

Prevalence and associated factors of depression among people with epilepsy in Mekelle, Tigray, Ethiopia, 2019.

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Abstract

Background - Epilepsy is the world's most common neurological disorder, affecting approximately 50 million people worldwide and contributed to different psychiatric illness. Depression is one of the most frequent co morbid psychiatric disorders that affects the life of the patients. This comorbidity in people with epilepsy impose significant burdens on patients and their families. The study aimed to determine the prevalence of depression and associated factors among peoples with epilepsy in Mekelle , Ethiopia.

Methods – An institutional based cross-sectional study was conducted among systematically selected 296 people with epilepsy from April 15, 2019 – May 30, 2019. Depression was assessed by using the Patient health questionnaire (PHQs). The data were entered & clean by using Epi Info 4.4 version. Statistical Package for Social Sciences version 25 was used for analysis. Factors with a p-value < 0.30 in the bivariate logistic regression were entered into the multivariate model. A p-value of less than 0.05 was considered statistically significant.

Result - The prevalence of depression was found to be 34.8%. Unable to read & write (AOR= 0.400, 95% CI: 0.162, 0.986), long duration of the medication intake at least for 11 years (AOR= 3.715, 95% CI: 1.498, 9.212), absence of improvement with medication (AOR= 0.216, 95% CI: 0.101, 0.460), feeling of perceived stigma (AOR= 0.244, 95% CI: 0.129, 0.462), stress symptoms(AOR= 0.452, 95% CI: 0.220, 0.928), were significantly associated with depression.

Conclusion – Nowadays depression among peoples with epilepsy is high.

Keywords:- Comorbidity, Depression, Epilepsy, Outpatient, Mekelle.

Introduction

Globally from the total people who suffer from epilepsy, \approx 15–60% also experienced depression and/or anxiety disorder, 80% of them were exist in in low-income regions and these comorbidities are often underrecognized and undertreated (1–3). Depression is characterized by loss of interest, depressed mood, disturbance of sleep, problem in appetite and psychomotor activity, difficulty to concentrate or make decision, guilty or sinful feeling, easily tiredness and recurring thoughts of death or suicide (4).

The burden of comorbidity in people with epilepsy impose significant burdens on patients and their families (5). Several diseases, including depression, anxiety...& others are up to eight times more common in people with epilepsy than in the general population & negatively affect quality of life (5,6). People with epilepsy (PWE) have been experienced more psychological disorders than general population (7).

Psychiatric comorbidities, especially depression (8–11) and anxiety disorders, seem to be the most frequent complications of epilepsy and reduce quality of life beyond seizures itself and affect the clinical course of epilepsy (5,12–15). A population-based study in the United Kingdom indicated that 30.6% of PWE have depression (1). A Canadian study using data from the national population health survey

demonstrated an association between epilepsy and lifetime major depression not only seriously affects PWE's health-related quality of life but also contributes to the high suicide rates among PWE compared with the general population, making it potentially life-threatening (2).

A systematic desk review and electronic web-based search conducted in United States show that prevalence of depression among patients with epilepsy was 32.71% and receiving polytherapy is the factor associated with epilepsy (16). A systematic review study conducted in different countries Asia revealed that 25% of PWE suffer from depression (9). A hospital based cross sectional study conducted in the north eastern part of India revealed that 18% of total population experiences depression and Presence of partial seizures, frequent seizures, long duration of epilepsy and poor compliance to antiepileptic drug were significantly associated depression (17).

Another institutional based cross-sectional study conducted on patients attending psychiatric outpatient epilepsy clinic in psychiatry department of Amritsar city in India show that 40% of the participant suffer from depression (with 22.5% severe depression & 17.5% moderate depression) and also being female & on antiepileptic medication also factors associated with epilepsy (10).

A community based cross-sectional study among peoples with epilepsy in Brazil show that the prevalence of depression were 24.7% and low educational status, lifetime suicidal thought & suicidal attempt were factors significantly associated with depression (18). A study conducted in Turkey by using Beck depression inventory scale on 41 PWE show that 34.7% were suffer from depression, seizure frequency was the independent predictor of depression (19)

A cross-sectional study conducted in Rwanda show that 26.8% of the participant experience depression (20). Institution based quantitative cross-sectional study show that the prevalence of depression was 45.2% & Lower educational status, early onset of illness, seizure frequency, poly-pharmacy and difficulties of adherence to anti-epileptic drugs (AEDs) were factors statistically associated with depression (21). A study conducted in Ethiopia show that the prevalence of depression among PWE were 43% & Occupational status and perceived stigma were significantly associated with it (22).

An Institution-based cross-sectional study conducted at Emanuel Mental Specialized and Tikur Anbesa Hospitals, Addis Ababa, Ethiopia on a Samples of 422 epilepsy patients by using patient Health Questionnaire (PHQ)-9 show that 43.7% of the participant were experienced depression & being female, single, having feeling of perceived stigma and medication nonadherence were factors significantly associated with it (23). Another Cross-sectional study conducted in selected public health facilities shows that 51.2% experiences depression Low educational status, Seizure frequencies ≥ 3 per month, Age onset of epilepsy ≤ 11 years, low anti-epileptic drug adherence and poor knowledge about epilepsy were the independent predictors of depression (24). A study conducted in Ethiopia show that 17.4% of PWE take alcohol (25) but there is limited study revealing association substance use with depression among PWE.

People with epilepsy (PWE) will experience depression at a higher rate, mainly two-three fold when compared to a general population (26). About 55% lifetime prevalence for depression was Despite their

relatively high prevalence with severe complication it remain unrecognized and untreated in many patients with epilepsy (27). In Ethiopia other factors like physical abuse and sexual abuse also were not addressed. Not only this but also there are no studies that assessed the magnitude and associated factors of depression among epileptic people in the Mekelle city of Tigray regional state, Ethiopia. Currently depression become a common comorbid problem for many cases including epilepsy. Giving good information about the comorbidity of depression with epilepsy is one of the main ways that reduce it & promote healthy behaviors among peoples with epilepsy. This indicates that there is a need to identify the factor that leads depression in people with epilepsy. And also, it would be help health professionals to design strategies against the possible risk factors that increase depression among epileptic outpatients. Furthermore, the study results would give a little bit of information for policymakers to design and integrate comorbid screening approach with the general health service in order to minimize comorbidity. Since there is a paucity of information about depression and its associated factors among people with epilepsy, this study was aimed to assess the prevalence of depression & its associated factor among patients with epilepsy in Mekelle town, Ethiopia, 2019.

Methods

Study areas and period

The study was conducted at the neurologic outpatient department of Ayder Comprehensive Specialized Hospital and Mekelle General Hospital located in Mekelle city, the Northern part of Ethiopia from April 15/2019 – May 30/2019. Mekelle is the capital city of Tigray regional state & located 780 km far in the north from Addis Ababa, with a total estimated population of 310, 436 of whom 140,067 (45.1%) are men and 170,369 (54.9%) are women (28). The city covers 109 square kilometers & has one comprehensive specialized hospital (Ayder), three general hospital, nine health centers and several private hospital and clinics. Only three hospitals (Ayder Comprehensive Specialized Hospital, Mekelle General Hospital and Quiha General Hospital) gives outpatient neurological services but the former two gives the service in a separate manner & the latter one gives neurological service with mental health services. In 2018/19 a total of 1103 epileptic patients are got services in the two hospitals (400 in ACSH & 703 in MGH). The total monthly epilepsy caseloads in the two hospitals were more than 560 & in both Hospital, epilepsy is a leading diagnosis of neurological problems.

Study design

An institution-based cross-sectional study was conducted.

Source population and study population

Source population

All outpatients who were taking epileptic services in the neurology outpatient department of Ayder Comprehensive Specialized Hospital & Mekelle General Hospital.

Study population

Outpatients he/she newly diagnosed as epileptics and they have been taking follow up treatment during the study period in ACSH & MGH.

Eligibility criteria

Inclusion criteria

Newly diagnosed epileptic patients and outpatients who were in regular follow up treatment under the diagnosis of epilepsy with the age of 12 years old and above.

Exclusion criteria

Outpatients he/she was unable to communicate, aged from 12–17 years come alone was excluded from the study.

Sample size and sampling procedure

Sample size

Single population proportion formula was used to determine the maximum number of samples required for this study. The study conducted in Ethiopia indicated that the prevalence of depression among epileptic patient was 43.8% (23).

The final sample size for this study was determined by $n = (Z_{\alpha/2})^2 P (1-P) / D^2$

Where, n = the required sample size

Z = standard score corresponding to a 95% confidence interval

P = assumed a proportion of prevalence of perceived stigma among people with epilepsy

D = the margin of error (precision) 5%

Then, $n = (1.96)^2 \times (0.438) (0.562) / (0.05)^2 = 378$

The total patient in the two are 1103 (400 in ACSH & 703 in MGH). Since the N is < 10,000, use correction formula

$n_f = n / 1 + (n/N)$. Where, N = total population of people with epilepsy

Nf = final sample size

$n_f = 378 / 1 + (378/1103) = 282$ and considering the non-respondent rate of 5% it becomes 296. Finally, the population was proportionally allocated in the following way.

Sampling technique and procedure

A systematic random sampling technique was used to select participants from both hospitals. The k value was calculated by dividing the total population to total sample size ($1103/296 \approx 3$). The data was collected in six-week duration; the total patient follows in one month were obtained by calculating the average of the previous year of twelve-month. The required sample size was proportionally allocated for each hospital. Finally, every 3rd person the data collector was selected the patient from the respected hospital.

Data collection

Data were collected by trained 2 BSc degree health professionals by using interviewer-administered pre-tested questionnaire. The questionnaire consisted of the socio-demographic characteristics (age, sex, marital status, educational level & others) and questions that address the factors associated with depression. Depression was assessed by using patient health questionnaires (PHQs).

Data collection procedure

PHQ-9 is one of the most widely used self-report measures of depression. It is a reliable and valid measure of depression in a range of cultural groups and has been validated with psychiatric and non-psychiatric populations with Cronbach's α range from 0.84–0.915 in most of the countries including Africa (29,30). In Ethiopia, it was also validated in Afaan Oromo Cronbach's alpha, 0.84 (31). It consists of 9 items, and each item four-point Likert scores (not at all '0' up to nearly every day '3') to describe a specific behavioral manifestation of depression. A score ≥ 10 are considered as having depression (32).

Perceived stigma was measured by using the KSSE which was developed and validated in Kilifi, Kenya with high internal consistency, Cronbach's α of 0.91 (33) and adopted to Ethiopia (34,35). It is a simple three-point Likert scoring system scored as "not at all" (score of 0), "sometimes" (score of 1), and "always" (score of 2). It has fifteen items and a total score was calculated by addition of all item scores. The lowest score was 0 and the highest was 30. The 66th percentile was used to categorize the scores (33–36).

Social support was assessed by Oslo 3-item social support scale, Oslo 3-item social support scale is a 3-item questionnaire commonly used to assess' social support. The scale asks about the ease of getting help from neighbors, the number of people the subjects can count on when there are serious problems, and the level of concern people show in what the subject is doing. A sum-index is obtained by adding the raw scores of the three items. The range is 3–14. The scores are interpreted as ; 3–8 (poor social support), 9–11 (moderate social support), and 12–14 (strong social support) (37,38).

For screening of substance use a modified form of ASSIST, developed by World Health Organization (WHO) an international group of substance abuse researchers to detect and manage substance use and related problems in primary and general medical care settings was used.

To assess anxiety & stress GAD-7 and modified form of DASS respectively was used.

GAD-7 is mostly used tool for screening of anxiety by remembering the past 2 weeks. It also contains 7 items with a four Likert item. The tool is cross-culturally validated with the internal consistency of Cronbach's $\alpha = 0.915$ (39). A score greater than or equal to 10 is considered as having moderate to severe anxiety (32).

The DASS 21 is a 21-item self-report questionnaire designed to measure the severity of a range of symptoms common to both Depression and Anxiety stress. But for this study I was taken the modified form of DASS-21 contain 7 items only, which scored from 0 (did not apply to me at all over the last week) to 3 (applied to me very much or most of the time over the past week) with the main focus on to assess the severity of the core symptoms Stress only. This tool is cross-culturally valid measures in China with a Cronbach alpha of = 0.86 and adopted in Ethiopia (40). A score > 9 is considered as having moderate to severe stress. For that PHQ-9, GAD-7 & the modified form of DASS-21 scores > 9 and the patients become voluntary they were linked to psychiatry outpatient department for further screening and management.

Operational definitions

Anxiety:- According to Generalized Anxiety Disorder-7 scale people with epilepsy, those who scored > 9 was concluded to have anxiety (32).

Comorbidity:- is defined as a greater than coincidental presence of two disorders in the same person without inferring a causal relation (41).

Depression:- According to Patient Health Questionnaire-9 scale people with epilepsy, those who score > 9 was concluded to have depression (29,31,32)

Nonstigmatized patient:- People with epilepsy who score less than or equal to the 66th percentile of Kilifi stigma scale of epilepsy (33–36).

People with epilepsy:- Peoples who experienced At least two unprovoked (or reflex) seizures occurring greater than 24 hours apart (42).

Perceived stigmatized patient:- People with epilepsy who score above the 66th percentile of Kilifi stigma scale of epilepsy (33–36).

Physical abuse:- Those acts commission by other persons that cause actual physical harm or have the potential for harm on people with epilepsy (43).

Sexual abuse:- Those acts where another person uses an epileptic patient for sexual gratification forcefully (43).

Stress:- According to the modified form of depression, anxiety & stress scale people with epilepsy, those who scored > 9 was concluded to have stress (40).

Suicidal ideation:- After starting the illness any thoughts about self-harm with deliberate consideration or planning of possible techniques of causing one's own death (44).

Suicidal attempt:- After starting epilepsy any attempt to end one's own life (44).

Data quality assurance

To keep the quality of the study's data, the questionnaires were translated into Tigrigna (local language) by professional Tigrigna speaker individuals who had experience and knowledge in mental illness and back-translation to English was performed by a senior specialist who had clinical experiences in institutions for its simplicity and clarity for use.

Two weeks before the actual data collection pre-test was carried out on 5% of the total sample of people with epilepsy in Qiuha General Hospital to ascertain clarity, feasibility, and applicability of the study tools, to estimate the proper time required for answering the questionnaire, and to identify obstacles that may be faced during data collection. The sample in the pre-test was excluded from the entire sample of research work.

In addition, the principal investigator gave a one-day training for data collectors on the techniques of data collection. Confidentiality of the participants throughout the whole process of data collection was maintained. The collected data were checked daily for completeness.

Data analysis procedure

Data were entered and cleaned by using Epi-info version 4.4.3.1 and transferred to Statistical Package for Social Sciences version 25 (SPSS-25) for further analysis. Descriptive statistical analysis was used to estimate the frequencies and percentages of the variables. Binary logistic regression and adjusted odds ratio with a 95% confidence interval were used to identify the associated factors of the outcome variable. All factors with a p-value < 0.30 in the bivariate logistic regression was directly entered into the multivariate model. Finally, all P-value less than 0.05 will be considered statistically significant.

Ethical Consideration

The ethical approval was obtained from the ethical review board of Mekelle University, College of Health science. Verbal and then written consent form was taken from each participant. For those aged from 12–17, a written assent was taken from their relatives that s/he comes with them. An information sheet was attached to each questionnaire to provide study details & to tell the rights of the participants. All the collected data was used for the purpose of this study only. Hard copy completed questionnaires and computer data was kept confidentially.

Results

A total of 296 patients with epilepsy were recruited in the study. The overall response rate was 100%.

Sociodemographic Characteristics.

All of the respondents were in the age group of 13–65 years with the mean, age of 31.6 ± 13.04 .SD. The median & mode age of respondent was 29 and 24 respectively. Among all participants, 163(55.1%) were male, 186(62.8%) were live in urban area & geographically 268(90.5) were Tigran in ethnicity. Majority of the participant 239(80.7%) were orthodox in religion, 96(32.4%) were unable to read & write, 95(32.1%) were married, 135 (45.6%) had no any specified monthly income and 162(54.7%) were had moderate social support (Table 1).

Table 1

Distribution of study subjects by socio demographic factors peoples with epilepsy (n = 296) on follow up at Ayder comprehensive specialized hospital and Mekelle hospital, Mekelle, Tigray, Ethiopia, 2019.

	Variables	Frequency	Percentage
Age	12–17 years	34	11.5
	18–24 years	77	26.0
	24–34 years	70	23.6
	35–44 years	63	21.3
	> 44 years	52	17.6
Sex	Male	163	55.1
	Female	133	44.9
Residency	Urban	186	62.8
	Rural	110	37.2
Ethnicity	Tigray	268	90.5
	Amhara	11	3.7
	Afar	16	5.4
	Other	1	.3
Religion	Orthodox	239	80.7
	Catholic	4	1.4
	Protestant	4	1.4
	Muslim	49	16.5
Educational status	Unable to read & write	96	32.4
	Primary 1–8	84	28.4
	Secondary 9–12	48	16.2
	Techniques	8	2.7
	Diploma	9	3.1
	first degree and above	51	17.2
Marital status	Married	95	32.1
	Single	150	50.7

	Variables	Frequency	Percentage
	Divorced	22	7.4
	Widowed	26	8.8
	Other	3	1.0
Employment	No	41	13.9
	Student	69	23.3
	Farmer	32	10.8
	house wife	56	18.9
	Government	16	5.4
	Private	33	11.1
	Merchant	24	8.2
	Others	25	8.4
	Monthly income	No	135
301–600		23	7.8
< 300		21	7.1
601–1000		24	8.1
> 1000		93	31.4
Social support	Low	72	24.3
	Moderate	162	54.8
	High	62	20.9

Description of respondents by clinical factors

From the total 296 respondents, 120(40.5%) were start epilepsy at the age of 18 & above, 135(45.6%) were live with epilepsy for at least 11 years and 134 (45.3%) were experienced seizure related physical trauma. 163 (55.1%) of the participant were reported that they experience at most 2 seizures in a month & 82 (27.7%) experience seizure frequency 3–5 time per month. Majority of the respondent 216(73.0%) were on monotherapy, 88(28.7%) were taken the medication for more than 11 years and 243 (82.1%) were had good improvement with medication (Table 2).

Table 2

Distribution of study subjects by clinical related factors of peoples with epilepsy (n = 296) on follow up at Ayder comprehensive specialized hospital and Mekelle hospital, Mekelle, Tigray, Ethiopia, 2019.

	Variables	Frequency	Percentage
Age of onset	< 6 years	32	10.8
	6–11 years	76	25.7
	12–17 years	68	23.0
	18 & above years	120	40.5
Total duration of the illness	≤ 1 year	11	3.7
	2–5 years	64	21.6
	6–10 years	86	29.1
	11 years or above	135	45.6
Number of seizures	≤ 2 per month	163	55.1
	3–5 per month	82	27.6
	6–10 per 6 months	41	13.9
	≥ 11 per year	10	3.4
Seizures related physical trauma	No	162	54.7
	Yes	134	45.3
Number of AEDs	Monotherapy	216	73.0
	Polytherapy	80	27.0
Length of time with medication	0–11 month	31	10.5
	Less than 2 years	40	13.5
	2–5 years	85	28.7
	6–10 years	52	17.6
	11 or more years	88	29.7
Improvement with medication	No	53	17.9
	Yes	243	82.1
Medication related side effect.	No	207	69.9
	Yes	89	30.1

	Variables	Frequency	Percentage
Life time substance use history	No	220	74.3
	Yes	76	25.7
Substance use history in the past 3 months.	No	267	90.2
	Yes	29	9.8
Presence of chronic medical illness	No	250	84.5
	Yes	46	15.5
Perceived stigma	No	193	65.2
	Yes	103	34.8
Anxiety	No	200	67.6
	Yes	96	32.4
Stress	No	227	76.7
	Yes	69	23.3
History of physical abused	No	284	95.9
	Yes	12	4.1
History of sexual abused	No	293	99.0
	Yes	3	1.0
Suicidal attempt history	No	285	96.3
	Yes	11	3.7
Presence of suicidal wish	No	238	80.4
	Yes	58	19.6

Description of Respondents Patient's Contagion Belief, and Causal Belief of Epilepsy.

Regarding the cause of epilepsy, 94(31.8%) were believe that it is caused by walks around garbage, dumps, ashes, walking along a river & 69(23.3%) were not know. Out of the total participant 181(61.1%) were believe that epilepsy is a mental illness, 263 (88.9) were believe that epilepsy is treatable (Table 3).

Table 3

Distribution of study subjects by (causal, contagion, heritability, treatability & mental illness Belief) of people with epilepsy (n = 296) up at Ayder on- follow comprehensive specialized hospital and Mekelle hospital, Mekelle, Tigray, Ethiopia, 2019.

	Variables	Frequency	Percentage
Cause of epilepsy	I don't know	69	23.3
	spiritual possession	39	13.2
	evil eye	19	6.4
	family history	32	10.8
	Pathogens	6	2.0
	sinful act	37	12.5
	walks around garbage, dumps, ashes, walking along a river	94	31.8
Contagious	No	255	86.1
	Yes	41	13.9
Heritable	No	235	79.4
	Yes	61	20.6
Mental illness	No	115	38.9
	Yes	181	61.1
Treatable	No	33	11.1
	Yes	263	88.9
By what means?	Hole water	1	0.3
	Traditional treatment	2	0.6
	Modern medicine	222	75.0
	Hole water & modern medicine	41	14.0

Depression Scores of Participants.

Overall, the prevalence of perceived stigma was found to be 34.8%. Regarding the proportion of depression toward each item, most of the participants 213 (71.9%) reported that they Trouble falling or staying asleep, or sleeping too much, 210 (70.9%) were reported feeling down, depressed or hopeless and 197 (66.6%) also reported that having little interest or pleasure in doing things (Table 4).

Table 4

Proportion of responses to PHQ-9 by study participants of patients with epilepsy (n = 296) on follow up at Ayder comprehensive specialized hospital and Mekelle hospital, Mekelle, Tigray, Ethiopia, 2019.

Scale	Not at all		Several days		More than half of the days.		Every day	
	n/296	%	n/296	%	n/296	%	n/296	%
1 Little interest or pleasure in doing things	99	33.4	111	37.5	63	21.3	23	7.8
2 Feeling down, depressed or hopeless	86	29.1	128	43.2	67	22.6	15	5.1
3 Trouble falling or staying asleep, or sleeping too much	82	27.7	136	46.2	63	21.3	14	4.8
4 Feeling tired or having little energy	101	34.1	121	40.9	59	19.9	15	5.1
5 Poor appetite or overeating	126	42.6	102	34.5	54	18.2	14	4.7
6 Feeling bad about yourself – or that you are a failure or have let yourself or your family down	143	48.3	100	33.8	46	15.5	7	2.4
7 Trouble concentrating on things, such as reading the newspaper or watching television	133	44.9	90	30.4	61	20.6	12	4.1
8 Moving or speaking so slowly that other people could have noticed, or the opposite	205	69.3	77	26.0	14	4.7	0	0
9 Thoughts that you would be better off dead or of hurting yourself in some way	196	66.2	90	30.4	10	3.4	0	0

The lowest score of the data was 0 and the highest score was 19. The mean, median and mode the respondent was 7.2, 6, 5 respectively. Scores above 9 were considered to show the PWE who had depression. Accordingly, out of the 296 study subjects recruited in the study, 103 (34.8%) scored above 9 as measured by the PHQs.

Factors associated with depression

Bivariate analyses were done between depression and response variables of socio-demographic variables (Age, Residency, educational status, Marital status, employment & social support), Clinical factors (total

duration of the illness, seizure frequency, number of AEDs, side effect of medication, seizure related trauma, feeling perceived stigma, anxiety symptoms, stress symptoms and history of suicidal attempt) and patients belief factors (contagious belief, heritability belief, perceived as a mental illness & treatability belief) were found to be significantly associated with depression at p value less than 0.3. All individual factors < 0.30 at bivariate analyses were entered to multivariate logistic regression for further analysis.

Accordingly, Unable to read & write (AOR = 0.400, 95% CI: 0.162, 0.986), long duration of the medication intake at least for 11 years (AOR = 3.715, 95% CI: 1.498, 9.212), poor improvement with medication (AOR = 0.216, 95% CI: 0.101, 0.460), feeling of perceived stigma (AOR = 0.244, 95% CI: 0.129, 0.462), stress symptoms(AOR = 0.452, 95% CI: 0.220, 0.928), were significantly associated with depression (Table 5).

Table 5

Factors associated with depression in people with epilepsy (bivariate and multivariate analysis) for the study of the prevalence of depression and associated factors among epileptic patients in ACSH & MGH, 2019.

Variables	Depression		Bivariate		Multivariate analysis
	No	Yes	P-value	COR(95%,CI)	AOR (95%,CI)
Age					
12–17 years	23	11	1		
18–24 years	52	25	0.588	1.298 (0.505, 3.338)	1.392 (0.279,6.953)
24–34 years	37	33	0.502	1.305 (0.600, 2.837)	1.136 (0.301,4.285)
35–44 years	43	20	0.025*	2.421 (1.119, 5.238)	2.261 (0.7007.305)
> 45 years	38	14	0.573	1.262 (0.561, 2.839)	1.517 (0.5234.400)
Sex					
Male	102	61	1		
Female	91	42	0.294	1.296 (0.799, 2.103)	
Residency					
Urban	125	61	0.348	1.266 (0.774, 2.069)	
Rural	68	42	1		
Educational status					
Unable to read & write	58	38	0.300	0.723 (0.391, 1.336)	0.400 (0.162, 0.986)**
Primary 1–8	57	27	0.809	0.916(0.449, 1.869)	0.692 (0.2551.877)
Secondary 9–12	30	18	0.566	1.526 (0.360, 6.474)	3.189 (0.61516.543)

Note * :- Significantly associated at $p < 0.30$ & ** :- Statically significant at $p < 0.05$

P-value of Hosmer and Lemeshow goodness of fit test was = 0.593

	Depression		Bivariate		Multivariate analysis
Techniques	4	4	0.714	0.763 (0.180, 3.237)	0.335 (0.0532.106)
Diploma	6	3	0.090	0.522 (0.246, 1.106)	0.348 (0.1151.055)
First degree and above	38	13	1		1
Marital status					
Married	66	29	1		
Single	94	56	0.999	0.000 (0.000, —)	
Divorced	15	7	0.999	0.000 (0.000, —)	
Widowed	18	8	0.999	0.000 (0.000, —)	
Other	0	3	0.999	0.000 (0.000, —)	
Employment					
No	25	16	0.655	0.833 (0.375, 1.854)	1.273 (0.4723.432)
Student	45	24	0.492	0.710 (0.268, 1.885)	1.695 (0.5035.715)
Farmer	22	10	0.705	1.172 (0.516, 2.663)	1.628 (0.5844.540)
House wife	32	24	0.744	1.215 (0.377, 3.916)	1.470 (0.3615.986)
Governmental	9	7	0.104*	0.421 (0.148, 1.195)	2.405 (0.1071.532)
Private	26	7	0.903	0.937 (0.332, 2.646)	1.971 (0.5277.372)
Others/day labor	15	9	0.213*	0.493 (0.162, 1.500)	0.592 (0.1542.279)
Merchant	19	6	1		
Monthly income					
No	95	44	0.836	1.103 (0.435, 2.797)	0.708 (0.2062.432)

Note * :- Significantly associated at $p < 0.30$ & ** :- Statically significant at $p < 0.05$

P-value of Hosmer and Lemeshow goodness of fit test was = 0.593

	Depression		Bivariate		Multivariate analysis
< 300	15	8	0.183*	1.880 (0.743, 4.760)	2.655 (0.8028.787)
301–600	11	10	0.213*	1.750 (0.726, 4.219)	1.395 (0.4364.461)
601–1000	13	11	0.958	0.985 (0.560, 1.732)	1.265 (0.5612.853)
> 1001	63	30	1		
Social support					
Low	44	28	0.587	0.853 (0.481, 1.513)	1.143 (0.5402.420)
Moderate	105	57	0.232*	0.643 (0.311, 1.327)	.819 (0.3162.123)
High	44	18	1		
Age of onset					
< 6 years	20	12	1		1
6–11 years	44	32	0.657	1.212 (0.519, 2.831)	1.128 (0.3263.899)
12–17 years	50	18	0.264*	0.600 (0.245, 1.470)	1.602 (0.5964.306)
18 & above years	79	41	0.725	0.865 (0.385, 1.942)	0.854 (0.3242.248)
Total duration					
≤ 1 year	8	3	1		
2–5 years	43	21	0.581	0.680 (0.172, 2.683)	
6–10 years	55	31	0.704	0.885 (0.4721.661)	
11 years or above	87	48	0.941	1.022 (0.5811.795)	
Seizures frequency					
≤ 2 per month	112	51	0.568	0.683 (0.1852.526)	
3–5 per month	54	28	0.714	0.778 (0.2032.985)	

Note * :- Significantly associated at $p < 0.30$ & ** :- Statically significant at $p < 0.05$

P-value of Hosmer and Lemeshow goodness of fit test was = 0.593

	Depression		Bivariate		Multivariate analysis
6–10 per 6 months	21	20	0.619	1.429 (0.3505.825)	
11 or above per year	6	4	1		
No of AEDs					
Monotherapy	142	74	1		
Polytherapy	51	29	0.750	0.916 (0.536, 1.566)	
Treatment duration					
0–11 month	18	13	0.132*	1	1
less than 2 years	29	11		1.926 (0.8204.523)	2.850 (0.9278.761)
2–5 years	54	31	0.979	1.011 (0.4382.338)	1.975 (0.6535.972)
6–10 years	28	24	0.195*	1.531 (0.8042.916)	1.820 (0.7644.337)
11 or more years	64	24	0.024*	2.286 (1.1134.692)	3.715 (1.498, 9.212)**
Adherence with medication					
No	20	33	0.000*	0.245 (0.1320.456)	0.216 (0.101, 0.460)**
Yes	173	70	1	1	
Side effect					
No	137	70	1		
Yes	56	33	0.589	0.867 (0.5171.455)	
Substance use in life time					
No	143	77	1		
Yes	50	26	0.901	1.036 (0.5981.793)	
Substance use within 3 months					
No	175	92	1		
Yes	18	11	0.709	0.860 (0.3901.898)	

Note * :- Significantly associated at $p < 0.30$ & ** :- Statically significant at $p < 0.05$

P-value of Hosmer and Lemeshow goodness of fit test was = 0.593

	Depression		Bivariate	Multivariate analysis	
Seizure related trauma					
No	108	54	1		
Yes	85	49	0.561	0.867 (0.5371.402)	
Chronic medical illness					
No	166	84	1		
Yes	27	19	0.315	0.719 (0.3781.368)	
Feeling Perceived stigma					
No	146	47	1		
Yes	47	56	0.000*	0.270 (0.1630.449)	0.244 (0.129, 0.462)**
Anxiety					
No	133	67	1		
Yes	60	26	0.499	0.840 (0.5061.394)	
Stress					
No	157	70	1		
Yes	36	33	0.010*	0.486 (0.281,0.843)	0.452 (0.220, 0.928)**
Physical abused					
No	186	98	1		
Yes	7	5	0.611	0.738 (0.2282.385)	
Sexual abuse					
No	192	101	1		
Yes	1	2	0.278*	0.263 (0.0242.936)	
Suicidal attempt					
No	185	100	1		
Yes	8	3	0.595	1.441 (0.3745.555)	

Note * :- Significantly associated at $p < 0.30$ & ** :- Statically significant at $p < 0.05$

P-value of Hosmer and Lemeshow goodness of fit test was = 0.593

	Depression		Bivariate	Multivariate analysis
Suicidal wish				
No	155	83	1	
Yes	38	20	0.955	1.017 (0.5561.860)
Contagious belief				
No	169	86	1	
Yes	24	17	0.336	0.718 (0.3661.409)
Heritability belief				
No	161	74	1	
Yes	32	29	0.020*	0.507 (0.2860.899)
Belief of mental illness				
No	81	34	1	
Yes	112	69	0.133*	0.681 (0.4131.124)
Treatable belief				
No	23	10	0.566	1.258 (0.5742.757)
Yes	170	93	1	
Note * :- Significantly associated at $p < 0.30$ & ** :- Statically significant at $p < 0.05$				
P-value of Hosmer and Lemeshow goodness of fit test was = 0.593				

Discussion

The aim of this study was to assess the prevalence of depression and associated factors among people with epilepsy on regular follow up at Ayder comprehensive specialized hospitals & Mekelle hospital. Overall, the prevalence of depression was found to be 34.8%. (95% CI: 29.3, 40.2)

This result was in line with the other study conducted in USA (32.7%), in United kingdom (30.6%), in India (40%), (1,10,16). The prevalence of depression (34.8%) was line with study conducted in Turkey among people with epilepsy (34.7%) (19). The prevalence of depression among PWE in this study is greater as compared to other study conducted in India (18%), in Brazil (24.7%), in Asia (25%), in Rwanda (26.8%) and in Nigeria among peoples with epilepsy (9,17,18,20,45). In contrast, the prevalence of depression and anxiety the result of these study (34.8%) is lower than when compared to the study conducted in west Africa Togo (84%) and Benin (85.3%), (45) in Northwest Ethiopia (45.2%), in central Ethiopia (43.7%), in

west Shewa (43%), in Bench Maji zone (51.2%) (21–24). The possible explanations for the variation may be due to use of different tools; geographical areas sample size and cultures of the study subject.

Regarding the associated factors, those who are unable to read & write were more likely to have depression (AOR = 0.400, 95% CI: 0.162, 0.986) than those who have first degree or above. This study is supported by other studies conducted in Brazil (18), in North west Ethiopia (21) in Bench maji zone (24). The possible explanations might be those individuals with lower educational status might face difficulties socioeconomic stressors like unemployment, poverty and economic dependency and may have poor coping strategies to their illness, which in turn to social isolation, poor adherence to their AEDs, school dropout that impaired their cognition and contributes to poorer psychological adjustment that they face in life.

People with epilepsy who were taking AEDs for at least 11 years were four time more likely to had depression (AOR = 3.715, 95% CI: 1.498, 9.212) than those who were taking less than 11 months. The possible explanation is patients taking antiepileptic medication may become depressed as a result of their treatment. Because patients starting tiagabine may develop symptoms of agitation, withdrawal, and mood disturbance suggestive of depression.

Those people with epilepsy who hadn't improvement with antiepileptic medication were more like to develop depression (AOR = 0.216, 95% CI: 0.101, 0.460) than those people with epilepsy who had good improvement medication. These results were consistent with the previous studies in Europe (46) in India (17), in North west Ethiopia (21), in Bench Maji zone (24). The possible explanation is those patients who had difficulties of adherence to their AEDs may result in breakthrough seizures that may lead an individual to develop depression.

Those patients who had develop perceived stigma were seventeen times (AOR = 0.244, 95% CI: 0.129, 0.462) more likely to develop depression than those people with epilepsy who had not develop perceived stigma. The result is supported by other studies conducted in Europe (46) in jimma (26) central Ethiopia (22) and in north west Ethiopia (21). This may be due to lack of coping strategies to different seizure effect such as perceived negative social attitude as a result of unaccepted sign of seizure, or the subjects may not develop stigma resistance ability through their life that help them to cope up with different cultural belief, social stigma and the impact of the illness that contributed to felt stigma.

Those patients with high perceived stress had more to had depression (AOR = 0.452, 95% CI: 0.220, 0.928) as compared to those patients who had low perceived stress. These results were consistent with the previous studies in Ethiopia (21,22). The possible explanation is that those individual with high perceived stress may have poorer psychological adjustment when they face different stress causing problems such as unemployment, lower educational status, perceived stigma, and seizure frequency & related trauma in their life that may be precipitate depression disorders.

Conclusion

This study shows that depression among PWE is the common public health problem. The study also revealed that sociodemographic factors like educational status, clinical related factors like long term intake of medication, poor improvement with medication, stress symptom, perceived stigma were significantly associated with development of depression .

Recommendation

The researcher recommends to:-

- Planners and policymakers in collaboration with Ministry of Health to design approach in order to screen frequently co-occurring illness & to enhance the quality of life of people with epilepsy.
- MOH, NGOs, Health extension worker and other responsible bodies need to work collaboratively to increase awareness comorbidity of mental illness with chronic health problems including epilepsy by designing campaign.
- Government and non-government sectors to give training for religious institutions, society leaders and parents to increase perception about the nature of epilepsy& its comorbidity.
- Health professionals need to routinely screen those people with epilepsy for the presence of additional comorbidities and related conditions. It is advised to provide appropriate counselling service or link to respected setting, so that it would be possible to prevent and intervene accordingly.
- The researcher also recommended to further research on depression using different study design, set up and sample size will be conducted in order to investigate future some of the risk factors that were found to be associated with depression among people with epilepsy.

Limitations Of The Study

Recall and response biases might have occurred when completing the questionnaire. In addition, some of the independent variables like medication adherence, physical & sexual abuse, presence suicidal wish... were assessed by single questions this may lead some patients to respond in indecorous manner. As a result of using a cross-sectional study design, the researcher was not establishing any cause and effect relationship between the possible determinant of perceived stigma and the outcome of interest.

Declarations

Ethics approval and consent to participate

This study was carried out after obtaining ethical approval from Mekelle University, College of Health Science office of Health Research Ethics Review Committee (HRERC) with reference number of Notification of Expedited Approval ERC 1301/2019. Permission letter was obtained from Mekelle University to Psychiatric clinics, and finally, the letter was distributed to health professionals who work in the neurologic clinics and data collectors. Verbal and then written consent form were taken from each participant. For those aged from 12-17, a written assent was taken from their relatives that s/he comes

with them. An information sheet was attached to each questionnaire to provide study details & to tell the rights of the participants. All the collected data was used for the purpose of this study only. Hard copy completed questionnaires and computer data was kept confidentially. Decision capacity tool was used.

Consent for publication

Consent of publication for this research is Mekelle University, College of health science, psychiatry department and participants.

Availability of data and materials

All availability of data and material are attached on the manuscript.

Competing Interests

We authors declare that we have no conflict of interest for example on financial support for educational programs, employment or consultation, support from a project sponsor, position on advisory board or board of directors or other type of management relationships and multiple affiliations.

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Authors' contributions

JS was the principal investigator of the study; made substantial contributions in conception selecting design, supervising & managing data collection as well as analysis and interpretation of data. KM involved in drafting and revising critically the manuscript. All authors also agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All authors read and approved the final manuscript.

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Figures

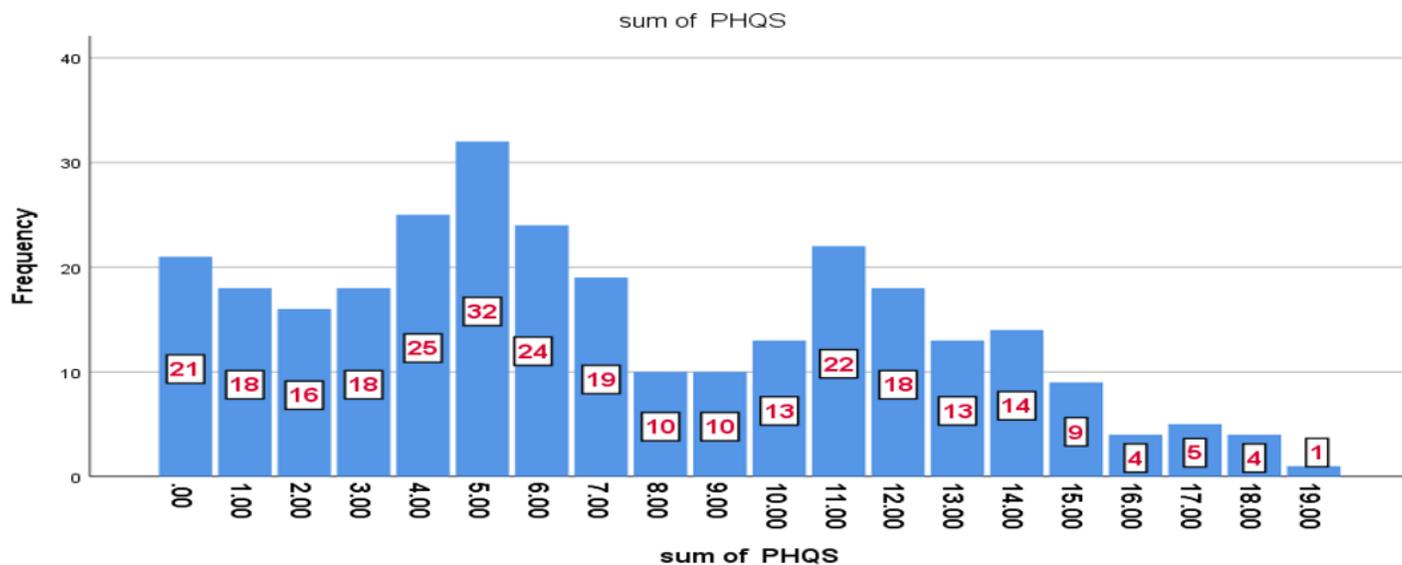


Figure 1

The frequency of the sum of patient health questionnaire response of the study depression and associated factors among PWE (n=296) on follow up at Ayder comprehensive specialized hospital and Mekelle hospital, Mekelle, Tigray, Ethiopia, 2019

category of sum of PHQs
Textbox

not depressed
depressed

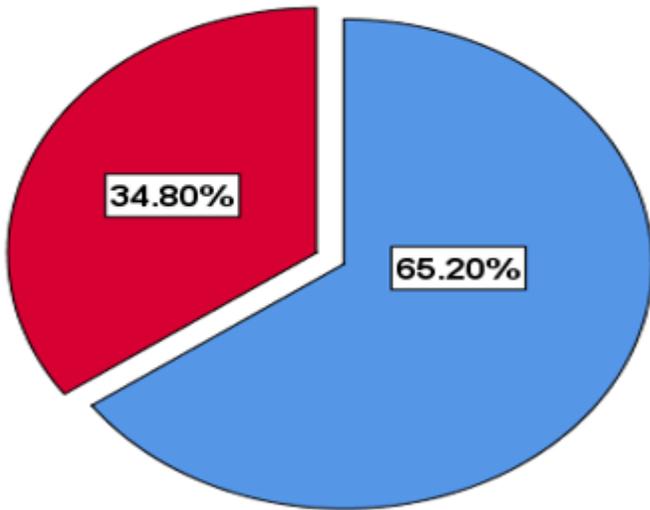


Figure 2

Prevalence of depression among people with epilepsy (n=296) on follow up at Ayder comprehensive specialized hospital and Mekelle hospital, Mekelle, Tigray, Ethiopia, 2019.