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Assessing the Prevalence and Associated Risk Factors of Post-Stroke Depression among Stroke Survivors in Blantyre, Malawi

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Abstract

Background:

Post-stroke depression is a common neuropsychiatric complication affecting stroke survivors worldwide, with a global prevalence of 20–50%. Establishing its prevalence and associated risk factors is crucial for developing effective interventions and improving patient outcomes; however, this remains understudied in Malawi. This study aimed to determine the prevalence and associated risk factors of post-stroke depression among stroke survivors in Blantyre, Malawi.

Methods:

One hundred and ten adults with stroke were recruited from those receiving care at Kachere Rehabilitation Centre and Queen Elizabeth Central Hospital in Blantyre, Malawi. The Patient Health Questionnaire-9 was administered to assess depression in each patient. In addition, patients' demographic details, socioeconomic status, and medical history were recorded. Scores from the Patient Health Questionnaire-9 were categorised as normal (0), mild depression (1–4), moderate depression (5–9), moderately severe depression (10–19), and severe depression (20–27). One-way ANOVA was used to compare the mean age between depression levels, while Pearson's Chi-square test was used to assess the relationship between depression levels and the remaining patient characteristics.

Results

Sixty-one patients (55.5%) were males. The mean age of patients was 56.74 ± 13.70 (range: 29–88 years). The prevalence of depression was 47.3%. The level of depression varied from mild (31.8%) to severe (1.8%). However, depression levels did not show statistically significant mean age differences (one-way ANOVA, $p = 0.098$). Similarly, depression levels were not significantly associated with patients' demographics, socioeconomic status, or medical history (Chi-Square, $p > 0.05$).

Conclusions

This study reveals a high prevalence of depression among stroke survivors in Blantyre, Malawi. The results emphasise the need for routine mental health assessments and targeted interventions to improve patient outcomes and quality of life in this population.

BACKGROUND INFORMATION

Stroke is one of the leading causes of death and disability worldwide (1). It is estimated that one in every four adults will experience a stroke during their lifetime (2). Globally, there are an estimated 12.2 million new cases and 6.5 million stroke-related deaths annually, and stroke is particularly prevalent in low- and

middle-income countries (2). In particular, low- and middle-income countries account for 80% of all stroke incidences and 77% of all stroke survivors globally (2). In Malawi, stroke ranks as the 6th highest cause of death among adults (3). This is mainly driven by an increasing burden of non-communicable diseases such as hypertension and diabetes, as well as limited access to preventive and rehabilitative services (4).

Stroke commonly presents with focal neurological deficits that can be classified into consciousness, cognition, motor, and sensory impairments (5). Current epidemiological stroke studies have focused on mortality and recurrence rather than long-term outcomes (6). This focus on mortality and recurrence has left a growing demand for literature that addresses the morbidity and quality of life of patients with stroke after the initial stroke episode, as this disease can give rise to multiple complications with varying severity.

Stroke impairments can be permanent or temporary and may impose physical and financial burdens on the family. Therefore, caring for stroke survivors can be complex and often present physical, mental, and social demands to the caregivers. It is thus not surprising that mental health problems manifest to both stroke survivors and their caregivers, resulting from direct brain damage, maladaptive reactions to stroke sequelae, and care responsibilities (7). In general, vascular diseases, such as stroke, have been linked to a significant contribution to psychiatric comorbidities (7).

Depression is a major public health concern and largely considered a leading cause of disabilities. Characterized by persistent low mood, loss of interest in activities, and reduced energy, depression negatively impacts an individual's social and occupational functioning. According to the World Health Organization (WHO), depression affects over 280 million people globally and frequently co-occurs with chronic illnesses, such as stroke (8). In Africa, the management of depression is affected by several factors, including the unavailability of mental health services. Most African countries have inadequate mental health experts, with an estimated 1.4 professionals available per 100 000 people. This is far less than the WHO-recommended 9 per 100,000 ratios (9). In addition to these challenges, mental health issues in Africa face social stigma, inadequate funding, and a lack of political will.

Post-stroke depression is a common mental health condition affecting stroke survivors, with global prevalence estimated between 20 and 50% (10). In Sub-Saharan Africa, the prevalence of post-stroke depression is estimated at 29% observed at any time point, 28% within a month of stroke occurrence, 31% within 1–6 months, and 25% more than 1 year after stroke occurrence (10). Post-stroke depression often happens as survivors deal with the experience of living with stroke, which is often frightening and poorly understood by survivors. More often, survivors are unable to evaluate their situation objectively, which may lead to the projection of blame outwardly or towards the self (7). Post-stroke depression affects the recovery, quality of life, and mortality of patients with stroke and significantly increases the risk of stroke reoccurrence (11).

Post-stroke depression research dates back to 1955, when the association between stroke and depression was demonstrated (12). Since then, there has been a growing interest in establishing the

prevalence of post-stroke depression and examining associated risk factors. Some of the risk factors reported include family history of depression, medical and psychiatric history, stroke characteristics, functional and cognitive impairments, and social support (13). While the prevalence of post-stroke depression and its associated risk factors has been reported globally, empirical data for the Malawian population is not available. Cultural beliefs, stigma surrounding mental health issues and inadequate mental health services in Malawi may play a crucial role in post-stroke depression occurrence, thus affecting the prevalence and associated risk factors in this setting. This study was conducted to establish the prevalence of post-stroke depression and examine associated risk factors among stroke survivors receiving care at Queen Elizabeth Central Hospital and Kachere Rehabilitation Centre in Blantyre, Malawi.

METHODOLOGY

1.1 Study design

This study employed a quantitative, cross-sectional design.

1.2 Study setting and population

Adult stroke patients (≥ 18 years) undergoing rehabilitation at Kachere Rehabilitation Centre and those attending the neurology clinic at Queen Elizabeth Central Hospital were targeted for this study.

1.2.1 Inclusion criteria

Patients with the following characteristics were eligible for inclusion in this study:

- Adult patients (≥ 18 years)
- Patients diagnosed with stroke using clinical presentation and confirmed or not confirmed with imaging
- Stroke had occurred in the last 3 to 12 months.

1.2.2 Exclusion criteria

Patients with the following characteristics were excluded from this study:

- Patients with a mini mental state examination (MMSE) score of less than 18
- Patients diagnosed with depression or anxiety prior to the occurrence of stroke
- Patients with a previous history of stroke
- Patients with aphasia
- Stroke survivors on anti-hypertensive drugs (like methyldopa and reserpine) that could precipitate depression
- Patients with traumatic brain injury

1.3 Sample size determination and sampling method

A total of 110 patients receiving care at Queen Elizabeth Central Hospital and Kachere Rehabilitation Centre were sampled using a simple random sampling technique. The sample size was calculated using the following formula:

$$n = p(1-p)\left(\frac{z_{1-\alpha/2}}{MoE}\right)^2$$

To calculate the sample size, the following parameters were considered: Z = 1.96, p = 22.9, and MoE = 0.08. These parameters were estimated based on previous comparable studies (8).

1.4 Data collection

Data were collected through structured interviews. Prior to these interviews, the MMSE questionnaire was administered to patients who met the study inclusion criteria. Patients with MMSE scores > 18 were considered eligible for data collection, and those with MMSE scores < 17 were excluded from the study. A structured questionnaire was used to collect information on patients' demographic details, socioeconomic status and medical history. Details collected from patients using this questionnaire included sex, age, marital status, level of education, employment status, location of stay (urban, peri-urban, or rural), total monthly household income, current comorbidities, side of the lesion in the brain, smoking status, alcohol consumption, family history of depression, and family history of stroke. In addition, the Patient Health Questionnaire-9 (PHQ-9) was administered to assess the severity of depression in these patients.

1.5 Data analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS version 30.0). Statistical significance was considered for p-value of less than 0.05. Descriptive statistics were used to summarize and characterize samples. For continuous variables, data were summarized using mean, standard deviation, and range, while for categorical variables (ordinal and nominal), frequencies were used. For the purpose of data analysis, PHQ-9 scores were transformed into ordinal variables (0: normal, 1–4: mild depression, 5–9: moderate depression, 10–19: moderately severe, 20–27: severe depression). One-way ANOVA was used to compare the mean age between depression levels. This test was conducted based on the following assumptions: independent observation, homogeneity of variance, random sampling, and normal distribution. The Shapiro-Wilk test was used to assess the normality of the age distribution (normal distribution, p > 0.05). The Pearson Chi-square test was used to assess the association between levels of depression and patients' demographics, socioeconomic status, and medical history.

RESULTS

Socio-demographic characteristics of the participants

Sixty-one (55.5%) patients recruited for this study were males (Table 1). The age of patients in this sample ranged from 29 to 88 years, with a mean age of 56.74 ± 13.70 years {males: mean age 55.97 ± 12.36 years (range = 29–84 years); females: mean age 57.69 ± 15.28 years (range = 32–88 years)}. In both males (Shapiro-Wilk test, p = 0.369) and females (Shapiro-Wilk test, p = 0.200), and for the sample as a whole (Shapiro-Wilk test, p = 0.209), age was normally distributed (Fig. 1). Eighty-six (78.2%) patients were married, 65 (59.1%) were not employed, 45 (40.9%) reported secondary education as their highest academic level, and 57 (51.6%) resided in peri-urban communities (Table 1). A total of 49 (44.5%) had a monthly household income of less than MK180,000 (equivalent to $100).

Sixty-three (57.3%) patients had a single comorbidity, while 12 (10.9%) had multiple comorbidities (Table 2). Fifty-seven (51.8%) had a right cerebrovascular accident, and three (2.7%) had no social support. Only one (0.9%) patient reported a family history of depression, whereas 12 (10.9%) reported a family history of stroke (Table 2). Three (2.7%) patients had a history of cigarette smoking and alcohol consumption (Table 2).

Table 1
Descriptive statistics for marital status, employment, education, and location of stay

Variable	Males	Female	Total
	N = 61 (55.5%)	N = 49 (44.5%)	N = 110 (100%)
Marital status			
Single	2 (3.3%)	1 (2.0%)	3 (2.7%)
Married	55 (90.2%)	31 (63.3%)	86 (78.2%)
Divorced	1 (1.6%)	3 (6.1%)	4 (3.6%)
Widowed	3 (4.9%)	14 (28.6%)	17 (15.5%)
Employment			
Not employed	29 (47.5%)	36 (73.5%)	65 (59.1%)
Self-employed	16 (26.2%)	7 (14.3%)	23 (20.9%)
Employed	16 (26.2%)	6 (12.2%)	22 (20.0%)
Education			
None	6 (9.8%)	5 (10.2%)	11 (10.0%)
Primary	14 (23.0%)	18 (36.7%)	32 (29.1%)
Secondary	30 (49.2%)	15 (30.6%)	45 (40.9%)
Tertiary	11 (18.0%)	11 (22.4%)	22 (20.0%)
Location of stay			
Rural	13 (21.3%)	9 (18.4%)	22 (20.0%)
Peri-urban	36 (59.0%)	21 (42.9%)	57 (51.8%)
Urban	12 (19.7%)	19 (38.8%)	31 (28.2%)
Household monthly income			
Less than MK180,000	24 (39.3%)	25 (51.0%)	49 (44.5%)
MK180,000	30 (49.2%)	15 (30.6%)	45 (40.9%)
More than MK180,000	7 (11.5%)	9 (18.4%)	16 (14.5%)

MK180,000 was equivalent to $100 at the time of data collection.

Table 2
Descriptive statistics for comorbidities, site of lesion, social support, family history of depression, family history of stroke, smoking status, and alcohol consumption

Variable	Males	Female	Total
	N = 61 (55.5%)	N = 49 (44.5%)	N = 110 (100%)
Comorbidities	20 (32.8%)	15 (30.6%)	35 (31.8%)
None	37 (60.7%)	26 (53.1%)	63 (57.3%)
Single	4 (6.6%)	8 (16.3%)	12 (10.9%)
Multiple			
Site of lesion	27 (44.3%)	26 (53.1%)	53 (48.2%)
Left	34 (55.7%)	23 (46.9%)	57 (51.8%)
Right			
Social support	2 (3.3%)	1 (2.0%)	3 (2.7%)
None	52 (85.2%)	46 (93.9%)	98 (89.1%)
Family	5 (8.2%)	0 (0%)	5 (4.5%)
Family and Friends	2 (3.3%)	2 (4.1%)	4 (3.6%)
Other			
Family history of depression	61 (100%)	48 (98.0%)	109 (99.1%)
No	0 (0%)	1 (2.0%)	1 (0.9%)
Yes			
Family history of stroke	57 (93.4%)	41 (83.7%)	98 (89.1%)
No	4 (6.6%)	8 (16.3%)	12 (10.9%)
Yes			
Smoking status and alcohol consumption	36 (59.0%)	44 (89.8%)	80 (72.7%)
No	1 (1.6%)	0 (0%)	1 (0.9%)
Smoking	21 (34.4%)	5 (10.2%)	26 (23.6%)
Alcohol	3 (4.9%)	0 (0%)	3 (2.7%)
Smoking and alcohol			

Prevalence of post-stroke depression

The majority of patients (52.73%) had no depression (Fig. 2). However, 52 (47.3%) were depressed. For these patients, the level of depression varied from mild, observed in 31.8%, to severe, observed in 1.8%.

The mean age differences between patients showing different levels of depression (mild to severe) were not statistically significant (one-way analysis of variance, P = 0.098). Similarly, the level of depression was not significantly associated with patient demographics, socioeconomic status, or medical history (Chi-square test, p > 0.05) (Table 3).

Table 3
Association between depression and patients' characteristics

Patients' characteristics	Level of depression	
	X^2	P-value
Sex	4.590	0.332
Marital status	5.503	0.939
Education level	19.284	0.082
Employment status	10.034	0.263
Location of stay	13.782	0.088
Monthly household income	9.330	0.315
Comorbidities	6.934	0.544
Social support	4.922	0.961
Site of lesion	2.829	0.587
Family history of depression	2.163	0.706
Family history of stroke	7.812	0.099
Smoking status and alcohol consumption	12.656	0.395
X^2: Chi-square value		

DISCUSSION

The current study aimed to determine the prevalence of post-stroke depression and assess its associated risk factors among patients receiving care at Kachere Rehabilitation Centre and Queen Elizabeth Central Hospital in Blantyre, Malawi. Results reveal a high prevalence of post-stroke depression among this population, highlighting a need to incorporate mental health services in the management of patients diagnosed with stroke.

Depression, in this study, was observed in 52 patients, suggesting a 47.3% prevalence. This is higher than the prevalence reported in Iran (46.9%) (14) and China (31%) (15) but lower than what was reported in India (55%) (16). In Africa, pooled prevalence of post-stroke depression was reported at 42.5% in 2025, with a range of 26.9 to 58.1% (24). Among countries with the highest prevalence of post-stroke

depression in Africa, as of 2025, is Nigeria, which reported the prevalence of 47.6% (17). The prevalence reported in Nigeria is similar to what was observed in the current study. This places Malawi among countries with the highest prevalence of post-stroke depression in Africa. However, it is worth noting that the current study only considered patients from Blantyre, Malawi, limiting conclusions that can be drawn from these findings. The high prevalence of post-stroke depression, meanwhile, is largely not surprising. Several factors, including unavailability of mental health services, social stigma towards disability and mental health issues, inadequate health financing and staffing, and a lack of political will, may contribute to such a high prevalence.

In general, the high prevalence of post-stroke depression observed in this study calls for healthcare providers to screen patients for depression during stroke management. Screening for depression in this group of patients and subsequent treatment provided may help the patient recover more rapidly, as it has been noted that depression can negatively affect stroke recovery due to loss of motivation (18). Many patients living with post-stroke depression tends to have poorer rehabilitation outcomes and a lower quality of life after stroke, which in turn increases the chance of patient mortality and morbidity. In addition, patients with post-stroke depression may stay longer in the hospital, putting enormous pressure on the healthcare system already struggling with poor funding and inadequate staffing.

Previous studies have suggested that sex, age, level of education, socio-economic status, site of lesion, cognitive impairment, cigarette smoking, and post-stroke functional impairments are the risk factors associated with the occurrence of post-stroke depression (1, 12, 19) However, all these factors were not significantly associated with post-stroke depression in the current study. Results of the current study, meanwhile, agree with those reported by Kutlubaev and Hackett in 2014(20) and De Ryck and colleagues in 2014(21). Kutlubaev and Hackett, in particular, conducted a meta-analysis to explore factors associated with post-stroke depression in Africa. This was done by reviewing 23 studies that included 18,374 stroke patients in total. These suggest that post-stroke depression is more complex than earlier thought. Each individual may have a unique experience, as well as confounding variables that may predispose and lead to the development of depression after stroke. This highlights the need to provide individualized assessments to each patient. Healthcare providers should consider the possibility of post-stroke depression in every stroke patient and proceed to screen for the condition regardless of the risk factors they present with.

CONCLUSIONS

This study reveals a high prevalence of post-stroke depression among stroke survivors in Blantyre, Malawi. These results emphasise the need for routine mental health assessments and targeted interventions to improve patient outcomes and quality of life. Demographic details, socio-economic status, and medical history were not significantly associated with the occurrence of post-stroke depression in this study. This suggests that every patient has a unique experience and factors leading them to the development of depression. Largely, this emphasises the need to screen every stroke patient for depression irrespective of their background.

Abbreviations

MMSE – Mini Mental Status Exam

PHQ-9 – Patient Health Questionnaire 9

SPSS - Statistical Package for Social Sciences

Declarations

Ethics approval and consent to participate

This study was approved by the College of Medicine Research and Ethics Committee (ethics approval number: P04/25-1473). Additional approvals were obtained from Queen Elizabeth Central Hospital and Kachere Rehabilitation Centre. All patients provided informed consent, having been shared with an information sheet providing details of the study. To upheld confidentiality, no personally identifiable data were collected from patients.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

None

Funding

None

Authors' contributions

MG, AM, IS, and ZP conceptualised the study and performed data collection. YG, RK, and NT supervised the study. MG and TK analysed the data. MG wrote the first draft of the manuscript. TK, YG, RK, and NT revised the draft. All authors read the final draft and agree to be accountable for all aspects.

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Figures

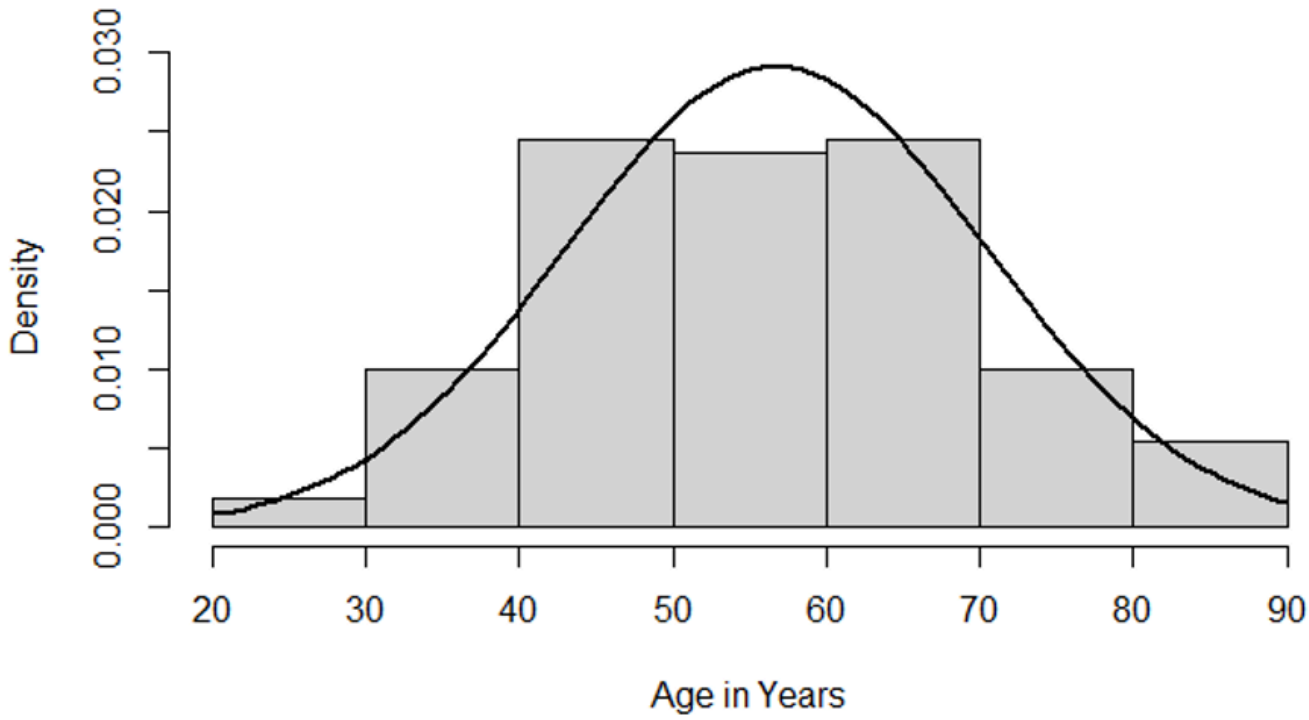


Figure 1

age distribution of patients in the sample

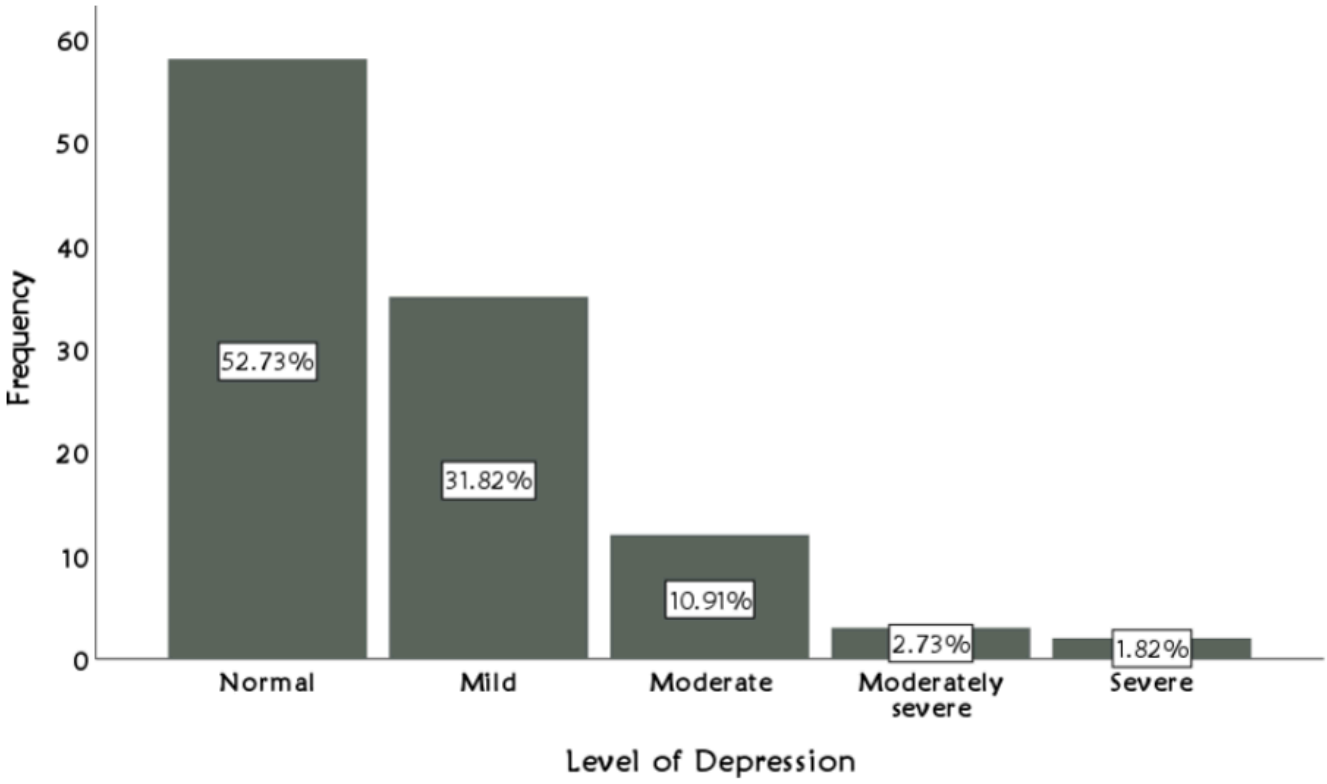


Figure 2

frequency distribution of levels of depression