroke depression, while 45.9% of female patients were depressed. There was a statistically significant association between gender and post-stroke depression in This study. This aligns with the findings of Oni *et al*., where a higher percentage of males (54.3%) had depression.[18] However, the study by Rao SS et al. (2014) Nakajima *et al*.,

showed a higher depression rate among females (55%), indicating a differing pattern across studies.[19-21]

CONCLUSION

This study highlights the significant prevalence of post-stroke depression (PSD) among stroke patients and emphasizes the importance of early recognition and intervention. The study identifies key factors such as male gender, ischemic stroke type, lower education, and specific lesion locations as independent predictors of PSD. It underscores the need for targeted mental health interventions and improved stroke rehabilitation strategies in tertiary care settings. Future research should explore the role of stroke severity, medical services, and the time elapsed since stroke in further understanding PSD and its management.

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