International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Prevalence and Predictors of Anxiety and Depression One Month After First-Ever Ischemic Stroke: A Prospective Study

Navuddh Oam[1], Kakada Bin[2], Kimeach Kong[3], Samith Sourn[4], Navuth Chum[5]

[1]Department of Neurology, Khmer Soviet Friendship Hospital, St 271, Beung Keng Kang 1, Phnom Penh, Cambodia
Corresponding author Email: *na.rcammed[at]ymail.com*

[2, 5]Department of Neurology, Khmer Soviet Friendship Hospital, St 271, Beung Keng Kang 1, Phnom Penh, Cambodia

[3, 4]Techo Santepheap National Hospital, Win-win Boulevard, Prek Phnov, Phnom Penh, Cambodia

Abstract: ***Depression and anxiety following a stroke can have a detrimental impact on patient outcomes; however, healthcare providers may sometimes fail to recognize these conditions as they primarily focus on the physical impairments of stroke survivors in the immediate aftermath of an episode. This research aimed to examine the frequency and determinants of depression, anxiety, or both together one month after an ischemic stroke by conducting a prospective cross-sectional study on a group of 95 patients who were hospitalized due to acute ischemic stroke at the Department of Neurology, Khmer Soviet Friendship Hospital, Cambodia and then monitored for a month. Data were collected by interviews using a series of structured questionnaires in addition to clinical data retrieved from patients' medical records. To identify predictors of depression, anxiety, and anxiety after stroke, we initially conduct a series of univariate logistic analyses for each independent variable. We then selected variables with p <0.10 in bivariate logistic analyses and included them in the multivariate logistic regressions. The study, involving 95 ischemic stroke patients, revealed that 29.5% were male while 70.5% were female. Out of the participants, 33.6% experienced anxiety, 31.5% were identified as depressed, and 32.6% had both depression and anxiety concurrently. Using a multiple logistic regression analysis, we identified anxiety as a predictor of depression; depression as a predictor of anxiety; and female sex, headaches, and swallowing difficulty as predictors of the comorbidity of depression and anxiety. It was concluded that periodical screenings for poststroke anxiety and depression from an early stage in a hospital to years after stroke in a community are recommended to provide better chances for early identification of patients at risk because anxiety and depression may manifest at any stage of recovery.***

Keywords: **depression, anxiety, stroke, poststroke**

1. Introduction

Depression and anxiety represent the most prevalent mood disorders among individuals who have experienced a stroke, with depression affecting approximately 13.7-31.1% of survivors as per the American Stroke Association in 2014, and anxiety impacting around 20.0-38.3% of cases [1]. These post-stroke mood disorders not only hinder active participation in rehabilitation and impede functional recovery but also lead to reduced social engagement, diminished quality of life, and heightened disability levels [2]

Mood disorders following a stroke can arise at any point during the recovery process [3, 4] and frequently persist or recur over time [3, 5]. The prevalence of post-stroke depression (13.7-31.1%) is notably higher than the likelihood of depression in the general population without concomitant physical ailments, which stands at 3.2% worldwide [6]. Focus primarily on physical recovery during stroke treatment may lead to the underrecognition of depression and anxiety, both early on and in the long term thereby resulting in inadequate diagnosis and treatment of these conditions [2, 4]. Identifying these symptoms is complex as they often intertwine with stroke-related impairments [7, 8].

In Cambodia, cultural aspects can further complicate the ability of healthcare providers to accurately diagnose depression and anxiety post-stroke. Consequently, mood disorder symptoms in Cambodian individuals are frequently expressed through vague and unexplained physical complaints like body pain or headaches [9], making early post-stroke diagnosis particularly challenging. Therefore the purposes of this study to (1) determine the prevalence of depression and anxiety in first-ever ischemic stroke patients at one month after stroke, (2) examine all the potential risk factors and determine the independent predictors of early-onset depression after first-ever ischemic stroke, (3) analyze the association between depression and anxiety and clinical severity based on NIHSS in ischemic stroke patients, (4) analyze the relationships of age, gender, hemisphere of lesion, functional independence, and cognitive functioning with depression and anxiety one month post stroke.

2. Material and Methods

2.1 Study Population

All patients, both sexes, age equal to or more than 18 years old who admitted to Department of Neurology, Khmer-Soviet Friendship Hospital with first-ever ischemic stroke. All patients with first-ever stroke, had a clinically diagnosed new stroke within a week, with complete medical record and head CT or MRI were included in the study. The exclusion for the patients who had experienced an in-hospital stroke or transient ischemic attack, pregnant and lactating women, history of anxiety or depression treatment.

2.2 Study Setting and Questionnaire

The study was conducted at Department of Neurology, Khmer Soviet Friendship Hospital (KSFH). This is a cross-sectional, descriptive study in patients hospitalized with acute ischemic stroke.

This study was conducted after obtaining the approval from the study hospital and enrolled patients who were evaluated and referred by neurologists at Department of Neurology, KSFH. After informed consent was obtained from each patient, the investigator conducted interviews with individual patients using structured questionnaires. The case record form consisted of a variety of items on patients' characteristics related to ischemic stroke. A spouse or adult child who provides ancillary information and patients' medical records confirmed patient responses.

We assessed depression and anxiety using the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) [10]. HADS consists of two subscales (HADS-depression and HADS-anxiety) with 7 items each. Each item uses a 4-point Likert scale (from 0 = not at all to 3 = very often). Each subscale scores range 0-21, with higher scores indicating a greater likelihood of depression and anxiety. We used a score of 8 or above on the HADS-depression and HADS-anxiety subscales as criteria for depression and anxiety, as recommended by the scale developers.

2.3 Data Analysis

All data were stored in Excel and data entry was carried out with coding and verification. For description of baseline characteristics, number and percentage were used for categorical variables, and mean with standard deviation or median with 25th-75th percentile range were used for continuous variable according to their distribution. Baseline characteristics such as gender, age, nationality, occupation are described in number and percentages for categorical variables, and median and interquartile range for continuous variables. To identify predictors of depression, anxiety, and anxiety after stroke, we initially conduct a series of univariate logistic analyses for each independent variable. We then selected variables with $p < 0.10$ in bivariate logistic analyses and included them in the multivariate logistic regressions. SPSS Version 22 was used for data analysis, and an alpha of 0.05 was used to determine statistical significance.

2.4 Ethical Consideration

This study was conducted with approval from the committee of Khmer Soviet Friendship Hospital. Participants were consented at the beginning of the survey; it is mentioned to be totally voluntary, confidential and the right to withdraw at any time. All participants were recorded anonymous. Following the survey process, participants will be asked for voluntary verbal informed consent for participation in the study and fill in the questionnaire as an agreement.

3. Results

3.1 Demographic Background

This prospective cross-sectional study was conducted at the Department of Neurology, Khmer-Soviet Friendship Hospital. Patients experiencing acute ischemic stroke were admitted between January 1, 2021, and April 30, 2021. The demographic characteristics are summarized in Table 1, 2. Of the 95 subjects included in the study, 28 (29.5%) were male, while 67 (70.5%) were female. A statistically significant relationship was observed among gender, anxiety, and depression. The median age of the study population was 65 years (IQR 55-75 years), showing a similar distribution between the anxiety and depression groups. Among the patients, 16 (16.8%) were aged 50 years or younger, while 79 (83.2%) were aged 51 years or older. The majority of patients were reported to be living with a spouse. Regarding educational attainment, 83 (87.4%) had completed education up to middle school level, while 12.6% had education beyond high school.

Table 1: Differences in Anxiety by Sample Characteristics

Characteristics	Total Subjects No. (%)	Absent[1] (n=65) No. (%)	Present[2] (n=30) No. (%)	p-value
Gender	95 (100)			**0.01**
Female	67 (70.5)	48 (73.8)	19 (63.3)	
Male	28 (29.5)	17 (26.2)	11 (36.7)	
Age group (years)	65 (55-75)*			0.172
≤50	16 (16.8)	11 (16.9)	5 (16.7)	
≥51	79 (83.2)	54 (83.1)	25 (83.3)	
Living with Spouse				0.17
Yes	94 (98.9)	64 (98.5)	30 (100)	
No	1 (1.1)	1 (1.5)	0 (0)	
Educational Status				0.784
≤Middle school	83 (87.4)	57 (87.7)	26 (86.7)	
≥High School	12 (12.6)	8 (12.3)	4 (13.3)	

*Median (IQR). Note: [1]present (HADS-depression score 8-21 and HADS-anxiety score 8-21); [2]absent (HADS- depression scores 0-7 and HADS- anxiety score 0-7).

Table 2: Differences in Depression by Sample Characteristics

Characteristics	Total Subjects No. (%)	Absent[1] (n=63) No. (%)	Present[2] (n=32) No. (%)	p-value
Gender	95 (100)			**0.01**
Male	67 (70.5)	45 (71.4)	22 (68.8)	
Female	28 (29.5)	18 (28.6)	10 (31.3)	
Age group (years)	65 (55-75)*			0.21
≤50	16 (16.9)	12 (19.0)	4 (12.5)	
≥51	79 (83.1)	51 (81.0)	28 (87.5)	
Living with Spouse				0.15
Yes	94 (98.9)	62 (98.4)	32 (100)	
No	1 (1.1)	1 (1.6)	0 (0)	
Educational Status				0.62
≤Middle school	83 (87.3)	54 (85.7)	29 (90.6)	
≥High School	12 (12.7)	9 (14.3)	3 (9.4)	

*Median (IQR). Note: [1]present (HADS-depression score 8-21 and HADS-anxiety score 8-21); [2]absent (HADS- depression scores 0-7 and HADS- anxiety score 0-7).

3.2 Predictors of Poststroke Depression and Anxiety

Among anxiety and depression groups, there is no significant difference for location of lesion stroke severity, cognitive and level of dependence. Bu there is significant difference for speech difficulty, swallowing difficulty, impaired mobility with the p value of <0.05. See Table 3, 4.

Table 3: Logistic regressions results of poststroke anxiety as dependent variables. OddsRatio is presented for significant predictor variables.

Characteristics	Total Subjects No. (%)	Absent[1] (n=65) No. (%)	Present[2] (n=30) No. (%)	p-value
Lesion location				0.18
Left hemisphere	44 (46.3)	33 (50.8)	11 (36.7)	
Right hemisphere	52 (53.7)	32 (49.2)	19 (63.3)	
Stroke Severity (NIHSS)*	6.8 (2.9)	5.3 (1.9)	10.0 (2.1)	0.17
Cognitive (MMSE)*	25.3 (0.8)	25.2 (0.8)	25.5 (0.7)	0.98
Level of dependence (BI)*	68.5 (7.4)	70.0 (6.9)	65.1 (7.5)	0.82
Speech difficulty				**0.02**
Yes	38 (40.0)	13 (20.0)	25 (83.3)	
No	57 (60.0)	52 (80.0)	5 (16.7)	
Swallowing difficulty				**0.03**
Yes	35 (36.8)	16 (24.6)	19 (63.3)	
No	60 (63.2)	49 (75.4)	11 (16.7)	
Impaired mobility (mRS)				**<0.001**
Yes	63 (66.3)	38 (58.5)	25 (83.3)	
No	32 (33.7)	27 (41.5)	5 (16.7)	
Headache				0.11
Yes	39 (41.1)	22 (33.8)	17 (56.7)	
No	56 (58.9)	43 (66.2)	13 (43.3)	

Note: * Mean (SD). [1]present (HADS-depression score 8-21 and HADS-anxiety score 8-21); [2]absent (HADS- depression scores 0-7 and HADS- anxiety score 0-7).

Table 4: Logistic regressions results of poststroke depression as dependent variables. Odds Ratio is presented for significant predictor variables.

Characteristics	Total Subjects No. (%)	Absent[1] (n=65) No. (%)	Present[2] (n=30) No. (%)	p-value
Lesion location				0.14
Left hemisphere	44 (46.3)	31 (49.2)	13 (40.6)	
Right hemisphere	52 (53.7)	32 (50.8)	19 (59.4)	
Stroke Severity (NIHSS)*	6.8 (2.9)	5.4 (1.9)	9.6 (2.6)	0.20
Cognitive (MMSE)*	25.3 (0.8)	25.2 (0.8)	25.4 (0.7)	0.06
Level of dependence (BI)*	68.5 (7.4)	70.0 (6.8)	65.4 (7.8)	0.17
Speech difficulty				**0.04**
Yes	38 (40.0)	13 (20.6)	25 (78.1)	
No	57 (60.0)	50 (79.4)	7 (21.9)	
Swallowing difficulty				**0.02**
Yes	35 (36.8)	14 (22.2)	21 (65.6)	
No	60 (63.2)	49 (79.4)	11 (34.4)	
Impaired mobility (mRS)				**<0.01**
Yes	63 (66.3)	37 (58.7)	26 (81.3)	
No	32 (33.7)	26 (41.3)	6 (18.8)	
Headache				0.30
Yes	39 (41.1)	20 (31.7)	19 (59.4)	
No	56 (58.9)	43 (68.3)	13 (40.6)	

Note: * Mean (SD). [1]present (HADS-depression score 8-21 and HADS-anxiety score 8-21); [2]absent (HADS- depression scores 0-7 and HADS- anxiety score 0-7).

3.3 Multivariate Logistic Regression

In the multivariate logistic regression models, we identified anxiety as a predictor of depression, whereas depression as a predictor of anxiety. We also identified that female sex, headaches, and swallowing difficulty were predictors of the concurrence of depression and anxiety (see Table 5).

Table 5: Multivariate logistic regression for the predictor of anxiety and depression

Variable	Predictor	OR (95% CI)	P-value
Anxiety	Sex (male)	1.45 (.76 - 2.76)	0.258
	Swallowing difficulty	2.64 (.92 – 7.60)	0.071
	Impaired mobility	0.92 (.46 – 1.85)	0.821
	Speech difficulty	1.26 (.64 – 2.46)	0.500
	Impaired cognition	1.35 (.63 – 2.89)	0.441
	Headaches	2.08 (.93 - 4.66)	0.074
	Depression	13.16 (4.85 - 35.67)	**<0.001**
Depression	Sex (male)	1.69 (.69 – 4.11)	0.250
	Age (≤ 60)	1.30 (.56 – 3.05)	0.545
	Without spouse (with spouse)	0.71 (.20 – 2.45)	0.585
	Living alone (with family)	0.61 (.17 – 2.22)	0.453
	Impaired mobility	1.50 (.68 – 3.30)	0.315
	Speech difficulty	1.91 (.86 – 4.26)	0.115
	Impaired cognition	2.22 (.75 – 6.56)	0.147
	Anxiety	15.15 (5.61 - 40.88	**<0.001**
Concurrent	Sex (female)	1.21 (.59 – 2.46)	**0.009**
	Swallowing difficulty	5.30 (1.87- 15.01)	**0.002**
	Impaired mobility	2.17 (1.62 – 2.23)	**0.02**
	Speech difficulty	1.35 (.72 – 2.52)	**0.03**
	Headaches	2.29 (1.10- 4.80)	**0.028**

4. Discussion

Several important findings resulted from our study. The prevalence of poststroke depression or anxiety in this study was similar to the prevalence in previous studies: 31.5% versus 13.7-31.1% for depression and 33.6% versus 20.0-38.3% for anxiety [3, 7, 11]. The prevalence of concurrent depression and anxiety after stroke (32.6.7%) was much a bit higher in our study than at 3 months after stroke (12.3%) [8]. Increased prevalence over the course of recovery such as 12.3% at 3 months [8], 17.3% at 2-5 years [12], and 56.9-73.2% at 2-10 years after stroke [3] indicates that the negative health outcomes due to depression and anxiety after stroke could be continued across stages of recovery and even more significant in later stages. These findings suggest that screenings for both depression and anxiety should be included in a routine checkup from an early stage in a hospital (i.e., at 1 month) to years after stroke in a community. This will provide better opportunities for early identification of patients at risk because depression and anxiety may manifest at any stage of recovery [4].

Consistent with reports of research in the general population and stroke patients[2, 3], patients who were women and experienced impairments in physical or cognitive functions were more likely to exhibit depression, anxiety, or concurrent depression and anxiety in this study. The high correlation (r = 0.70) between depression and anxiety in our study was similar to the correlations (0.59 - 0.63) reported in other studies [8, 12]. In line with prior studies, poststroke anxiety was a significant predictor of poststroke depression [3, 13], and poststroke depression was a significant predictor of poststroke anxiety [14].

We found that a headache was among the predictors of concurrent depression and anxiety. This could be explained by the fact that a headache is a somatically expressed mood disorders, which is culturally acceptable among Cambodian people [9,15]. Also, a headache is among the risk factors or warning signs of stroke [16]. Therefore, it is possible that participants who have experienced a headache at the onset of stroke might have felt anxious about having another stroke by connecting a headache with a stroke when they had a persistent headache after stroke.

Particular attention should be paid to female patients and those who have difficulty swallowing and headaches, as these patients were at a higher risk for concurrent depression and anxiety. Additional attention to patients' expression of culture-bound somatic symptoms (e.g., headaches) will lead to an integrated and holistic assessment of individuals who cannot directly express symptoms of depression and anxiety after stroke. This approach may be critical because displays of negative emotions (e.g., depression) through somatic symptoms (e.g., a headache) are culturally and socially acceptable in Cambodian culture and most Asian cultures where group harmony is valued [16, 17]. In contrast, direct display of emotional distress is favored in Western cultures (e.g., the United States) where independence and individualism are valued [16].

5. Conclusion

In conclusion, this study highlights a prevalence of poststroke depression, anxiety, and concurrent depression and anxiety among first-ever ischemic stroke patients at Department of Neurology, KSFH. Considering the negative impact of depression, anxiety, and concurrent depression and anxiety on patient outcomes, early and periodic assessments using a valid and reliable screening tool will promote the timely recognition of individuals who have these mood disorders. Such assessments may lead to appropriate treatments and ultimately improve patients' health outcomes, including reduction of disability and mortality after stroke.

6. Limitation of the Study

This study was a single center with limited number of study subjects. Due to the nature of the study design (i.e., a cross-sectional, descriptive study), we could not capture the sequence of depression and anxiety onsets and their changes over the course of recovery. Also, the study findings may not be generalizable to stroke patients in other populations or settings because the data were collected at a single location in

Cambodia. Self-report of preexisting conditions (e.g., depression, anxiety, and impairments in cognition or mobility) may be another potential limitation of our study.

Conflict of Interest Statement

All authors disclose no conflict of interest related to this submission.

References

[1] American Stroke Association. (2014). Post-stroke mood disorders. Retrieved from http://www.strokeassociation.org /STROKEORG/LifeAfterStroke/RegainingIndependence/EmotionalBehavioralChallenges/Post-Stroke-Mood-isor- ders_UCM_467460_Article.jsp

[2] De Ryck, A., Brouns, R., Geurden, M., Elseviers, M., De Deyn, P. P., & Engelborghs, S. (2014). Risk fac- tors for poststroke depression: Identification of inconsistencies based on a systematic review. *Journal of Geriatric Psychiatry and Neurology, 27*, 147-158.

[3] Ayerbe, L., Ayis, S., Rudd, A. G., Heuschmann, P. U., & Wolfe, C. D. (2011). Natural history, predictors, and associations of depression 5 years after stroke. *Stroke, 42*, 1907-1911.

[4] Chriki, L. S., Bullain, S. S., & Stern, T. A. (2006). The recognition and management of psychological reactions to stroke: A case discussion. *Primary Care Companion to the Journal of Clinical Psychiatry, 8*, 234-240.

[5] Choi-Kwon, S., Han, K., Choi, S., Suh, M., Kim, Y.-J., Song, H., Kim, J. S. (2012). Poststroke depression and emotional incontinence: Factors related to acute and subacute stages. *Neurology, 78*, 1130-1137.

[6] Moussavi, S., Chatterji, S., Verdes, E., Tandon, A., Patel, V., & Ustun, B. (2007). Depression, chronic diseases, and decrements in health: Results from the World Health Surveys. *Lancet, 370*, 851–858.

[7] Burton, L.-J., & Tyson, S. (2015). Screening for mood disorders after stroke: A systematic review of psychometric properties and clinical utility. *Psychological Medicine, 45*, 29-49.

[8] Barker-Collo, S. L. (2007). Depression and anxiety 3 months post stroke: Prevalence and correlates. *Archives of Clinical Neuropsychology, 22*, 519-531.

[9] Bernstein, K. S. (2007). Mental health issues among urban Korean American immigrants. *Journal of Transcultural Nursing, 18*, 175-180.

[10] Zigmond, A. S., & Snaith, R. P. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica, 67*, 361- 370.

[11] Broomfield, N. M., Quinn, T. J., Abdul-Rahim, A. H., Walters, M. R., & Evans, J. J. (2014). Depression and anxiety symptoms post-stroke/TIA: Prevalence and associations in cross-sectional data from a regional stroke registry. *BMC Neurology, 14*, 198.

[12] Bergersen, H., Frøslie, K. F., Stibrant Sunnerhagen, K., & Schanke, A.-K. (2010). Anxiety, depression, and psychological well-being 2 to 5 years poststroke. *Journal of Stroke and Cerebrovascular Diseases, 19*, 364-369.

[13] Morrison, V., Pollard, B., Johnston, M., & MacWalter, R. (2005). Anxiety and depression 3 years following stroke: Demographic, clinical, and psychological predictors. *Journal of Psychosomatic Research, 59*, 209-213.

[14] Kroeders, R., Benhardt, J., & Cumming, T. (2013). Physical inactivity, depression and anxiety in acute stroke. *International Journal of Therapy and Rehabilitation, 20*, 289-293.

[15] Kramer, E. J., Kwong, K., Lee, E., & Chung, H. (2002). Cultural factors influencing the mental health of Asian Americans. *Western Journal of Medicine, 176*, 227-231.

[16] Katsarava, Z., & Weimar, C. (2010). Migraine and stroke. *Journal of the Neurological Sciences, 299*, 42-44.

[17] Grover, S., & Ghosh, A. (2014). Somatic symptom and related disorders in Asians and Asian Americans. *Asian Journal of Psychiatry, 7*, 77-79.