

## RESEARCH ARTICLE

# Prevalence and associated factors of anxiety disorder symptoms among people with epilepsy in Mekelle, Ethiopia, 2019: Institutional-based cross-sectional study

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**Abstract**

**Aim:** Anxiety can have a profound influence on the health-related quality of life of people with epilepsy and caregivers. The study aimed to assess the prevalence and associated factors of anxiety disorder among people with epilepsy.

**Design:** An institutional-based cross-sectional study was conducted.

**Method:** From 18 April 2019–30 May 2019, systematically selected 300 peoples with epilepsy were recruited. Anxiety was assessed by using the generalized anxiety disorder-7 (GAD-7). The data were entered by using Epi Info and analysed by SPSS version 25.

**Result:** The prevalence of anxiety was 38.3%. Secondary educational status, medication-related side effect, substance use history, seizure-related physical trauma, stress symptoms and a mental illness belief were significantly associated factors. The prevalence of anxiety disorder symptom was high, and it reinforced the need for recognition and treatment of mental disorders in people with epilepsy.

**KEYWORDS**

anxiety disorder, comorbidity, epilepsy, mekelle, people with epilepsy

## 1 | BACKGROUND

Epilepsy is one of the common neurological disorders in the world affecting a person's social, psychological and physiological well-being. (Dessie et al., 2019; Mammen & Sathesh Kumar, 2017; Yerdelen & Altintas, 2015). Psychologically, epilepsy leads to the most frequent complications affecting the quality of life of PWE more than the seizures itself (Gaitatzis et al., 2004; Mammen & Sathesh Kumar, 2017; Verrotti et al., 2014). The effect of epilepsy is not only limited to the exposed individuals but also to the patient's cohabiting relatives to various degrees (Yerdelen & Altintas, 2015). A study revealed that around 50–60 million peoples live with epilepsy and up to 60% of them experienced anxiety and/or depression (Keezer

et al., 2015; Mbewe et al., 2013). Emotional disorders, especially anxiety is the most frequently co-occurred illness in people with epilepsy than among the general population (Alsaadi et al., 2015; Amruth et al., 2014a; Dessie et al., 2019; Gaitatzis et al., 2004; Keezer et al., 2015; Lacey et al., 2009; Li, 2017; Mammen & Sathesh Kumar, 2017; Verrotti et al., 2014).

Various study shows that epilepsy is more severe among patients with focal epilepsy (Takele & Adamu, 2018) and more frequent compared with normal controls and patients with other chronic diseases (Kanner & Balabanov, 2002; Espinola & Sosa, 2008). A cross-sectional study conducted in Canada among PWE to determine the magnitude and associated factors of anxiety found that the prevalence of anxiety was 40.0%, having depression, medication side

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effects, smoking and illicit substance use were significantly associated with anxiety (Pham et al., 2017). A study conducted in India among PWE shows that 50% of the study participants develop psychiatric comorbidity (Rani et al., 2018). A case-control study conducted in India reported that PWE had higher anxiety of 32.5% as compared with asthmatic patient control (17.5%) and normal control (7.5%), had longer duration of seizures, had increased frequency of seizures, had recent reappearance of seizures, had anti-convulsant polypharmacy, had poor compliance with medications, and family history of seizures is an independent predictive factor (Amruth et al., 2014).

A case-control study conducted in Turkey shows that 28.6% of the participants experienced anxiety symptoms, and seizure frequency is an independent predictor (Balibey et al., 2015). An institutional-based cross-sectional study conducted in Mexico indicated that 38.8% of PWE experienced significant anxiety symptoms, and having depression, and history post-traumatic were significantly associated with anxiety (Lopez-Gomez et al., 2008). Another institutional-based cross-sectional study conducted in the Sheikh Khalifa Medical City epilepsy clinic found that the prevalence of anxiety was 43.5%, and factor depressive symptoms and age were statistically and significantly associated with anxiety (Alsaadi et al., 2015).

A community-based study conducted in Brazil among PWE shows that 39.4% of the participants develop anxiety and different factors like being female gender, low schooling, lifetime suicidal thoughts, lifetime suicide attempts and being in the low economic group were associated with anxiety (Stefanello et al., 2011). An institution-based cross-sectional study conducted in Emanuel Mental Specialized Hospital found that 33.5% of PWE develop anxiety and factors such as monthly revenue, frequency of seizure and side effects of AEDs, and being divorced/widowed was significantly associated with anxiety (Tegegne et al., 2015).

The co-occurring anxiety disorders can have a negative impact on the life of PWE and their caregivers at numerous levels: they can deteriorate the quality of life, limit the tolerance of anti-epileptic drugs, increase suicide risk, and increase healthcare costs than the general population (Kwon & Park, 2014; Scott et al., 2017a, 2017b). This implies that early detection and appropriate management of anxiety in PWE is compulsory.

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 anxiety among epileptic people in the Mekelle city of Tigray regional state, Ethiopia. Currently, anxiety disorder becomes a common comorbid problem for many cases including epilepsy. Giving good information about the comorbidity of anxiety with epilepsy is one of the main ways that reduce it and promote healthy behaviours among people with epilepsy. This indicates that there is a need to identify the factor that leads to anxiety in people with epilepsy. And also, it would help health professionals to design strategies against the possible risk factors among PWE. Furthermore, the study results would give a little bit of information for policymakers to design and integrate

a comorbid screening approach with the general health service to minimize comorbidity. Lastly, these research findings were used as a baseline data source for other related studies. Since there is a paucity of information about anxiety disorder and its associated factors among people with epilepsy, this study aimed to assess the prevalence of anxiety and its predictive factor among patients with epilepsy in Mekelle town, Ethiopia.

## 2 | METHODS

### 2.1 | Study areas

The study was conducted at the neurologic outpatient department of Ayder Comprehensive Specialized Hospital (ACSH) and Mekelle General Hospital (MGH) located in Mekelle city, the Northern part of Ethiopia. Only three hospitals (Ayder Comprehensive Specialized Hospital, Mekelle General Hospital and Quiha General Hospital) give outpatient neurological services, but the former two separately give the service and the latter one gives neurological service with mental health services. The total monthly epilepsy caseloads in the two hospitals were more than 560, and in both the hospitals, epilepsy is a leading diagnosis of neurological problems.

### 2.2 | Study period

From 15 April 2019–30 May 2019.

### 2.3 | Study design

An institution-based cross-sectional study was conducted.

### 2.4 | Source population

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

### 2.5 | Study population

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

### 2.6 | 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.

## 2.7 | Exclusion criteria

Outpatients who were unable to communicate and aged from 12–17 years come alone.

## 2.8 | Sample size

The sample size of 300 was determined based on a single population proportion formula by using the prevalence of anxiety disorder among epileptic patients was 47.8% (Takele & Adamu, 2019), confidence level 95%, margin of error 5, and 5% for non-response rate. Finally, the study participants were proportionally allocated in the following way (Figure 1).

## 2.9 | Sampling technique and procedure

A systematic random sampling technique was used. The  $k$  value was calculated by dividing the source of population to the total sample size ( $1103/296 \approx 3$ ). Every other person the data collector was selected the patient.

## 2.10 | Data collection

Data were collected by trained two BSc degree health professionals by using an interviewer-administered pre-tested questionnaire. The questionnaire consisted of the socio-demographic characteristics (age, sex, marital status, educational level and others), and questions that address

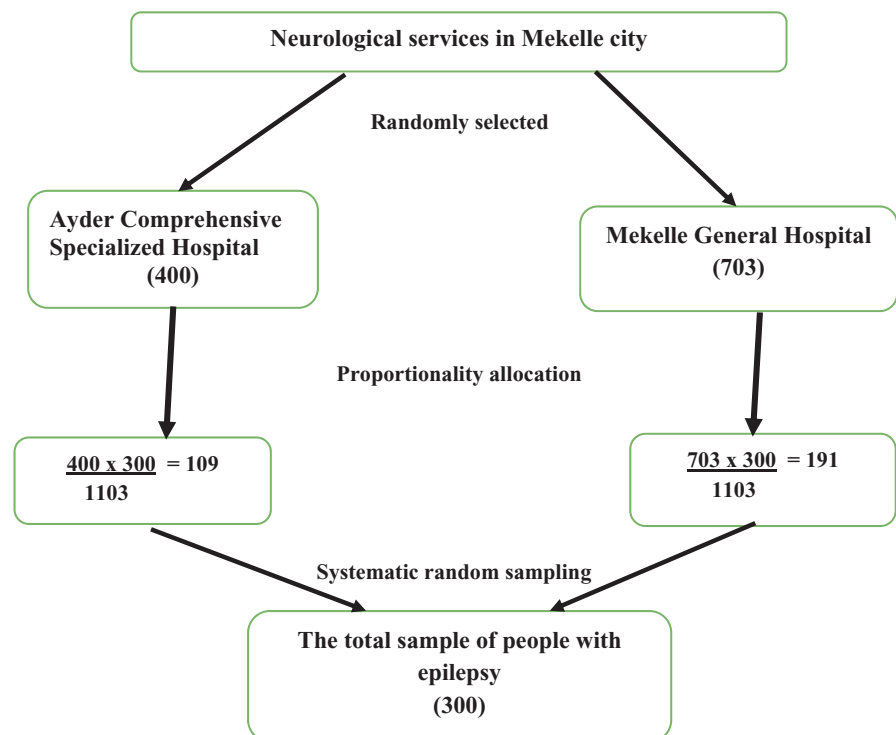
the factors were associated with anxiety disorder. Anxiety disorder symptoms were assessed by using Generalized Anxiety Disorder-7.

## 2.11 | Data collection procedure

GAD-7 is the mostly used tool for screening of anxiety by remembering the past two weeks. It also contains seven items with a four Likert item. The tool is cross-culturally validated with the internal consistency of Cronbach's  $\alpha = 0.915$  (Stefanello et al., 2011). A score greater than or equal to 10 is considered as having moderate to severe anxiety disorder (Sawaya & Zeinoun, 2016).

To assess depression and stress, PHQ-9 and modified form of DASS-21, respectively, were used. PHQ-9 is one of the most widely used 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  $\alpha$  range from 0.84–0.915 in most of the countries including Africa (Rathore et al., 2015; Yeung et al., 2008). In Ethiopia, it was also validated in Afaan Oromo Cronbach's alpha, 0.84 (Woldetensay et al., 2018). PHQ-9 contains nine item and each item four-point Likert scores (not at all '0' up to nearly every day '3') to describe a specific behavioural manifestation of depression. A score  $>10$  is considered as having depression (Sawaya & Zeinoun, 2016).

The DASS 21 is a 21-item questionnaire designed to measure the severity of a range of symptoms common to both depression anxiety and stress. But for this study, I was taken the modified form of DASS-21 which contained seven items only and 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



**FIGURE 1** Sample size proportionality for the study of anxiety disorder symptoms and associated factors among epileptic patients ( $n = 300$ ) in Mekelle, Ethiopia, 2019

to assess the severity of the core symptoms of stress only. The tool was cross-culturally valid measures in China with a Cronbach alpha of =0.86 and adopted in Ethiopia (Bekele & Damota, 2018). A score >9 is considered as having moderate to severe stress. The study participant his/her PHQ-9, GAD-7 and the modified form of DASS-21 scores >9 and they become voluntary were linked to the psychiatry outpatient department for further screening and management.

Perceived stigma was measured by using the KSSE which was developed and validated in Kilifi, Kenya, with high internal consistency, Cronbach's  $\alpha$  of 0.91 (Mbuba, 2011) and adopted to Ethiopia (Fanta et al., 2015; Tiki et al., 2018). 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 the total score was calculated by adding all item scores. The lowest score was 0, and the highest was 30. The 66th percentile was used to categorize the scores (Fanta et al., 2015; Mbuba, 2011; Nyakwana et al., 2014; Tiki et al., 2018).

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 neighbours, 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) (Jemal, 2018; Tahir et al., 2016). For screening of a substance, use a modified form of ASSIST, developed by the World Health Organization (WHO).

## 2.12 | Study variables

Dependent variables: Anxiety disorder.

Independent variables:

- Socio-demographic factors such as age, sex, religion, ethnicity, marital status, educational level, household income, employment, living area and social support
- Clinically related factors such as frequency of seizure, illness duration, length of time on AEDs, duration of seizure, chronic medical illness, a complication of epilepsy, number of AEDs, the age of onset and treatment adherence
- Physical conditions such as burn, fracture as a result of seizures, physical abuse and sexual abuse
- Psychological-related factors such as depression, stress, substance use, suicidal ideation/attempt and perceived stigma
- Social-related factors such as causal, contagion, hereditary, treatable and mental illness belief

## 2.13 | Operational definitions

- People with epilepsy: People who experienced at least two unprovoked (or reflex) seizures occurring greater than 24 hr apart (Fisher et al., 2014).

- Physical abuse: Those acts where other other persons that cause actual physical harm or have the potential for harm on people with epilepsy (Veldwijk et al., 2012).
- Sexual abuse: Those acts where another person uses an epileptic patient for sexual gratification forcefully (Veldwijk et al., 2012).
- Suicidal ideation: After starting the illness, any thoughts about self-harm with deliberate consideration or planning of possible techniques of causing one's death (American Psychiatric Association, 2013).
- Suicidal attempt: After starting epilepsy, any attempt to end one's own life (American Psychiatric Association, 2013).

## 2.14 | Data quality assurance

To keep the quality of the study's data, the questionnaires were translated into local language by professional local language speakers 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. Also, the principal investigator gave a one-day training for data collectors on the techniques of data collection. The confidentiality of the participants throughout the whole process of data collection was maintained. The collected data were checked daily for completeness.

## 2.15 | 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 was used to identify the predictive factors of the outcome variable. All factors with a  $p$ -value <.20 in the bivariate logistic regression were directly entered into the multivariate model. Finally, all  $P$ -value less than 0.05 will be considered statistically significant.

## 2.16 | Ethics consideration

Ethics approval was obtained from the ethical review board of Mekelle University, College of Health Science. A written consent form was taken from each participant. For those aged from 12–17, a written form of assent was taken from their relatives that s/he comes with them. All the collected data were used for this study

only. Hard copy completed questionnaires and computer data were kept confidential.

An information sheet was attached to each questionnaire to provide study details and to tell the rights of the participants. This form indicated that participation is voluntary and that clients have the right to withdraw from completing the questionnaire at any time s/he wishes. Participants were assured that if s/he wished to refuse to participate, their care or dignity will not be compromised in any way since there is no relationship between participation and health or treatment outcome. Participants were also informed that there is no expectation of additional treatment or any benefits for them associated with participating in the study.

### 3 | RESULTS

A total of 300 patients with epilepsy were recruited in the study. The overall response rate was 100%.

#### 3.1 | Socio-demographic characteristics

All of the respondents were in the age group of 13–65 years with the mean, age of  $31.8 \pm 12.89$ .SD. The median and mode age of the respondent was 29.5 and 24, respectively. Among all participants, 162 (54%) were male, 195 (65%) were living in the urban area and geographically, and 275 (91.7%) were Tigran in ethnicity. Majority the participant 247 (82.3%) were orthodox in religion, 103 (34.3%) were unable to read and write, 150 (50.7%) were single, 145 (48.3%) had no any specified monthly income, and 170 (56.7%) had moderate social support (Table 1).

#### 3.2 | Description of respondents by clinical factors

From the total 300 respondents, 120 (40%) started epilepsy at the age of 18 and above, 142 (47.3%) were living with epilepsy for at least 11 years, and 137 (45.7%) experienced seizure-related physical trauma. One hundred eighty (60.0%) of the participants reported that they experience at most two seizures in a month, and 81 (27%) experienced seizure frequency 3–5 times per month. Majority of the study 222 (74.0%) were on monotherapy, 90 (30.3%) took the medication for more than 11 years, 270 (90.0%) had good improvement with medication, and 72 (24.0%), 105 (35.0%) and 86 (28.7%) reported depression symptoms, feeling of stigmatization and stress symptoms, respectively (Table 2).

#### 3.3 | Description of respondent patient's contagion belief and causal belief of epilepsy

Regarding the cause of epilepsy, 73 (24.3%) believed that it is caused by walks around garbage, dumps, ashes, walking along a river, and 73 (24.3%) did not know the cause. Out of the total participants,

**TABLE 1** Distribution of study subjects by socio-demographic factors of people with epilepsy ( $n = 300$ ) in Mekelle, Tigray, Ethiopia, 2019

	Variables	Frequency	Percentage
Age	12–17 years	34	11.3
	18–24 years	77	25.7
	24–34 years	74	24.7
	35–44 years	61	20.3
	>44 years	54	18.0
Sex	Male	162	54.0
	Female	138	46.0
Residency	Urban	195	65.0
	Rural	105	35.0
Ethnicity	Tigray	275	91.7
	Amhara	8	2.7
	Afar	16	5.3
	Other	1	0.3
Religion	Orthodox	247	82.3
	Catholic	2	0.7
	Protestant	5	1.7
	Muslim	46	15.3
Educational status	Unable to read and write	103	34.3
	Primary 1–8	89	29.7
	Secondary 9–12	47	15.7
	Techniques	9	3.0
	Diploma	6	2.0
	First degree and above	46	15.3
Marital status	Married	96	32.0
	Single	152	50.7
	Divorced	25	8.3
	Widowed	24	8.0
	Other	3	1.0
Employment	No	41	13.7
	Student	70	23.3
	Farmer	29	9.7
	Housewife	60	20.0
	Government	12	4.0
	Private	32	10.6
	Merchant	30	10.0
Others	26	8.7	
Monthly income	No	145	48.3
	301–600	16	5.4
	< 300	19	6.3
	601–1000	27	9.0
	>1000	93	31.0
Social support	Low	67	22.3
	Moderate	170	56.7
	High	63	21.0

	Variables	Frequency	Percentage
Age of onset	<6 years	35	11.7
	6–11 years	72	24.0
	12–17 years	73	24.3
	18 years and above	120	40.0
Number of seizures	≤2 per month	180	60.0
	3–5 per month	81	27.0
	6–10 per 6 months	30	10.0
	≥11 per year	9	3.0
Seizure-related physical trauma	No	163	54.3
	Yes	137	45.7
Number of AEDs	Monotherapy	222	74.0
	Polytherapy	78	26.0
Length of time with medication	0–11 month	36	12.0
	Less than 2 years	38	12.7
	2–5 years	79	26.3
	6–10 years	56	18.7
	11 or more years	91	30.3
Improvement with medication	No	30	10.0
	Yes	270	90.0
Medication-related side effects.	No	206	68.7
	Yes	94	31.3
Lifetime substance use history	No	224	74.7
	Yes	76	25.3
Substance use history in the past three months	No	269	89.7
	Yes	31	10.3
Presence of chronic medical illness	No	260	86.7
	Yes	40	13.3
Depression	No	228	76.0
	Yes	72	24.0
Perceived stigma	No	195	65.0
	Yes	105	35.0
Stress	No	214	71.3
	Yes	86	28.7
History of physical abused	No	290	96.7
	Yes	10	3.3
History of sexual abused	No	298	99.3
	Yes	2	0.7
Suicidal attempt history	No	289	96.3
	Yes	11	3.7
Presence of suicidal wish	No	251	83.7
	Yes	49	16.3

**TABLE 2** Distribution of study subjects by clinically related factors of people with epilepsy ( $n = 300$ ) in Mekelle, Tigray, Ethiopia, 2019

178 (59.3%) believed that epilepsy is a mental illness, and 272 (90.7%) believed that epilepsy is treatable (Table 3).

### 3.4 | Anxiety scores of participants

The prevalence of anxiety disorder was found to be 38.3%. Regarding the proportion of anxiety symptom towards each item,

223 (74.3%) reported that they were afraid as if something awful might happen, 210 (70.0%) reported becoming easily annoyed or irritable, and 207 (69.0%) also reported that they were having trouble relaxing (Table 4).

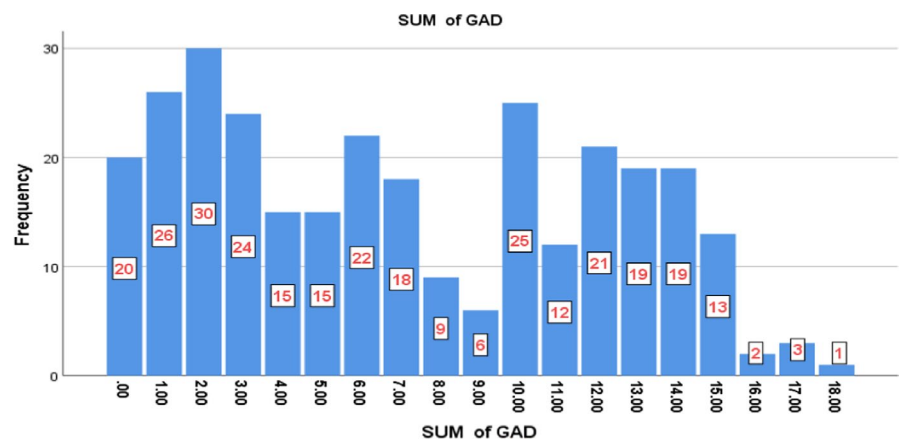
The lowest score of the data was 0, and the highest score was 18. The mean, median and mode of the respondent were 7.06, 6 and 2, respectively. Scores above 9 were considered to show the PWE who had anxiety (Figure 2). Accordingly, out of the 300 study subjects

**TABLE 3** Distribution of study subjects by (causal, contagion, heritability, treatability and mental illness belief) of people with epilepsy ( $n = 300$ ) in Mekelle, Tigray, Ethiopia, 2019

Variables		Frequency	Percentage
Cause of epilepsy	I don't know	73	24.3
	Spiritual possession	36	12.0
	Evil eye	19	6.4
	Family history	34	11.3
	Pathogens	7	2.3
	Sinful act	31	10.4
	Walks around garbage, dumps, ashes, Walking along a river	73	24.3
Contagious	No	262	87.3
	Yes	38	12.7
Heritable	No	245	81.7
	Yes	55	18.3
Mental illness	No	122	40.7
	Yes	178	59.3
Treatable	No	28	9.3
	Yes	272	90.7
By what means?	Hole water	1	0.3
	Traditional treatment	1	0.3
	Modern medicine	225	75.0
	Hole water and modern medicine	48	15.1

**TABLE 4** Proportion of responses to GAD-7 by study participants of patients with epilepsy ( $n = 300$ ) in 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	Feeling nervous, anxious or on edge	116	38.7	94	31.3	78	26.0	12	4.0
2	Not being able to stop or control worrying	110	36.7	110	36.7	78	26.0	2	0.6
3	Worrying too much about different things	105	35.0	89	29.7	87	29.0	19	6.3
4	Trouble relaxing	93	31.0	87	29.0	78	26.0	42	14.0
5	Being so restless that it is hard to sit still	165	55.0	105	35.0	28	9.4	2	0.6
6	Becoming easily annoyed or irritable	90	30.0	110	36.7	76	25.3	24	8.0
7	Feeling afraid as if something awful might happen	77	25.7	108	36.0	79	26.3	36	12.0



**FIGURE 2** The frequency of the sum of generalized anxiety disorder-7 questionnaire response of the study anxiety disorder symptoms and associated factors among PWE ( $n = 300$ ) in Mekelle, Tigray, Ethiopia, 2019

recruited in the study, 115 (38.3%) scored above 9 as measured by the GAD-7 (95% CI: 32.8, 43.8) (Figure 3).

### 3.5 | Factors associated with anxiety

Bivariate analyses were done between anxiety and response variables of socio-demographic variables (age, residency, educational status, marital status, employment and social support), clinical factors (seizure frequency, number of AEDs, the side effect of medication, seizure-related trauma, feeling perceived stigma, depression symptoms, stress symptoms and history of suicidal attempt) and patients' belief factors (contagious belief, heritability belief, perceived as mental illness and treatability belief). All individual factors  $<0.20$  at bivariate analyses were entered to multivariate logistic regression for further analysis.

Accordingly, secondary educational status (AOR = 6.357, 95% CI: 1.292, 31.277), medication-related side effect (AOR = 2.547, 95% CI: 1.242, 5.224), substance use history (AOR=2.344, 95% CI: 1.009, 5.448), seizure-related physical trauma (AOR=2.078, 95% CI: 1.055, 4.091), stress symptoms (AOR=9.636, 95% CI: 4.325, 21.469), and a belief of epilepsy mental illness (AOR=2.038, 95% CI: 1.016, 4.087) were significantly associated with anxiety disorder (Table 5).

## 4 | DISCUSSION

This study aimed to assess the prevalence of anxiety disorder symptoms and associated factors among people with epilepsy in Mekelle, Ethiopia. Overall, the prevalence of anxiety disorder was found to be 38.3% (95% CI: 32.8, 43.8).

The result of this study conducted in Mexico (38.8%) (Lopez-Gomez et al., 2008) and with the other study conducted in Canada (40%) (Pham et al., 2017), Brazil (39.4%) (Stefanello et al., 2011), United Arab Emirate (43.5) (Alsaadi et al., 2015), and Emanuel specialized mental health hospital of Ethiopia (33.5%) (Tegegne

et al., 2015). Anxiety disorder symptoms in this study (38.3%) is higher when compared with the other study conducted in Iran (24.5%) (Asadi-pooya, 2011), Australia (20.2%) (Scott et al., 2017), India (11.0%) (Rehman et al., 2017), Korea (15.3%) (Kwon & Park, 2013) and Thailand (5.3%) (Kuladee et al., 2019). In contrast, the result of these studies (38.3%) is lower when compared with the study conducted in China (57.0%) (Sujithra, 2014), Oman (45.0%) (Al-asmí et al., 2012) and west Shewa of Oromia (47.8) (Takele & Adamu, 2019). The discrepancy might be a result of the difference in assessment tools, geographical areas, sample size, study setting and cultures of the study subject.

Regarding the associated factors, those who involved in secondary education were six times more likely to have anxiety (AOR = 6.357, 95% CI: 1.292, 31.277) than those who had a first degree or above. This is relatively supported by the study conducted in Brazil (Stefanello et al., 2011) and Shewa (Takele & Adamu, 2019). The possible explanations might be those individuals with secondary school educational status were a little bit knowledgeable about the nature of the illness, challenged different condition including their educational achievement, relationship with others, future employment status, economic dependency, and have poor coping strategies to their illness, which in turn to social isolation, impaired their cognition and contributes to the poorer psychological adjustment for their life challenges.

People with epilepsy who experienced AEDs-related side effects 2.5 times (AOR = 2.547 [1.242, 5.224]) more likely to have anxiety than those who had no AEDs-related side effects. This result also supported by many other studies conducted in Canada (Pham et al., 2017), in India (Rehman et al., 2017), and in Ethiopia (Tegegne et al., 2015). The possible explanation for this result is that as we know anxiety is the physiological reaction to the different external and internal situations (Gandy et al., 2013). The unusual reaction of AEDs to the body leads to anxiety symptoms due to the disturbance of different daily activities. Feeling/emotional change as a result of taking anti-epileptic drugs also leads to anxiety.

People with epilepsy who used substances in their lifetime were two times (AOR = 2.344 [1.009, 5.448]) more likely to experience anxiety when compared with those who did not use it. This result was also supported by many other studies conducted in Canada (Pham et al., 2017). This is because individuals with epilepsy often use drugs as a coping mechanism to temporarily relieve symptoms and emotional distress. But longer usage of substance might increase overall stress and anxiety severity.

Participants who experienced seizure-related trauma were two times (AOR = 2.078 [1.055, 4.091]) more likely to feel anxious than those who were not traumatized. The possible explanation for this is those people with epilepsy who experience seizure-related physical trauma cannot achieve their daily leaving activities, cannot involve in the community practice equally due to his/her physical trauma. They might face difficulties in socio-economic stressors such as school dropout, unemployment, poverty and economic dependency. All these factors contribute to the development of psychological disturbance like anxiety.

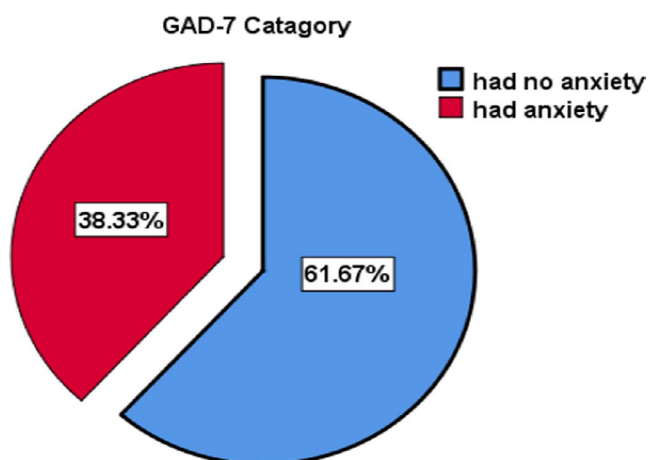


FIGURE 3 Prevalence of anxiety disorder symptoms among people with epilepsy ( $n = 300$ ) in Mekelle, Tigray, Ethiopia, 2019



**TABLE 5** Factors associated with anxiety disorder symptoms in people with epilepsy (bivariate and multivariate analysis) for the study of the prevalence of anxiety disorder and associated factors among epileptic patients in Mekelle, Ethiopia, 2019

Variables	Anxiety		Bivariate		Multivariate analysis	
	No	Yes	p-value	COR(95%,CI)	AOR (95%,CI)	p-value
<b>Age</b>						
12–17 years	26	8	1			
18–24 years	48	29	.149*	1.964 (0.785, 4.911)	1.033 (0.279, 3.818)	
24–34 years	36	38	.008*	3.431 (1.375, 8.558)	1.374 (0.304, 6.222)	
35–44 years	38	23	.161*	1.967 (0.763, 5.069)	1.302 (0.247, 6.858)	
>45 years	37	17	.422	1.493 (0.561, 3.973)	0.964 (0.173, 5.384)	
<b>Educational status</b>						
Unable to read and write	58	45	.353	0.760 (0.425, 1.357)	3.932 (0.722, 21.422)	
Primary 1–8	56	33	.910	1.041 (0.520, 2.085)	2.281 (0.486, 10.701)	
Secondary 9–12	26	21	.227	0.368 (0.073, 1.859)	<b>6.357 (1.292, 31.277)**</b>	<b>.023</b>
Techniques	7	2	.094*	6.444 (0.727, 57.127)	0.736 (0.076, 7.166)	
Diploma	1	5	.006*	0.314 (0.137, 0.716)	15.719 (0.810, 305.124)	
First degree and above	37	9	1			
<b>Employment</b>						
No	15	26	.000*	0.144 (0.061, 0.342)	1.550 (0.172, 13.989)	
Student	56	14	.071*	0.407 (0.154, 1.079)	0.669 (0.060, 7.493)	
Farmer	17	12	.002*	0.267 (0.116, 0.617)	0.477 (0.102, 2.239)	
House wife	41	19	.185*	0.412 (0.111, 1.530)	0.862 (0.127, 5.869)	
Governmental	7	5	.007*	0.262 (0.098, 0.700)	0.255 (0.035, 1.841)	
Private	22	10	.024*	0.305 (0.109, 0.854)	0.718 (0.116, 4.439)	
Merchant	10	20	.777	1.154 (0.429, 3.105)	0.487 (0.105, 2.270)	
Others/day labor	17	9	1			
<b>Monthly income</b>						
No	91	54	.225	0.721 (0.424, 1.223)	0.471 (0.074, 3.000)	
<300	13	3	.059*	0.280 (0.075, 1.049)	0.376 (0.041, 3.494)	
301–600	16	3	.026*	0.228 (0.062, 0.835)	0.258 (0.047, 1.408)	
601–1000	14	13	.784	1.128 (0.478, 2.660)	1.163 (0.286, 4.724)	
>1001	51	42	1			
<b>Social support</b>						
Low	34	33	.044*	2.087 (1.021, 4.264)	1.591 (0.552, 4.589)	
Moderate	108	62	.503	1.234 (0.667, 2.284)	0.909 (0.388, 2.128)	
High	43	20	1			
<b>Age of onset</b>						
<6 years	20	15	1			
6–11 years	41	31	.348	1.445 (0.670, 3.116)	0.405 (0.064, 2.581)	
12–17 years	45	28	.219	1.457 (0.800, 2.654)	0.487 (0.070, 3.387)	
18 years and above	79	41	.556	1.199 (0.655, 2.193)	0.177 (0.021, 1.530)	
<b>Seizures frequency</b>						
≤2 per month	109	71	.343	0.521 (0.135, 2.007)	0.405 (0.064, 2.581)	
3–5 per month	51	30	.288	0.471 (0.117, 1.889)	0.487 (0.070, 3.387)	

(Continues)

TABLE 5 (Continued)

Variables	Anxiety		Bivariate		Multivariate analysis	
	No	Yes	p-value	COR(95%,CI)	AOR (95%,CI)	p-value
6–10 per six months	21	9	<b>.170*</b>	0.343 (0.074, 1.582)	0.177 (0.021, 1.530)	
11 or above per year	4	5	1			
Treatment duration						
0–11 month	23	13	1			
Less than two years	30	8	<b>.155*</b>	0.472 (0.168, 1.328)	0.865 (0.225, 3.322)	
2–5 years	54	25	.637	0.819 (0.358, 1.877)	1.370 (0.423, 4.434)	
6–10 years	33	23	.634	1.233 (0.520, 2.925)	0.827 (0.234, 2.925)	
11 or more years	45	46	<b>.144*</b>	1.809 (0.817, 4.003)	1.422 (0.432, 4.675)	
Side effect						
No	148	58	1			
Yes	37	57	<b>.000*</b>	3.931 (2.353, 6.567)	<b>2.547 (1.242, 5.224)**</b>	<b>.011</b>
Substance use in life time						
No	146	78	1			
Yes	39	37	<b>.033*</b>	1.776 (1.048, 3.008)	<b>2.344 (1.009, 5.448)**</b>	<b>.048</b>
Seizure-related trauma						
No	117	46	1			
Yes	68	69	<b>.000*</b>	2.581 (1.600, 4.163)	<b>2.078 (1.055, 4.091)**</b>	<b>0.034</b>
Depression						
No	148	80	1			
Yes	37	35	<b>.041*</b>	1.750 (1.024, 2.992)	1.053 (0.484, 2.295)	
Perceived stigma						
No	136	59	1			
Yes	49	56	<b>.000*</b>	2.634 (1.613, 4.301)	1.962 (0.998, 3.854)	
Stress						
No	162	52	1			
Yes	23	63	<b>.000*</b>	8.533 (4.823, 15.098)	<b>9.636 (4.325, 21.469)**</b>	<b>.000<sup>a</sup></b>
Suicidal attempt						
No	181	108	1			
Yes	4	7	<b>.092*</b>	2.933 (0.839, 10.251)	5.418 (0.566, 51.903)	
Suicidal wish						
No	149	102	1			
Yes	36	13	<b>.066*</b>	0.528 (0.267, 1.044)	0.487 (0.153, 1.543)	
Contagious belief						
No	167	95	1			
Yes	18	20	<b>.055*</b>	1.953 (0.985, 3.874)	1.158, (0.412, 3.257)	
The belief of mental illness						
No	85	37	1			
Yes	100	78	<b>.019*</b>	1.792 (1.102, 2.915)	<b>2.038 (1.016, 4.087)**</b>	<b>.045</b>

Note: Bold identify the associated factor of bivariate and multivariate analysis.

\*Significantly associated at  $p < .2$  and \*\*Statistically significant at  $p < .05$ .

<sup>a</sup>Statistically significant at  $p < .01$ ,  $p$ -value of Hosmer and Lemeshow goodness of fit test = 0.485.

Those PWE with a high level of stress were ten times (AOR = 9.636, 95% CI: 4.325, 21.469) more likely to have anxiety as compared with those patients who had low-level stress. The possible explanation is that those individuals with high perceived stress may have a poorer psychological adjustment when they face different stress-causing problems such as unemployment, lower educational status, perceived stigma, and seizure frequency and related trauma in their life that may be precipitate anxiety disorders.

Those people with epilepsy who believe that epilepsy is a mental illness were two times (AOR = 2.038, 95% CI: 1.016, 4.087) more likely to have anxiety when compared with those who did not have beliefs. The possible rationalization is that the presence of a mental illness belief results in minimizing social interaction, reduce self-esteem, and also limits his/her social activity such as marriage, education and may perceive themselves as unsuccessful, dependent and handicapped. So, they think more and more about the above conditions. Finally, they may develop anxiety disorder.

#### 4.1 | Conclusion

The prevalence of anxiety disorder symptoms among PWE was higher than that in the general population. Clinicians and healthcare professionals taking care of PWE should be aware of an increased risk of developing psychiatric comorbidities like anxiety, in particular, and also should be ready to look for the conditions among this particular population. Systemic approaches are needed to reduce the anxiety disorder symptoms of PWE. A screening instrument like GAD-7 was used for the early detection and management of anxiety disorders.

### 5 | RECOMMENDATION

The researcher recommends:

- Health professionals need to routinely screen those people with epilepsy for the presence of additional comorbidities and link to the respected setting so that it would be possible to prevent and intervene accordingly.
- Planners and policymakers in collaboration with the Ministry of Health to design approach to screen frequently co-occurring illness and 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 the campaign.
- The researcher also recommended furthering research on anxiety disorder using different study designs, set-up and sample size will be conducted to investigate some of the future risk factors that were found to be associated with anxiety among people with epilepsy.

#### 5.1 | Limitations of the study

Recall and response biases might have occurred when completing the questionnaire. In addition, some of the independent variables such as medication adherence, physical and sexual abuse, and presence of suicidal wish were assessed by a single question; this may lead some patients to respond in an 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 anxiety disorder and the outcome of interest.

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#### CONFLICT OF INTEREST

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

#### AUTHOR CONTRIBUTIONS

JS: principal investigator of the study; made substantial contributions in conception selecting the design, supervising and managing data collection as well as analysis and interpretation of data. KM and FA: involved in drafting and critically revising 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.

#### ETHICAL APPROVAL

This study was carried out after obtaining ethics approval from Mekelle University, College of Health Science office of Health Research Ethics Review Committee (HRERC). Permission letter was obtained from Mekelle University to neurologic clinics, and finally, the letter was distributed to health professionals who work in the neurologic clinics and data collectors. Verbal and then written consent forms were taken from each participant. For those aged from 12–17, 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 and to tell the rights of the participants. All the collected data were used for this study only. Hard copy completed questionnaires and computer data were kept confidentially.

#### DATA AVAILABILITY STATEMENT

All availability of data and materials are attached to the manuscript.

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