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COLLEGE OF MEDICINE AND HEALTH SCIENCES

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DEPARTMENT OF INTERNAL MEDICINE

Prevalence And Associated Factors Of Post-Stroke Depression Among Patients On Follow Up At Medical Referral Clinics Of Bahir Dar City Public Specialized Hospitals

BY

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FEBRUARY, 2024

BAHIR DAR, ETHIOPIA

BAHIR DAR UNIVERSITY

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PREVALENCE AND ASSOCIATED FACTORS OF POST-STROKE DEPRESSION AMONG PATIENTS ON FOLLOW UP AT MEDICAL REFERRAL CLINICS OF BAHIR DAR CITY PUBLIC SPECIALIZED HOSPITALS

A RESEARCH PROPOSAL SUBMITTED TO THE DEPARTMENT OF INTERNAL MEDICINE, SCHOOL OF MEDICINE, COLLEGE OF MEDICINE AND HEALTH SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE SPECIALTY PROGRAM IN INTERNAL MEDICINE

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ABSTRACT

Background: Post stroke depression is among the most common neuropsychiatric complication in stroke survivors. In clinical practice, post stroke depression is commonly under-recognized and under-treated. Studies on post stroke depression has been done in various countries. However, there are not many studies done in Ethiopia particularly in the study area.

Objective: To assess the prevalence and associated factors of post stroke depression among patients on follow up at medical referral clinics of Bahir Dar city public specialized hospitals from September to December 2023.

Methods: An institutional based prospective cross-sectional study was conducted based on structured questionnaire and a review of patient charts from September to December 2023 on 394 patients. Public Health Questionnaire-9 was used to diagnose depression. All the necessary data was collected from patients on follow up at neurology clinic using the pre-developed data collection check list. Data was checked for cleanness manually and then exported to SPSS version 25 software for analysis. A systematic randomized sampling method was used to identify study participants. Bivariate and multivariate logistic regression analysis was performed to identify independent predictors of post stroke depression. A p value less than 0.05 is considered as significant with a 95% confidence interval.

Result: The overall prevalence of post stroke depression was found to be 42.9%. Employment status (AOR = 0.282, 95% CI: 0.112-0.709 C, *P*-value = 0.007), depression prior to stroke (AOR= 3.237, 95% CI: 1.098-9.544, *P*-value = 0.033), ischemic heart disease (AOR=4.090, 95% CI: 1.745-9.583, *P*-value = 0.001) and physical disability (AOR=4.051 95% CI: 2.239-7.332, *P*-value = 0.000) were found to be statistically significant independent predictors of PSD.

Conclusion and Recommendation: The prevalence of post stroke depression was found to be high and it was relatively higher compared to other similar studies. Patients with known depression prior to stroke, ischemic heart disease and significant physical disability were at a higher risk to develop PSD. Employed patients had less risk of developing PSD. Sufficient and comprehensive evaluation of stroke patients for depression is recommended.

Keywords: Stroke, Post stroke depression, Prevalence**,** Medical referral clinic, Bahir Dar

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LISTS OF ACRONYMS AND ABBREVIATIONS

CVT- Cerebral venous thrombosis

DALYs- Disability-adjusted life-years

DSM- Diagnostic and Statistical Manual of Mental Disorders

FHCSH- Felege Hiwot Comprehensive Specialized Hospital

GBD- Global burden of diseases

HMIS- Health management and information service

ICH- Intracerebral hemorrhage

IHD- Ischemic heart disease

PSD - Post-stroke depression

PHQ- Public health questionnaire

QOL- Quality of Life

SAH- Subarachnoid hemorrhage

TGSH- Tibebe Ghion Specialized Hospital

WHO-World Health Organization

1. INTRODUCTION

1.1. BACKGROUND

Stroke is associated with multiple neuropsychiatric complications such as depression, anxiety, and adjustment disorders. Among these, Post-Stroke Depression (PSD) is the most frequent and disabling complication. (1)

PSD is common, affecting around one-third of stroke survivors at some point in time after stroke. Stroke survivors with PSD are at increased risk for suboptimal recovery, recurrent vascular events, poor quality of life, and mortality. (2) PSD is commonly under-recognized and untreated in clinical practice and emphasis has to be given to the importance of the psychiatric examination of poststroke patients.(3)

Even though the pathophysiology of PSD is poorly understood, it is thought that cause of PSD is likely multifactorial with biological and psychosocial components and may vary depending on timing after event. Understanding the pathophysiology of PSD will aid in the management because it will guide in the selection of therapy. For example, for PSD due to biological causes, pharmacological therapy would be preferred whereas PSD resulting from psychosocial causes could possibly respond more favorably to psychotherapy and social support interventions than that of pharmacological therapy. (2)

An association between PSD and poststroke cognitive and functional deficits has been revealed by different studies, indirectly suggesting that PSD may be a psychological reaction to these deficits.(4, 5) In addition to this, multiple psychosocial risk factors for PSD are also risk factors for depression without stroke. Some of these risk factors are past psychiatric history, premorbid neurotic personality traits, and social isolation.(6, 7)

In contrast to this, different evidences suggest that PSD has underlying biological causes and is not a mere psychological response to new disability or a life-threatening event. Some of contributing biological factors to PSD include lesion location, genetic

susceptibility, inflammation, neurogenesis in response to ischemia, alterations in neurotrophic factors,

disruption of cortico-striato-pallido-thalamic-cortical projections, and alterations in serotonergic, noradrenergic, and dopaminergic pathways, leading to changes in amine levels.(8)

A stroke, or cerebrovascular accident, is defined as a sudden onset of a neurologic deficit that is attributable to a focal vascular cause. (9) Stroke typically results in permanent damage in the form of cerebral infarction, intracerebral hemorrhage (ICH) and/or subarachnoid hemorrhage (SAH).(10) Ischemic stroke (Infarction) is the result of atherosclerotic development of thrombi and emboli. A decrement or absence of cerebral circulation causes neuronal cellular injury and death. Intracerebral hemorrhage occurs due to rupture of cerebral vessels usually as the result of hypertension.(11)

According to the most updated definition for stroke, it encompasses ten clinical scenarios: CNS infarction, ischemic stroke, silent CNS infarction, ICH, stroke caused by ICH, silent cerebral hemorrhage, SAH, stroke caused by SAH, stroke caused by cerebral venous thrombosis (CVT), and not otherwise specified stroke. (12)

Stroke has become one of the top causes of mortality and disability-adjusted life-years (DALYs) lost globally.(13) Even though the incidence of stroke has grown worldwide, it is declining among the affluent and rising among those with less access to medical care. (9) "The incidence of stroke has doubled in low-and-middle-income countries over 1990–2016 but declined by 42% in high-income countries over the same period." Globally, stroke is still the second-leading cause of death and the third-leading cause of death and disability combined in 2019. There is a substantial increment in the annual number of strokes and deaths due to stroke from 1990 to 2019. (14)

1.2. STATEMENT OF THE PROBLEM

Depression and stroke are the two major causes of socioeconomic burden. The World Health Organization has recently reported that depression is "the leading cause of disability worldwide" and also it has been attributed as a major contributor to the overall global burden of disease. (15)

Perhaps, increased mortality associated with PSD is the most dramatic clinical phenomenon following PSD. During a 10-year follow-up period, a diagnosis of depression during the acute phase of stroke recovery was linked to a more than threefold increased risk of mortality.(16) A study done in United Kingdom also showed that even mild severity of PSD was associated with higher mortality as early as 1 year after stroke. (17) Another study also showed that in stroke survivors, post-stroke depression is linked to a noticeably higher chance of death.(18) Increased mortality in the long term after stroke has been associated with depression and this association is stronger among younger stroke survivors with age less than 65.(19)

PSD is also associated with poorer functional outcomes after stroke. Even though not explored in a systematic review or meta-analysis, different individual studies has shown association between PSD and reduced poststroke Quality of Life(QOL). (2)

The burden of functional impairment following a stroke may raise the risk of PSD, which can then result in further impairment, such as increased disability, fewer social interactions, a failure to recover in a timely manner, failure to return to work, and longer institutional care, all of which have an impact on quality of life. (20) Another study has also revealed two years after suffering from stroke, patients with in-hospital diagnosis of major or minor depression had a worse physical and language impairments compared with non-depressed individuals. And, in patients with major depression, the degree of physical or language recovery was found to be protracted even after the depression has waned. (21)

Even though there are different institutional based cross-sectional studies done in Ethiopia which have shown a high prevalence of PSD, there is paucity of updated local

data that signifies the magnitude of the problem. Therefore, this study aims to assess the prevalence and associated factors of PSD and in turn add a relevant data for development of efficient strategies for screening, early detection and treatment of PSD among stroke survivors.

1.3. SIGNIFICANCE OF THE STUDY

A lot of studies have been done regarding post-stroke depression in many European and American countries showing a significant proportion of stroke survivors develop PSD. But little is known about the prevalence of PSD and associated factors in the context of developing countries like Ethiopia and in particular, in the study area. The aim of this study is to assess the prevalence and associated factors of post stroke depression among patients on follow-up at medical referral clinics of Tibebe Ghion Specialized Hospital (TGSH) and Felege Hiwot Comprehensive Specialized Hospital (FHCSH).

The result of this study will add a lot by assessing the burden of PSD in the study area and identifying at risk groups for the development of PSD. Also, the data can be used in other African countries because of the related demographic and socioeconomic factors.

2. LITERATURE REVIEW

2.1. DIAGNOSIS OF PSD

According to Diagnostic and Statistical Manual of Mental Disorders (DSM)-5 poststroke mood disorders are defined as mood disorders due to stroke with depressive features, major depressive like episode, or mixed-mood features. “A patient with a diagnosis of mood disorder due to stroke with a major depression-like episode must have depressed mood or loss of interest or pleasure along with four other symptoms of depression lasting 2 or more weeks.”(22)

2.2. INCIDENCE, PREVALENCE AND NATURAL HISTORY OF PSD

The incidence and prevalence of PSD has been studied in many countries of the world. A systematic review and meta-analysis of 51 studies performed by Hackett et al which was conducted before June 2004 revealed a pooled frequency estimate of PSD of 33.(23)

The most recent meta-analysis of 61 cohorts which included 25,488 patients reported that 31% of patients developed depression at any time point up to 5 years following stroke. (24) According to a prior meta-analysis of 43 studies published in 2013 including 20,293 patients pooled prevalence of PSD was 29% at any time point within 5 years following stroke.(25) The frequency of PSD is highest in the first year after stroke, at nearly 1 in 3 stroke survivors, and declines afterwards.(2)

A study done in Germany in the year 2015, which included 289 patients found in rehabilitation clinics, showed a prevalence of PSD to be 31.1% in the early 6 weeks following stroke.(26)

An Egyptian hospital-based study done in 2020 also concluded that PSD is a common complication seen in stroke survivors. The study also showed that PSD has a significant impact on quality of life. The study showed a prevalence of stroke to be 36.9%.(20)

An institutional based cross-sectional study done in Ethiopia have found that depressive symptoms were common with prevalence of 32.2%. (27) Another institutional based study which was published in 2021 has also shown a prevalence of PSD to be 43.3%. (28)

2.3. PREDICTORS OF PSD

Several studies have been done in the past to assess factors associated with depression following stroke. Several systematic reviews have also reviewed these studies. Among these studies, a study published by A De Ryck et al in 2014 found that the most frequently cited risk factors for PSD in the literature were sex (female), history of depression, stroke severity, functional impairments or level of handicap, level of independence, and family and social support (29)

Another systematic review and meta-analysis showed that disability after stroke and history of depression pre-stroke are the most consistently reported predictors of depression after stroke. Some of the other important predictors of depression were cognitive impairment, stroke severity, lack of social or family support, and anxiety. However, there has been no association found between depression and other variables representing neurological damage, such as stroke subtype, lesion location or laterality of stroke. The importance of neurological damage on depression after stroke appears to be limited to cognitive impairment and stroke severity. (25)

A 2017 scientific statement for healthcare professionals from the American Heart Association and American Stroke Association also stated that physical disability, stroke severity, depression before stroke, and cognitive impairment consistently had a positive association with the development of PSD. (2) Other factors that has been associated as predictors of depression following stroke include a lack of family and social support after stroke and anxiety after stroke.(25, 29)

In contrast to other studies, an update systematic review published in 2014 have not shown consistent association between factors like old age, female sex, diabetes mellitus,

stroke subtype, education level, living alone and previous stroke on subsequent development of depression. (30)

In a 2020 study done in Egypt, low educational level, low socioeconomic status, cigarette smoking and a more severe functional impairment were found to a strong predictor for the development of PSD. However, no significant association was found between age, gender, marital and job status and PSD. In addition to these, no significant association was found between PSD and past psychiatric history of depression or family history of depression in a first degree relative. (20)

A recent case control study done in Ethiopia in the year 2022 concluded many factors were associated with PSD among which male gender, prior history of stroke, physical disability, severity of stroke, subcortical location of the lesion, and ischemic heart disease were found to be important factors in the occurrence of PSD. (31)

2.4. EPIDEMIOLOGY AND GLOBAL BURDEN OF STROKE

The incidence of stroke varies significantly over the life course based on age, sex and ethnicity. Every year there are approximately 795,000 new or recurrent cases of stroke among which 610,000 are new attacks and 185,000 are cases with recurrent stroke. Females have been shown to have a higher lifetime risk of stroke. And each year there are approximately 55,000 more females than males with a case of stroke.(32) To the contrary, the Global Burden of Diseases(GBD) 2013 study identified men having consistently greater incidence of ischemic stroke than women.(33)

In 2019 in the United States, there were around 150,005 deaths with stroke as an underlying cause and the age adjusted death rate for stroke as an underlying cause was found to be 37.0 per 100,000. In the united states, stroke ranks at the fifth place among all causes of death. (32)

In Africa in 2009, about 483,000 new stroke cases among people of age 15 years or more were estimated, which is equivalent to 81.2 (13.2–94.9)/100,000 person

years. Comparable figures for the year 2013 based on the same rates would amount to 535 thousand (87.0–625.3) new stroke cases, suggesting an increase of 10.8% of incident stroke cases between 2009 and 2013.(34)

According to a study done at Tikur Anbessa Specialized Hospital, even though ischemic stroke is slightly higher than hemorrhagic among the total number of patients with stroke, it was shown that hemorrhagic stroke was found to be significantly high compared with studies done in the developed nations. Hemorrhagic stroke was found to be more prevalent in the age between 31-45 and 45-60 years and is more common in males. It was proposed that untreated hypertension as a predisposing factor for the high prevalence of hemorrhagic stroke.(35)

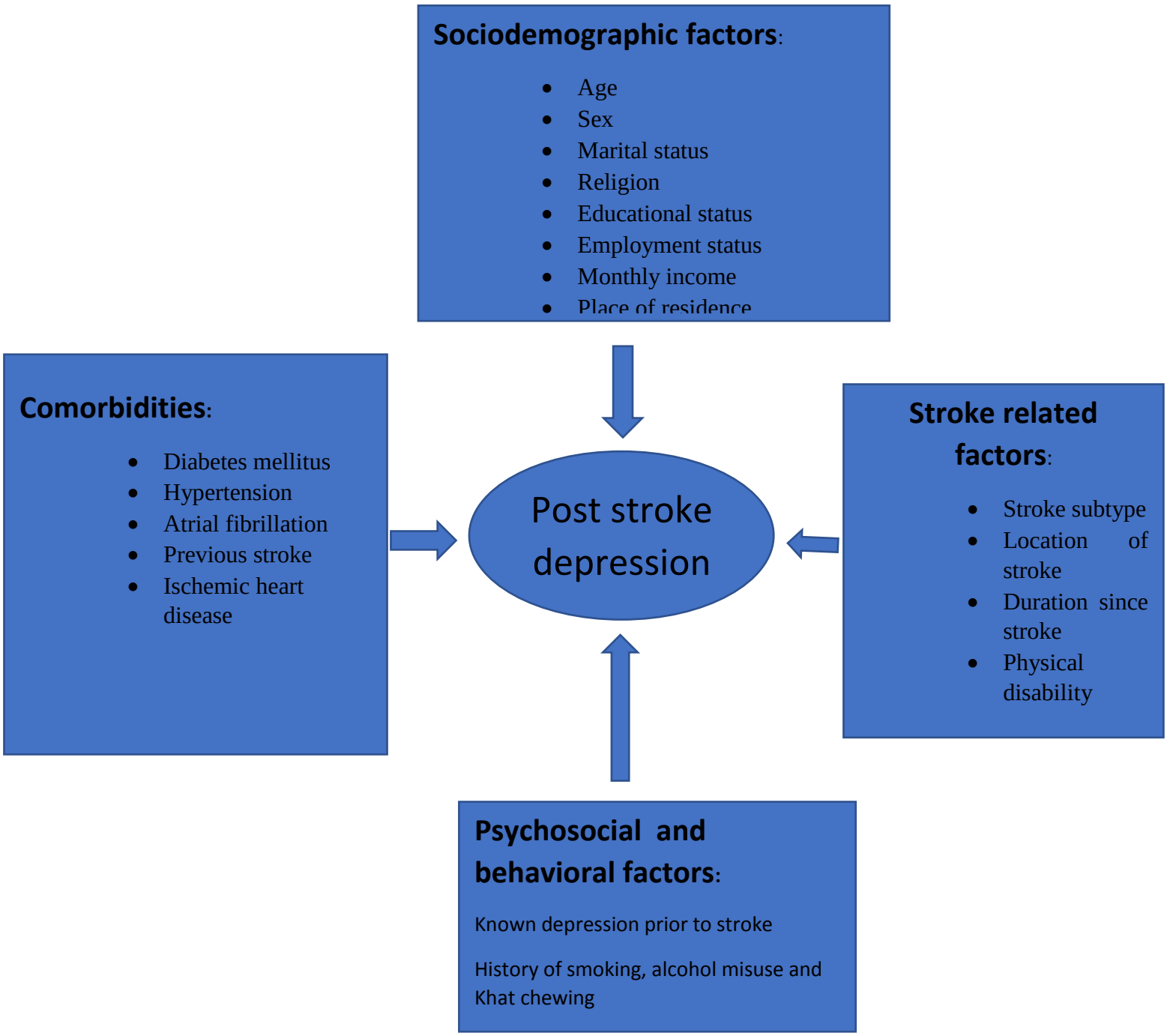

Figure 1: Conceptual Framework (2) (19, 20, 29-31)

3. OBJECTIVES

3.1.1. GENERAL OBJECTIVE

To assess the prevalence and associated factors of post stroke depression among patients on follow up at medical referral clinics of Bahir Dar city public specialized hospitals from September to December 2023.

3.1.2. SPECIFIC OBJECTIVES

To assess the prevalence of post stroke depression among stroke survivors

To identify factors associated with post stroke depression among patients on follow up at medical referral clinics of Bahir Dar city public specialized hospitals from September to December 2023.

4. METHODS

4.1. STUDY DESIGN

An institutional based cross-sectional study was conducted from September 1 to December 31, 2023.

4.2. STUDY AREA AND PERIOD

The study was conducted at two large public specialized hospitals in Bahir Dar city; Tibebe Ghion Specialized Hospital (TGSH) of Bahir Dar University and Felege Hiwot Comprehensive Specialized Hospital (FHCSH). Bahir Dar University College of Medicine and Health Sciences was established in 2007, known as Bahir Dar University Medical School, till 2009 when it became one of the four Bahir Dar University premier College. It is one of the youngest medical training institutions in Ethiopia; having been in the business of medical and health professionals training just over 10 years.

Tibebe Ghion Specialized Hospital is located on the outskirt of the vibrant Bahir Dar city (one of the ten most beautiful cities in Africa and one of the twelve UNESCO Learning Cities Awardee of 2015) about 10km south from the city center and about 7 km from the new bus station ('Addisu Meneharia') on the way to Adet District and about 23 km from the Blue Nile Falls (locally called ‘Tis Esat’ (Smoke of Fire))

Felege Hiwot Comprehensive Specialized Hospital is a government referral hospital, in the city of Bahir Dar, the capital city of Amara regional state.

The study was conducted in TGSH and FHCSH from September 1 to December 31 2023. On average there is 80 to 100 and 70 to 90 stroke survivors’ visits per month at the Neurology Clinic (Medical Referral Clinic) at TGSH and FHCSH respectively which was estimated by the health management information system (HMIS) records of TGSH and data registry of medical referral clinic of FHCSH.

4.3. SOURCE POPULATION

All patients with history of stroke and who are on follow up at outpatient neurology clinic of TGSH and FHCSH were the source population.

4.4. STUDY POPULATION

All adult patients with history of stroke patients on follow up at neurology clinic at TGSH and FHCSH during the study period were the study population.

4.5. INCLUSION CRITERIA

All adult patients with history of stroke who are 18 years or older and who have brain imaging documented on their respective chart during the study period were included in the study.

4.6. EXCLUSION CRITERIA

Patients with severe language impairment such as severe expressive or receptive aphasia or severe global aphasia, patients with cognitive impairment with difficulty in communication, incomplete medical chart, and history of major psychiatric illness other than depression were excluded.

4.7. STUDY VARIABLES

4.7.1. Dependent Variables

Prevalence of post stroke depression

4.7.2. Independent Variables

Several factors were included as independent variable categorized as sociodemographic, stroke related, psychosocial and behavioral factors and comorbidities. Among sociodemographic factors age, sex, marital status, religion, place of residence, educational status, employment status, monthly income was included. Stroke related factors include stroke subtype, location of stroke, duration since stroke, physical disability. Known depression prior to stroke and substance use such as smoking history, alcohol drinking history, and khat chewing history were included in psychosocial and behavioral factors. Comorbidities include hypertension, diabetes mellitus, previous stroke, ischemic heart disease and atrial fibrillation.

4.8. SAMPLE SIZE DETERMINATION AND PROCEDURE

4.8.1. Sample size determination

The sample size was be determined by using the following assumptions; single population proportion formula taking p value from another similar study conducted p= 27.5%(36), level of significance 5% (a=0.05), margin of error 5% (d=0.05).

$n = (za/2)^2 p (1-p)/d^2$,

Where

n = sample size.

Z = 95% confidence limit (1.96)

p = proportion of the post stroke depression, 0.275

d = margin of error or degree of accuracy desired (0.05)

$n= (1.96)^2 x (0.275) (0.725)/ (0.05)^2 = 306.$

Adding a 10% non-response rate the sample size is 337.

Table 1: Sample size calculation using significant factors

Variables	CI	AOR	Ratio (unexposed/exposed	Power	% of outcome in un-exposed	% of outcome In exposed	Sample size	Add 10% of NRR
Post stroke duration(36)	95 %	2.1	1.34	80%	14.1	25.9	358	394
Gender(36)	95 %	2.45	2.45	80%	20.28	38.46	198	218

Therefore, the sample size calculated by using the second objective is larger than the sample size calculated for single population proportion. So, that the final sample size of the study was found to be 394.

4.8.2. Sampling technique and procedures

A systematic random sampling method was utilized. The estimated total population size was divided by the sample size to get the interval (*k*) which was found to be 2. Therefore, the first patient was selected randomly and after that every second patients who visited medical referral clinics who met the inclusion criteria were interviewed.

Stroke survivor patients arriving at the neurology clinics of each hospital for their follow up were questioned for their willingness and consent to be involved in the study after they completed their usual care at the clinic. Those patients who gave informed consent were interviewed by health care workers or volunteers at the clinics using the Patient Health Questionnaire (PHQ-9) and additional information was taken from patients' chart.

4.9. OPERATIONAL DEFINITIONS

Stroke: is defined as a sudden onset of a neurologic deficit that is attributable to a focal vascular cause and the diagnosis must be supported by imaging findings such as CT or MRI.(9)

Depression: The patient must fulfill the defining criteria for depression according to PHQ-9 (37)i.e., a score of 10 or greater.

Post stroke depression: new onset of depression after the occurrence of the stroke

4.10. DATA COLLECTION TOOLS

Data was collected by interviewing the study participants using a structured pretested questionnaire and patient chart review. The Patient Health Questionnaire (PHQ) is a self-administered version of the PRIME-MD diagnostic instrument for common mental disorders. The PHQ-9 is the depression module, which scores each of the 9 DSM-IV criteria as 0–3 (0 = not at all, 1 = several days, 2 = more than half the days, and 3 = nearly every day). A sum of all these scores forms the basis for the scale score that

ranged between zero and twenty-seven (score 0–4 = no depression, score of 5–9 = minimal symptoms, score of 10–14 = minor depression, score of 15–19 = moderately severe depression, and score of 20–27 = severe depression). A score of 10 or more was used to classify patients as having depression or not. A PHQ-9 score ≥10 has been found to have a sensitivity of 88% and a specificity of 88% for major depression. (37) The screening tool which is prepared in English was translated to Amharic for the respondents.

Alcohol misuse is assessed using the CAGE questionnaire which is a tool that uses four questions to screen for excessive drinking or abuse. A score of 2 or more will be used to identify patients with alcohol misuse.

Physical disability is assessed using modified Rankin Scale which is a scoring system which measures the degree of disability or dependence in the daily activities of people who suffered a stroke or other cause of neurological disability. Patients with a score of 0-2 were categorized as 'No symptom to slight disability', a score of 3-4 as 'Moderate to moderately severe disability' and a score of 5 as 'Severe disability/Bedridden'.

Other factors like patient demographics, stroke type, location of stroke, duration since stroke, prior known depression and comorbidities will be collected from patient chart review.

4.11. DATA QUALITY ASSURANCE

Among the total sample size, 5% was taken for pretest and pretest was done at Addisalem Primary Hospital, Bahir Dar, Ethiopia before data collection in the study areas. The data was collected by trained health professionals (trained nurses who work in outpatient clinics & medical residents). Training was given how to proceed with filling the questionnaire, patient interviewing and collection of data from patient charts. Data collection was supervised by internal medicine residents.

4.12. DATA PROCESSING AND ANALYSIS

Data was checked for completeness and quality prior to data entry. Then data was checked for cleanness manually and then exported to and analyzed by Statistical Package for

Social Science (SPSS) version 25 software. The descriptive analysis was done by simple frequencies and proportions, and the results were presented by tables, and pie charts. Simple logistic regression analysis was performed to evaluate the strength of association between PSD, sociodemographic, stroke related factors, comorbidities and psychosocial factors. Multiple logistic regression analysis of all statistically significant variables was performed to control potential confounders. P-value less than 0.05 was considered statistically significant. Both simple and multiple regression analysis were expressed as odd ratios (OR) with 95% confidence interval (CI).

4.13. ETHICAL CONSIDERATION

Ethical clearance was obtained from Bahir Dar University Ethics Review Committee (Meeting No.: Expedit/2023, Protocol number: 838/2023). A support letter was sent to TGSH and FHCSH. Names were not used in collecting the data from the medical files. Confidentiality was maintained by keeping the data collection forms locked in a secure cabinet and the electronic data file was kept securely in a password protected computer. Data obtained in the course of study was only handled by the research team.

4.14. DISSEMINATION OF THE RESULT

The finding of this study will be disseminated through publications, presentations on scientific meetings and conferences. The finding of the study will be forwarded to Bahir Dar University, TGSH, and Amhara Regional Health Bureau.

5. RESULT

5.1. SOCIODEMOGRAPHIC CHARACTERISTICS

The study included 394 respondents in total, with a response rate of 100%. The mean age of respondents was 60.8(SD ± 13.5) years. The respondents were divided into four different age groups ranging from 23 to 91 years. Highest proportion belonged to the age group 61 to 74 years which included 160(40.6%) of the total respondents. Just over half of the respondents were male accounting for 52.8% of the total respondents.

Regarding employment status, 210(53.3%) of the respondents were unemployed and 98(24.8%) were retired. 200(50.8%) of the respondents were rural residents.

Table 2 Sociodemographic characteristics of post stroke patients on follow up at neurology Clinics of Bahir Dar public specialized hospitals (n=394)

Variables		Frequency	Percentage (%)
Gender	Male	208	52.8
	Female	186	47.2
Age	<45	49	12.4
	45-60	130	33.3
	61-74	160	40.6
	>75	55	14.0
Place of Residence	Urban	194	49.2
	Rural	200	50.8
Religion	Christian	350	88.8
	Muslim	42	10.7
	Others	2	0.5
Marital status	Single	14	3.6
	Married	272	69.0
	Divorced	22	5.6
	Widowed	86	21.8

Educational status	Illiterate	236	59.9
	Can read and write	65	16.5
	Elementary school	32	8.1
	High school	22	5.6
	College & above	39	9.9
Employment status	Employed	86	21.8
	Unemployed	210	53.3
	Retired	98	24.9

5.2. CLINICAL AND BEHAVIORAL CHARACTERISTICS

Majority of patients had ischemic stroke (307) which accounts for 77.9% of the total patients. Regarding location of stroke, right hemispheric and left hemispheric stroke account for 48.5% and 45.4% of the total patients respectively, while only 24 (6.1%) patients had stroke involving bilateral hemispheres.

With regard to physical disability, 234(59.4%), 58(14.7%) and 102(25.9%) patients had No symptom to slight disability, Moderate to moderately severe disability and Sever disability respectively.

Table 3 Clinical and Behavioral characteristics of post stroke patients on follow up at neurology Clinics of Bahir Dar public specialized hospitals (n=394)

Variables		Frequency	Percentage (%)
Stroke subtype	Ischemic	307	77.9
	Hemorrhagic	87	22.1
Location of stroke	Left hemispheric	179	45.4
	Right hemispheric	191	48.5
	Bilateral	24	6.1

Duration since stroke	< 6 months	82	20.8
	6 to 12 months	179	45.4
	> 12 months	133	33.8
History of hypertension	Yes	277	70.3
	No	117	29.7
Known depression prior to stroke	Yes	32	8.1
	No	362	91.9
History of DM	Yes	28	7.1
	No	366	92.9
Known previous stroke	Yes	41	10.4
	No	353	89.6
Known ischemic heart disease	Yes	50	12.7
	No	344	87.3
Atrial fibrillation	Yes	24	6.1
	No	370	93.9
Smoking history	Previous smoker	21	5.3
	No smoking history	373	94.7
Alcohol drinking history	Previously drinking	71	18
	No history of drinking	323	82
Khat Chewing history	Current user	8	2

	Previous user	32	8.1
	No history	354	89.8
Physical disability assessment by Modified Rankin Scale	No symptom to Slight disability	245	62.2
	Moderate to Moderately severe disability	58	14.7
	Severe disability/Bedridden	91	23.1

5.3. PREVALENCE OF POST STROKE DEPRESSION

The overall prevalence of PSD was found to be 42.9% (169 of 394 patients).

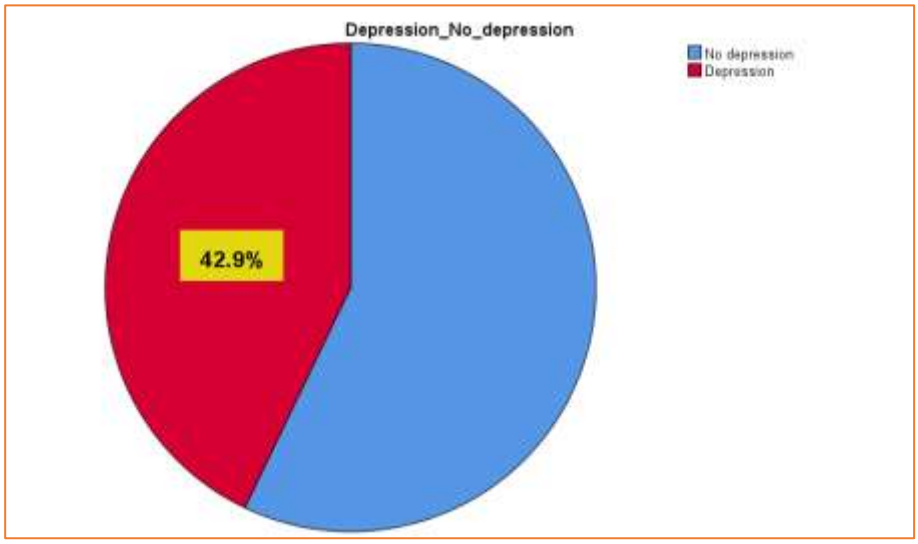

Figure 2: Prevalence of post stroke depression

5.4. FACTORS ASSOCIATED WITH POST STROKE DEPRESSION

To assess the relationship between various sociodemographic, clinical and behaviorally relevant variables with PSD binary logistic regression was utilized. Candidates for multivariate regression analysis were variables in the bivariate analysis with a p-value of < 0.25. The bivariate logistic regression analysis identified age, marital status, educational status, employment status, location of stroke, duration since stroke, known depression prior to stroke, known ischemic heart disease, and physical disability associated with PSD.

Among the variables analyzed with multivariate logistic regression analysis only employment status, known depression prior to stroke, known ischemic heart disease, and physical disability assessed by modified Rankin Scale were strongly associated with PSD.

Table 4 Bivariate and multivariate logistic regression analysis for factors associated with PSD among patients on follow up at neurology clinics of Bahir Dar public specialized hospitals(n=394)

Variables	Categories	Depression		COR (95% CI)	AOR (95% CI)
		Yes	No		
Age	<45	15	34	1	1
	45-60	47	83	1.284(0.634-2.598)	1.211(0.489-2.998)
	61-74	77	83	2.103(1.063-4.159)	1.210(0.491-2.985)
	>75	30	25	2.720(1.214-6.094)	1.404(0.467-4.225)
Marital status	Single	8	6	1.007(0.322-3.152)	0.738(0.178-3.066)
	Married	99	173	0.432(0.264-0.708)	0.718(0.379-1.360)
	Divorced	13	9	1.091(0.421-2.823)	2.209(0.658-7.416)
	Widowed	49	37	1	1
Educational status	Illiterate	109	127	1.373(0.686-2.749)	0.411(0.151-1.118)

	Can read and write	31	34	1.459(0.650-3.273)	0.514(0.177-1.495)
	Elementary school	8	24	0.533(0.191-1.491)	0.336(0.091-1.237)
	Highschool	6	16	0.600(0.192-1.874)	0.292(0.068-1.250)
	College and above	15	24	1	1
Employment status	Employed	15	71	0.294(0.148-0.584)	**0.282(0.112-0.709) ***
	Unemployed	113	97	1.620(0.998-2.629)	1.434(0.778-2.640)
	Retired	41	57	1	1
Location of stroke	Left hemispheric	69	110	1	1
	Right hemispheric	88	103	1.362(0.900-2.061)	1.157(0.705-1.900)
	Bilateral	12	12	1.594(0.678-3.748)	2.272(0.796-6.480)
Duration since stroke	< 6 months	26	56	0.532(0.299-0.946)	0.740(0.367-1.493)
	6 to 12 months	98	98	0.947(0.603-1.485)	1.270(0.726-2.221)
	>12 months	71	71	1	1
Known depression prior to stroke	Yes	23	9	3.781(1.701-8.404)	**3.237(1.098-9.544) ***
	No	146	216	1	1
Known IHD	Yes	39	11	5.836(2.887-11.797)	**4.090(1.745-9.583) ***
	No	130	214	1	1
Physical disability	No symptom to slight disability (mRS 0-2)	72	173	1	1
	Moderate to Moderately severe disability (mRS 3-4)	36	22	3.932(2.163-7.146)	**2.330(1.172-4.629) ***
	Severe disability (mRS 5)	61	30	4.886(2.915-8.188)	**4.051(2.239-7.332) ***

*Significant at P<0.05

6. DISCUSSION

The study was conducted to assess the prevalence and factors associated with PSD among stroke patients on follow up at neurology clinic in TGSH and FHCSH, Bahir Dar, Ethiopia. Our study showed prevalence of PSD to be 42.9% (95% CI; 37.9%, 47.9%). Among the depressed patients, 14% had minor depression whereas 28.9% had moderately severe to severe depression. Employment status, known depression prior to stroke, IHD and physical disability were all found to be factors contributing to increased risk of PSD.

Based on numerous individual studies and meta-analyses, prevalence of PSD has been estimated to be between 20-65% (29). The prevalence of PSD based on our study was comparable to some studies done in Ethiopia and Nigeria which have shown prevalence of PSD to be 43.3% and 42.9% respectively. (28, 38). Compared to other Ethiopian and large worldwide studies and meta-analyses, the prevalence of PSD was found to be higher in our study. The difference in prevalence estimates can be attributed to various factors including sociocultural differences, difference in methods used for ascertaining PSD, and methodological factors of different studies. One study which evaluated four of the various screening tests for depression in post stroke patients have shown different prevalence outcomes with different sensitivities and specificity for the diagnosis of depression based on the type of tool used (39). Another important factor for a high prevalence of PSD in the current study may be a higher proportion of patients with duration since stroke less than 1 year compared with more than 1 year (66.2% vs 33.7%). Various individual studies and large meta analyses have shown that PSD most commonly develops within the first few months after stroke and the proportion of PSD after the first year post stroke is significantly lower (23, 40, 41).

This study has shown that the odds of developing PSD among employed individuals was decreased by 71.8% (AOR: 0.282, 95% CI: 0.112-0.709) as compared to retired individuals. Being unemployed was found to be a predictor for PSD in several Ethiopian and African studies (36, 42). Employed patients were shown to have lower depressive symptoms compared to unemployed group of patients in a study done in Norway (43)

while several other studies suggest no relation could be demonstrated between employment status and PSD (44). This could be explained by patients without a job are more likely to face financial challenges which could be a contributing factor for depressive symptoms as it was shown in a study done in Nigeria (45).

Our study revealed that patients with known depression prior to stroke are three times more likely to develop PSD than their counterparts. A personal history of depression has been shown in various European studies, systematic reviews and metanalyses to be a significant predictor of PSD (3, 29, 46). A prior history of mental disorders including depression was found to be strongly associated with PSD in another meta-analysis which included a total of 36 studies (47). In a recent systematic review and meta-analysis which assessed the possible contribution of pre-stroke depression to PSD, it was revealed that patients with pre-stroke depression had a three times higher odds of developing PSD which goes in line with our study finding (48). An important possible explanation for the higher odds of PSD in patients with history of depression may be a higher chance of recurrence of psychiatric disorders including depression. To our knowledge, no other Ethiopian studies have identified depression as a predictor for PSD. It is of note that stroke patients should be evaluated for past psychiatric history and depression assessment should be done at baseline to identify any known prior depressive episodes.

In this study, the odds of developing PSD are four times more likely in patients who have concomitant ischemic heart disease (IHD). A recent Ethiopian study has revealed IHD as an independent predictor of PSD (31) and it has been shown that depression is a common comorbidity in the Ischemic heart disease population which has been associated with worse outcomes(49). A high prevalence of underrecognized and undertreated depression in these patients could be explanatory for the higher prevalence of PSD but requires further investigation to determine whether it is an independent predictor or not.

The other important variable which has shown significant association with PSD in our study was physical disability assessed by modified Rankin Scale. Compared to patients with “No symptom to slight disability”, patients with “Moderate to Moderately severe

disability" and "Severe disability" are two times and four times more likely to develop PSD respectively. Similar findings have been found in several studies from various African countries including Ethiopia, Egypt and Ghana (20, 31, 50) A significant degree of disability would have a negative influence on the patients' life and career, causing significant physical and psychological trauma that would ultimately lead to PSD.(43) An important point to note is PSD also an unfavorable factor for recovery and physical rehabilitation in the post stroke period (51, 52).

Even though it is a long standing debate, there are some studies that hypothesize stroke related biological factors and lesion location as an independent predictor for post stroke depression (53), other studies have revealed a contradicting finding and rather non stroke specific related factors such as history of personal or family history of depression and level of handicap could be a better predictor for development of PSD(54) which is consistent with the finding of our study.

Limitations of the study

It is challenging to assess the temporal link and demonstrate the causal association between exposure and result since this study is cross-sectional. Our study has excluded patients with severe aphasia because of the communication difficulty and because of lack of a gold standard depression assessment tool in aphasic patients. And this might undermine the prevalence of PSD as post stroke patients with aphasia, especially expressive aphasia, are at a higher risk of developing depression.

7. CONCLUSION AND RECOMMENDATION

This study has found that the prevalence of PSD was high and it was relatively higher compared to some other studies done in Ethiopia.

Our study has revealed that patients with known depression prior to stroke, ischemic heart disease and significant physical disability were at a higher risk to develop PSD. Employed patients had less risk of developing PSD.

8. RECOMMENDATION

To physicians and other health care professionals

We recommend sufficient and comprehensive evaluation of post stroke patients for depression and other neuropsychiatric complications of stroke which are underrated and undertreated. In addition to the usual care that stroke patients receive in the out-patient clinics, routine use of easy self-report or interview-based assessment tools for depression could aid physicians and other health professional in identifying patients with PSD. Assessing other comorbidities in stroke patients at baseline is recommended.

To TGSH and FHCSH

We recommend the institutions to provide training sessions for all health care professionals regarding thorough assessment of post stroke patients and use of depression assessment tools with a goal of identifying patients with this underrated diagnosis.

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10. APPENDICES

10.1. DATA COLLECTION CHECK LIST

My name is Dr. Ermiyas Yemane and I am specializing in internal medicine at Bahir Dar University School of Medicine and Health Sciences. This questionnaire is prepared for the partial fulfillment for the requirement of specialty program in internal medicine. The study will be conducted in Tibebe Ghion Specialized Hospital and Felege Hiwot Comprehensive Specialized Hospital at the Neurology clinic in patients who had follow up after stroke. You have been randomly selected to be involved in this study and the questionnaire requires your consent. If you do not agree or if it is inconvenient for you, you can stop filling the questionnaire at any time and moment. You do not need to write your name or address on the questionnaire. Your response will be confidential and will not be subjected to others. For additional information you can contact through the following means.

Phone Number: +251912755011 email: ermiyasyem@gmail.com

Consent of respondent: Agree ☐ Not Agree ☐

No	Question	Answer
1	Age in years	_____
2	Gender	A. Male B. Female
3	Marital status	A. Single B. Married C. Divorced D. Widowed
4	Religion	A. Christian B. Muslim C. Other
5	Educational status	A. Illiterate B. Can read and write C. Elementary School D. High school E. College and above
6	Employment status	A. Employed B. Unemployed C. Retired
7	Monthly income	_____
8	Place of residence	A. Urban B. Rural

Part I: **Socio-demographic Characteristics**

Part II: **Clinical and behavioral Characteristics**

No	Question	Answer
1	Stroke sub type	A. Ischemic B. Hemorrhagic
2	Location of Stroke	A. Left hemispheric B. Right hemispheric C. Bilateral
3	Duration since stroke	A. Less than 6 months B. 6 to 12 months C. More than 12 months
4	History of Hypertension	A. Yes B. No
5	History of depression prior to stroke	A. Yes B. No
6	History of diabetes mellitus	A. Yes B. No
7	Known previous stroke	A. Yes B. No
8	Known Ischemic heart disease	A. Yes B. No
9	Atrial fibrillation	A. Yes B. No
10	Smoking history (Smoker if >100 cigarettes/lifetime)	A. Current smoker B. Former smoker C. Never smoker
11	Alcoholism (Based on **CAGE** >/=2)	A. Currently drinking B. Previously drinking C. No history
12	Khat chewing history	A. Current user B. Previous user C. No history

Alcoholism based on CAGE

1. ማጠጥ መቀነ ስ እንዳለብህ ተሰምዶህ ያወቃል?(**C**)
2. ሰዎች ማጠጣትህን በመተቸት አበሳጭተውሃል?(**A**)
3. በማጠጣትህ መጥፎ ወይምየ ጥፋተኝነ ት ስሜት ተሰምዶህ ያወቃል?(**G**)
4. ራስህን ለሚረጋጋት ወይምእንደ የአይን ማከፈቻ በመጀመሪያ ጠዋት ጠጥተውያወቃሉ?(**E**)

Part III- Physical disability assessment- Modified Rankin scale

0 -ምንምምልክቶች የሉም

1- ምልክቶች ቢኖሩም ጉልህ የሆነ የአካል ጉዳት የለም; ሁሉንም የተለመዱ ተግባራትን እና ተግባሮችን ማከናወን ይችላል

2- ትንሽ የአካል ጉዳት; ሁሉንም ያለፉትን ተግባራት ማከናወን አለመቻል ፣ ግን ያለእርዳታ የራሱን ጉዳዮችን ማከታተል ይችላል

3- መካከለኛ የአካል ጉዳት; አንዳንድእርዳታየሚፈልግ ነገር ግን ያለ እርዳታመራመድ ይችላል

4 -መካከለኛ ከባድየአካል ጉዳት; ያለ እርዳታመራመድ አለመቻል እና ያለ እርዳታየሰ ውነ ት ፍላጎቶችን ማሟላ ት አለመቻል

5- ከባድ የአካል ጉዳት; የአልጋ ቁራኛ፣ ያልተቋረጠ እና የሚያቋርጥ የነርሲንግ እንክብካቤ እና ትኩረት የሚያስፈልገ ው

6 -ሞተዋል

PATIENT HEALTH QUESTIONNAIRE-9
(PHQ-9)

<u>ባለፉት 2 ሳምንታት</u> ወስጥ ከሚከተሉት ችግሮች ወስጥ ምን ያህል ጊዜ ተቸግረዋል? *(ሚለሱን ለማሚከት " ✓ " ይጠቀማ)*	**ምንም የለም**	**ብዙ ቀናት**	**ከግማሽ ቀናት በላይ**	**በየቀኑ ሚለት ይቻላል**
1. ነገሮችን ለማራት ትንሽ ፍላጎት ወይምትንሽ ደስታ	0	1	2	3
2. የመንፈስ ጭንቀት፣ የመደበት ወይምተስፋየመቁረጥ ስሜት	0	1	2	3
3. እንቅልፍ እስኪወስድዎ ወይም ተኝቶ ለመቆየት መቸገር ፣ ወይምብዙ መተኛት	0	1	2	3
4. የድካምስሜት ወይምትንሽ ጉልበት	0	1	2	3
5. ላነ ስተኛ የምግብ ፍላጎት ወይምከማከን በላይ መበላት	0	1	2	3
6. ስለራስዎ መጥፎ ስሜት - ወይም እርስዎ ወድቀት እንደሆኑ ወይም እራስዎን ችላ ያሉ ወይም ቤተሰብዎን እንዳሳፈሩ ተሰምቶዎታል	0	1	2	3
7. በነገሮች ላይ የማተኮር ችግር ለምሳሌ እንደ ጋዜጣ ማንበብ ወይምቴሌቪዥን መሚከት ላይ	0	1	2	3
8. ሌሎች ሰዎች ሊያስተወሉት በሚችሉት ማከን በጣም ቀስ ብሎ መንቀሳቀስ ወይም መገር? ወይም ተቃራኒው - በጣም የመንቀዠቀዥ ወይም እረፍት ማጣት፣ ከወትሮው በበለጠ ብዙ መንቀሳቀስ	0	1	2	3
9. ብሞት ይሻላል ወይም እራሴን በሆነ መንገድ ብጎዳ ይሻላል የሚል ሃሳብ ማሰማት	0	1	2	3

<u>ከተጠቀሱት ችግሮች ወስጥ ካጋጠምዎት</u> ፣ እነዚህ ችግሮች ስራዎትን ለማራት፣ በቤት ወስጥ ነገሮችን ለሚከናወን ወይም ከሌሎች ሰዎች ጋር ለማሞሞክ ምን ያህል <u>ከባድ አድርጎብዎታል?</u>

በጭራሽ አስቸጋሪ አይደለም	**በማከኑ አስቸጋሪ**	**በጣም ከባድ**	**በጣም አስቸጋሪ**
☐	☐	☐	☐

=ጠቅላላ ነጥብ_____

10.2. DECLARATION

I, the undersigned, declared that this is my original work, has never been presented in this university, and that all the resources and materials used for the research, have been fully acknowledged.

Principal Investigator

Name: Dr. Ermiyas Yemane (Year III Internal Medicine Resident)

Signature: ---------- Date: ----------

-

Advisors:

Name: **Dr. Mulugeta Biadge (MD, Consultant Neurologist, Assistant Professor)**

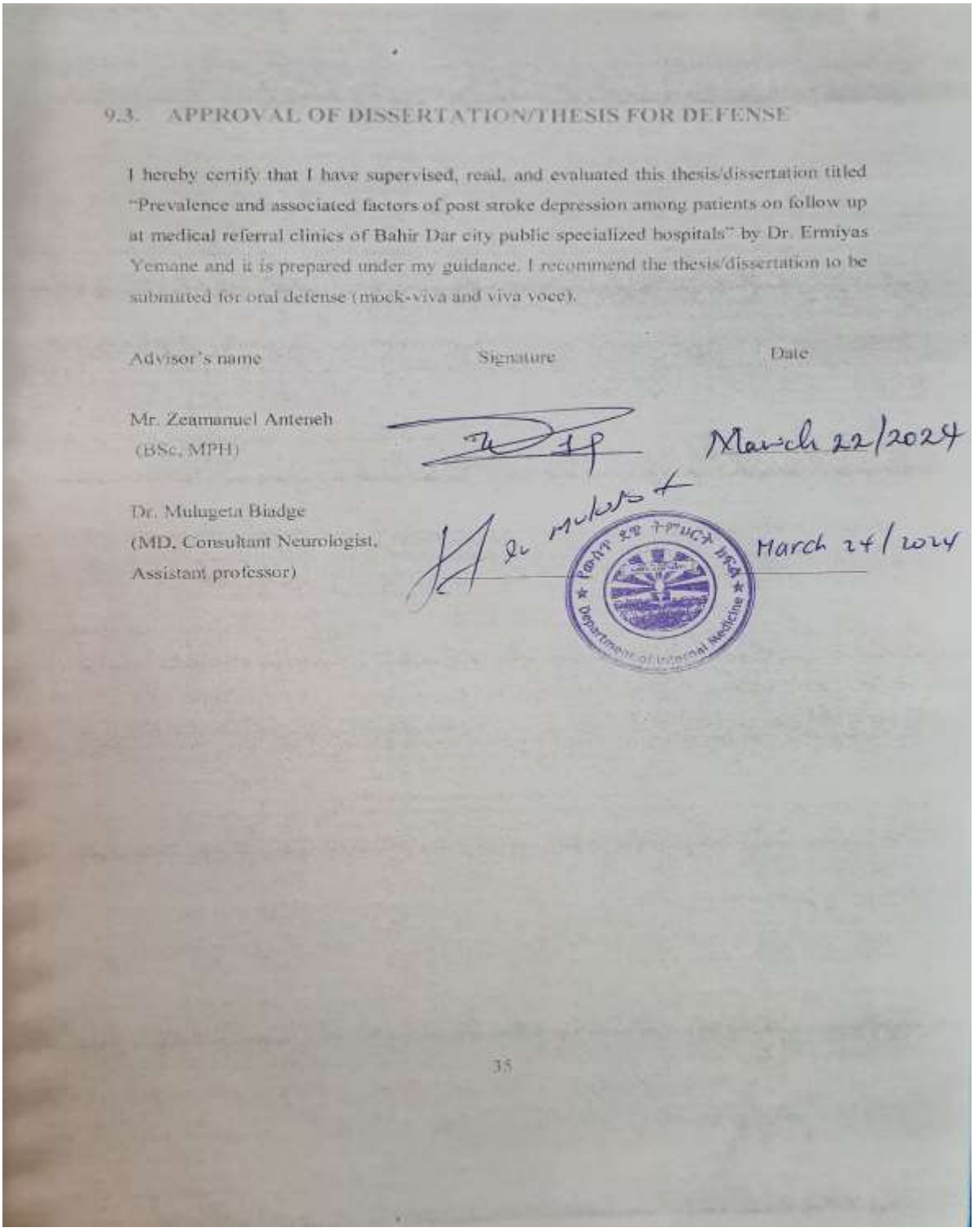
Signature: ---------- Date: ----------

-

Name**: Mr. Zeamanuel A. (BSc, MPH)**

Signature: ---------- Date: ----------

10.3. APPROVAL OF DISSERTATION/THESIS FOR DEFENSE



9.3. APPROVAL OF DISSERTATION/THESIS FOR DEFENSE

I hereby certify that I have supervised, read, and evaluated this thesis/dissertation titled "Prevalence and associated factors of post stroke depression among patients on follow up at medical referral clinics of Bahir Dar city public specialized hospitals" by Dr. Ermiyas Yemane and it is prepared under my guidance. I recommend the thesis/dissertation to be submitted for oral defense (mock-viva and viva voce).

Advisor's name	Signature	Date
Mr. Zeamanuel Anteneh (BSc, MPH)		March 22/2024
Dr. Mulugeta Biadge (MD, Consultant Neurologist, Assistant professor)	Dr Mulugeta	March 24/2024

Department of Internal Medicine

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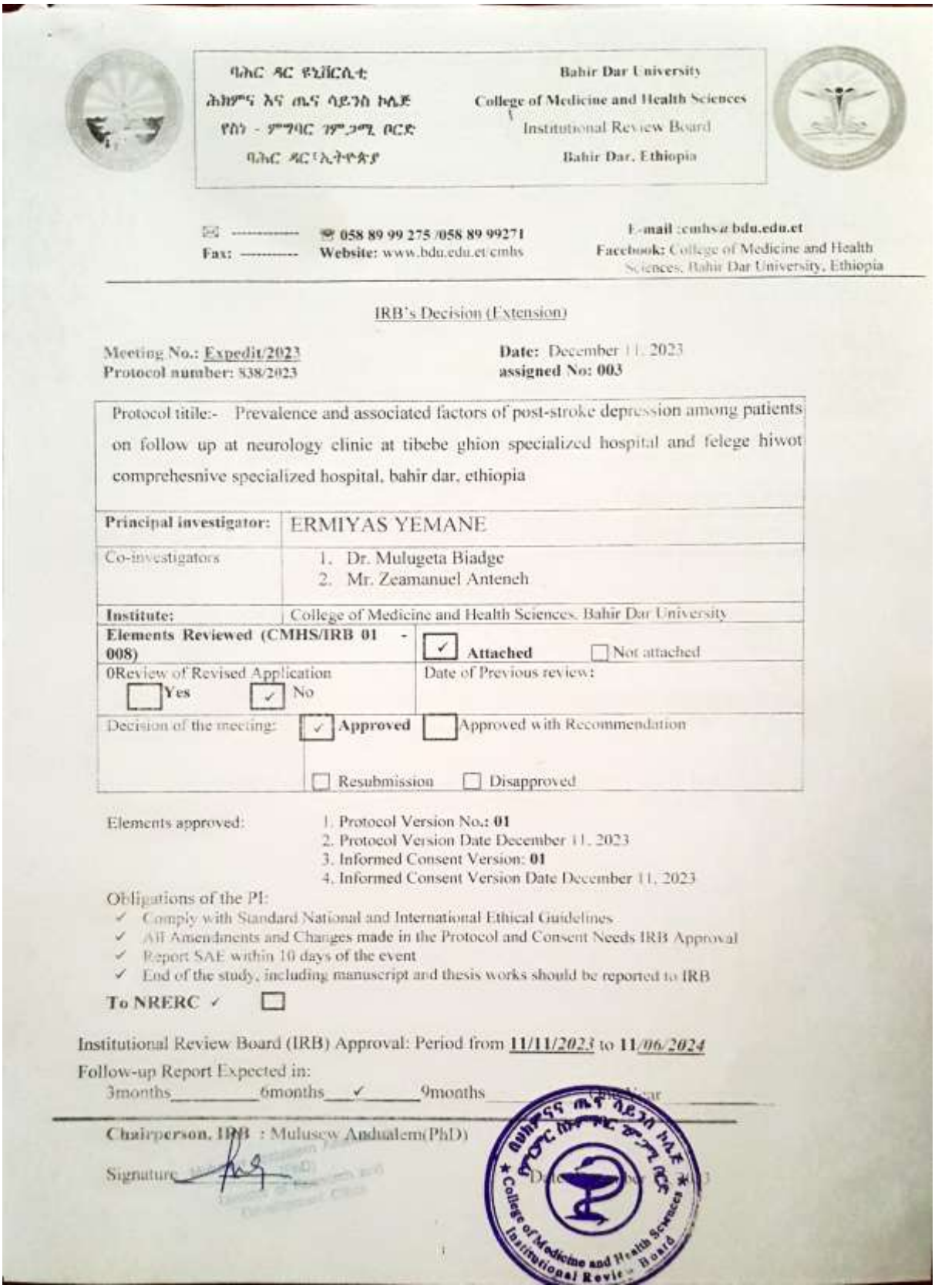
10.4. ETHICAL CLEARANCE



ባሕር ዳር ዩኒቨርሲቲ
ሕክምና እና ጤና ሳይንስ ኮሌጅ
የሰነ - ምግባር ግምጋሚ ቦርድ
ባሕር ዳር ፡ኢትዮጵያ

Bahir Dar University
College of Medicine and Health Sciences
Institutional Review Board
Bahir Dar, Ethiopia

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E-mail :cmhs@bdu.edu.et
Facebook: College of Medicine and Health Sciences, Bahir Dar University, Ethiopia

IRB's Decision (Extension)

Meeting No.: Expedit/2023 **Date:** December 11, 2023
Protocol number: 838/2023 **assigned No: 003**

Protocol titile:- Prevalence and associated factors of post-stroke depression among patients on follow up at neurology clinic at tibebe ghion specialized hospital and felege hiwot comprehesnive specialized hospital, bahir dar, ethiopia	
Principal investigator:	ERMIYAS YEMANE
Co-investigators	1. Dr. Mulugeta Biadge 2. Mr. Zeamanuel Anteneh
Institute:	College of Medicine and Health Sciences, Bahir Dar University
Elements Reviewed (CMHS/IRB 01 - 008)	✓ **Attached** ☐ Not attached
0Review of Revised Application ☐ **Yes** ✓ No	Date of Previous review:
Decision of the meeting: ✓ **Approved** ☐ Approved with Recommendation ☐ Resubmission ☐ Disapproved	

Elements approved:
1. Protocol Version No.: **01**
2. Protocol Version Date December 11, 2023
3. Informed Consent Version: **01**
4. Informed Consent Version Date December 11, 2023

Obligations of the PI:
- ✓ Comply with Standard National and International Ethical Guidelines
- ✓ All Amendments and Changes made in the Protocol and Consent Needs IRB Approval
- ✓ Report SAE within 10 days of the event
- ✓ End of the study, including manuscript and thesis works should be reported to IRB

To NRERC ✓ ☐

Institutional Review Board (IRB) Approval: Period from **11/11/2023** to **11/06/2024**

Follow-up Report Expected in:
3months_____ 6months__✓____ 9months_____ 1year_____

Chairperson, IRB : Mulusew Andualem(PhD)

Signature_____ Date_____

College of Medicine and Health Sciences Institutional Review Board