Journal of Chemical Health Risks

www.jchr.org

JCHR (2026) 16(2), 3502-3506 | ISSN:2251-6727

Post-Stroke Depression among Stroke Survivors: Rural Disparities and Evidence of a Treatment Gap: A Cross-Sectional Study

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(Received: 16 February 2026 Revised: 25 March 2026 Accepted: 10 April 2026)

KEYWORDS

Post stroke depression, Prevalence, Risk factors, BDI-II scale, SDS scale, Rural disparities, Treatment gap

ABSTRACT:

Introduction: Stroke, categorized as ischemic or hemorrhagic, leads to inadequate blood flow to the brain and often results in post-stroke depression (PSD) due to behavioural and biological changes.

Objectives: To assess the prevalence and risk factors of PSD and which areas [rural/urban] are more prone to develop PSD. To assess stroke patients with depression, we determine whether they are receiving anti-depressant medications or not.

Methods: A cross-sectional observational study of depression in stroke patients was conducted on 150 patients. BDI-II and SDS scales were used to assess the PSD. Data analysis was performed using MS Excel, Google Sheets, and Pearson correlation.

Results: This study assessed depression in stroke patients using the BDI-II and SDS scales and found that male patients had higher depression rates than females (BDI-II: 46.66%; SDS: 44.66%). Rural patients showed significantly higher prevalence than urban patients in both scales. Age-wise, the highest risk was observed in 61–70 years (22.66%) with BDI-II and 51–60 years (23.33%) with SDS. Comorbidities like hypertension and diabetes mellitus were associated with higher PSD rates. Most patients were not receiving antidepressant therapy. Statistical analysis showed a significant positive correlation between depression and stroke ($r = 0.4744$, $p = 0.00001$).

Conclusion: PSD was more prevalent in rural populations, with limited treatment access. Only 14–15% received antidepressants, highlighting a significant treatment gap.

1. Introduction

Stroke is a worldwide health issue, after coronary heart disease, which claims 7.2 million lives globally, it's the second principal reason for mortality[1]. All around the world, it ranks as the fourth majority of prevalent reason for disability and the second most reason for death[2]. Stroke is a potentially fatal disorder stemming from the brain's insufficient blood supply, commonly due to cerebral hemorrhage or a blocked artery, leading to brain cell death from lack of oxygen[3]. Hemorrhagic and ischemic stroke are the two primary forms. Reduced blood supply to the brain as a result of thrombosis, embolism, and systemic hypoperfusionor cryptogenic reasons, affecting brain functioncauses ischemic stroke. Hemorrhagic strokerepercussions of blood vessel rupture, leading to bleeding in or around the brain. It includes two kinds: intracerebral hemorrhage (bleeding inside brain) and subarachnoid hemorrhage (bleeding between the mind and its protective layers)[4]. Risk factors of stroke: risk variables that cannot be changedare age, sex, ethnicity, and genetics. Risk variables that can be changed are high blood pressure, mellitus diabetes, cardiac conditions, smoking, hyperlipidemia, alcohol, and sedentary behaviour/obesity. Physical activity lowers stroke risk, making it crucial for prevention[5]. Abrupt numbness or weakness in the arm, leg, or face (typically on one side of the body) are the most typical

Journal of Chemical Health Risks

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JCHR (2026) 16(2), 3502-3506 | ISSN:2251-6727

symptoms. Additional symptoms include disorientation, trouble speaking, light headedness, lack of coordination or balance, intense headaches for no apparent reason, fainting, or unconsciousness[6]. Stroke patients frequently experience post-stroke depression (PSD), often resulting from brain injury-related biological changes[7]. PSD is a common mental disease that appears as low mood, reduced vitality, disinterest or enjoyment, shame or low self-esteem, trouble sleeping when eating, and having trouble focusing. Moreover, anxiety symptoms frequently accompany depression[8]. PSD precise cause is unknown. Many scientists think that chemical alterations in the brain are the cause. This could be brought on by certain stressful situations or a genetic issue. It's most likely a mix of the two. Among the several signs of depression are: significant shift in appetite, frequently accompanied with weight gain or decrease it is quite challenging to focus. Weariness and low energy levels Feelings of powerlessness and despair feelings of guilt, self-loathing, and inadequacy, absence of enthusiasm or enjoyment for once-enjoyed activities, suicidal thoughts or thoughts of death, sleeping too much or having trouble falling asleep, depression can manifest as feelings of discouragement and anger instead of sadness. Psychotic symptoms, like delusions and hallucinations, may also be present in cases of extreme depression[9].

2. Objectives

To assess the risk factors and prevalence of depression in stroke patients. To assess which areas [rural/urban] are more prone to develop depression in stroke patients. And to assess PSD patients, we determine whether they are receiving antidepressant medications or not.

3. Methods

This was an observational cross-sectional study carried out in Neurology Department. It was conducted over a period of 6 months. The study enrolled stroke confirmed on the basis of imaging, age more than 18yrs. We excluded the patient age less than 18yrs, those patients who refused consent, patients with severe co-morbid conditions like malignant disease, renal failure or hepatic failure, past history of psychiatric illness before stroke, prior history of dementia or aphasia. Patients with stroke were selected, data collected and entered in according to our designed google form and by using Excel sheet. It includes regarding socio-demographic details (name, age, occupation), livelihood, past medical history, social habits, and neurological imaging (CT and MRI scans). BDI-II and SDS scales is used to assess the depression in stroke patients. All the data was collected, complied and a Pearson correlation analysis was performed to investigate the relationship between BDI-II scores and SDS scores.

4. Result

Prevalence of depression in stroke patients

Table 1: gender wise distribution and livelihood of PSD patients

Gender					
	In BDI-II Scale		**In SDS Scale**		**Total no. of patients**
	PSD patients	**Percentage (%)**	**PSD patients**	**Percentage (%)**	
Male	70	46.66	67	44.66	92
Female	37	24.66	28	18.66	58
Livelihood					
Urban	1	0.66	1	0.66	13
Rural	106	70.66	94	63.33	137

Table 1 Depicts the gender wise distribution and livelihood of post stroke depression patients according to BDI-II and SDS scales in 150 stroke patients. In BDI-II scale, the gender wise distribution of depression in stroke patients; male patients were 70 (46.66%) and female patients were 37 (24.66%). Livelihood of depression in stroke patients; urban patients were 1 (0.66%) and rural patients were 106 (70.66%). In SDS scale, the gender wise distribution of depression in stroke patients; male patients were 67 (44.66%) and female patients were 28 (18.66%). Livelihood of depression in stroke patients; urban patients were 1 (0.66%) and rural patients were 106 (63.33%).

Risk factors of depression in stroke patients

Table 2: Age, Past medical history and Social habits distribution

Age			
	In BDI-II Scale	**In SDS Scale**	**Total no. of**

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					patients (n=150)
	PSD patients	**Percentage (%)**	**PSD patients**	**Percentage (%)**	
20-30yrs	1	0.66	0	0	2
31-40yrs	6	4	1	0.66	8
41-50yrs	14	9.33	14	9.33	30
51-60yrs	31	20.66	35	23.33	46
61-70yrs	34	22.66	30	20	41
Above 70yrs	21	14	15	10	23
Past medical history					
Hypertension	76	50.66	64	42.66	84
Diabetes mellitus	21	14	21	14	28
Coronary artery disease	0	0	0	0	2
Cerebro vascular attack	2	1.33	2	1.33	7
Hyperthyroidism	0	0	0	0	1
Others	0	0	0	0	9
None	8	5.33	8	5.33	19
Social habits					
Alcohol	80	53.33	72	48	100
Smoking	1	0.66	1	0.66	3
Tobacco chewing	0		0	0	3
None	26	17.33	22	16	44

Table 2 Depicts risk factors of depression in stroke victims according to BDI-II and SDS scales out of 150 stroke patients. Risk factors like age, past medical history, social habits. In BDI-II scale, the risk of age group between 61-70years old is high (n=34; 22.66%) and the lowest risk of age group between 20-30years old is 1 (0.66%). The comorbidities like hypertension (n=76; 50.66%) and diabetes mellitus (n=21; 14%) are higher risk of developing PSD and comorbidities like coronary artery disease and hyperthyroidism and others (n=0; 00%) are lowest risk of developing PSD. Social habits, hypertension (53.33%) is higher risk of developing PSD and tobacco chewing (00%) is lowest risk of developing PSD.

In SDS scale, the risk of age group between 51-60years old is high (n=35; 23.33%) and the lowest risk of age group between 20-30years old is 0 (00%). The comorbidities like hypertension (n=64; 42.66%) and diabetes mellitus (n=21; 14%) are higher risk of developing PSD and comorbidities like coronary artery disease and hyperthyroidism and others (n=0; 00%) are lowest risk of developing PSD. Social habits, hypertension (48%) is higher risk of developing PSD and tobacco chewing (00%) is lowest risk of developing PSD.

BDI-II and SDS scales results:

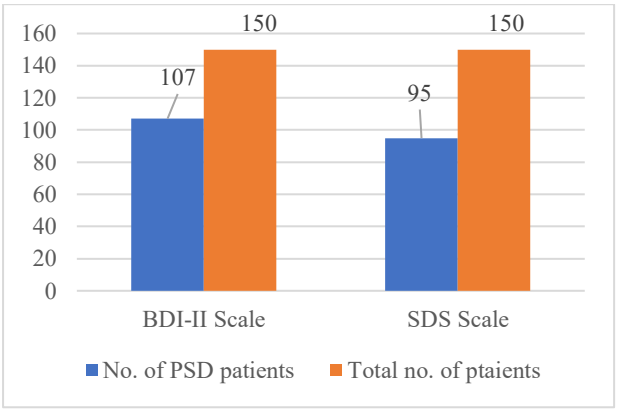

Figure 1: Comparison between BDI-II And SDS Scales

The fig 1 Depicts the comparison between the BDI-II & SDS scales. The no. of depressive patients from BDI-II scale are more (71%) compared with SDS scale (63.3%).

Table 3: Assessment of PSD Patients on Anti-depressant medications:

	Total no. of patients who are having depression	**No. of patients who are not taking antidepressant medications**	**No. of patients who are taking antidepressant medications**

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JCHR (2026) 16(2), 3502-3506 | ISSN:2251-6727

BDI-II Scale result	107	92	15
Percentage (%)		86	14
SDS Scale result	95	80	15
Percentage (%)		84.2	15.8

Table 3 depicts the how many depressive patients are taking and not taking anti-depressant medications according to BDI-II and SDS scale. In BDI-II scale, out of 107 PSD patients 92 (86%) were not taking anti-depressant medications and 15 (14%) were taking anti-depressant medications. In SDS scale, out of 95 PSD patients 80 (84.2%) were not taking anti-depressant medications and 15 (15.8%) were taking anti-depressant medications.

Table 4: Statistical analysis:

Pearson correlation between BDI-II and SDS scales	
R value	0.4744
P value	0.00001

Table 4 Depicts a statistical analysis was performed to investigate the relationship between depression and stroke by using BDI-II and SDS scores. The results showed a link that was fairly positive r value is 0.4744 and p value is 0.00001 indicating that depression is associated with stroke. Since the p-value is very low, this correlation is statistically significant.

5. Discussion

Stroke is a condition that has numerous side effects. One of the major issues in the post-stroke phase is PSD. The primary goal of the research is to find out the prevalence and risk variables of depression in stroke victims and to assess which areas are more prone to develop the depression in stroke patients and whether the depressive patients are taking antidepressants or not. According to Liming Dong and et al study, females are more prevalent to develop PSD than males, contrast to our study[10]. According to Carl Hörnsten and et al study, age above 65years old are higher risk of developing PSD, almost similar to our study[11]. According to Qianru Cai and et al study, Depression was more common in stroke patients in rural areas than in metropolitan ones, similar as our study[12]. According to GharibFawi Mohammed and et al study, Smoking, hypertension, greater physical impairment, and reduced cognitive function were identified as significant risk factors for PSD, almost as similar as our study[13]. According to Marie Eriksson and et al study,Approximately 50% of patients who reported feeling depressed three months after the stroke did not receive antidepressant medication, as similar as our study[14].

In this study, a higher percentage of patients with depression was observed in rural areas compared to urban areas, indicating differences in healthcare systems. Rural regions face challenges such as low mental health awareness, limited access to specialized care, follow-up issues, and budget constraints, which may elevate the risk of depression in rural stroke survivors and delay symptom onset. Notably, only 15% of patients were on antidepressant medication, highlighting a significant treatment gap despite the high prevalence of post-stroke depression (PSD). Underdiagnosis, insufficient screening, stigma surrounding mental health, and limited access to psychiatric care in rural regions may contribute to disparities in mental health treatment. The high prevalence of depression among rural patients, alongside low antidepressant usage, suggests that conditions like PSD remain largely undiagnosed and undertreated.

So, the Depression is one of the effects of a stroke and it is underdiagnosed and undertreated. we need to identify it in early stages to enhance the standard of living for the stroke patients. This study reveals male patients and above 40years old patients were more prone to develop PSD. Hypertension, alcohol may the risk factors of the PSD. The rural patients are more prevalent to develop PSD compared to urban patients. And 14-15% of patients receiving antidepressant therapy. The final conclusion of this study is significant burden of post-stroke depression, particularly among rural residents, and a significant gap in antidepressant use. Addressing these disparities through improved screening and management strategies is necessary to improve outcomes for stroke survivors.

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