

Factors associated with medication adherence among epileptic patients

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Abstract: Maintaining adherence to antiepileptic medications can be considered the most important challenge in the management of epileptic patients. Non adherence to antiepileptic medication might lead to uncontrolled seizures, increased health care costs and death. Several factors could be associated with patients' ability to maintain adherence. **Aim:** The aim of this study was to identify the factors associated with medication adherence among epileptic patients. **Setting:** This study was conducted at the Outpatient Clinic of The Alexandria Epilepsy Center at El Hadara Orthopedic and Traumatology University Hospital, Alexandria, Egypt. **Subjects:** A convenience sample of 100 adult epileptic patients was selected from patients showing up at the study setting for receiving care and follow up. **Tools:** Three tools were used for data collection. Biosociodemographic data structured questionnaire (Tool I) and Factors Associated with Epileptic Patients' Adherence to Medications Checklist (Tool II) were developed by the researcher. **Tool III:** Korean Version of the Hill-Bone Medication Adherence Subscale (HBMA-K) was adopted and used to collect the necessary data related to factors which might be associated with medication adherence among epileptic patients. **Results:** (47) out of 100 epileptic patients had poor adherence to antiepileptic medications. The main factors associated with their poor adherence were related to the educational, social, economic, disease and therapy related, physical and psychological domains. Age, level of education, onset of disease, presence of aura and seizures precipitating factors were significantly associated with medication adherence ($P = .000, .002, .000, .000$ and $.000$) respectively. **Conclusion:** It was concluded that, nearly half of the studied epileptic patients were poorly adherent to their antiepileptic medications. Educating epileptic patients about the importance of their adherence to antiepileptic medications should be encouraged.

Keywords: Medication, Adherence, Medication adherence, Epilepsy, Epileptic patients.

I. INTRODUCTION

Epilepsy is one of the most common serious neurological conditions, affecting over 70 million people worldwide associated with varied prevalence among countries⁽¹⁻³⁾. The World Health Organization (WHO) has estimated that 4–10 per 1000 people are affected with epilepsy worldwide, especially in the developing countries, which constitutes a major health problem⁽⁴⁾. According to records of The Alexandria Epilepsy Center, it has been estimated in 2018 that about 650 epileptic patients were newly diagnosed, and received medication⁽⁵⁾.

Epilepsy might put a great burden on patients, their families, and society as a whole. This burden could be represented in many health domains, including physical, psychosocial and economic well-being. The physical burden could result from the unpredictability of seizures, while the social burden could result from negative attitudes of others toward epileptic patients and the stigma of disease which might be felt by patients^(6,7). Moreover, the economic burden of epilepsy on the health systems could be related to costs of assessment, treatment, surgery and hospitalization. In addition, lost employment, income, and household work are considered also economic burdens^(8,9).

Antiepileptic drugs (AEDs) therapy is the main treatment for most of epileptic patients⁽¹⁰⁾. Clinicians had noted that non-adherent patients to AEDs could have difficulty in attaining seizure control more than adherent patients. Uncontrolled seizures might lead to major morbidity and mortality, including physical injury, such as head trauma, fractures and burns. Furthermore, psychosocial problems could occur such as depression, anxiety and poor quality of life⁽¹¹⁾.

Medication adherence can be defined as a ratio of the number of drug doses taken to the number of doses prescribed over a given period of time⁽¹²⁾. Medication nonadherence is a significant barrier in achieving seizure control in epileptic patients⁽¹³⁾. Nonadherence to AEDs is associated with increased risk of mortality, higher incidence of emergency admissions, severe injuries and fractures⁽¹⁴⁾. It might be intentional or unintentional. It would be intentional, when the patient decides not to take medications based on personal beliefs around the benefits of AEDs or fear from side effects. However, unintentional non-adherence refers to unplanned behavior which is passive rather than active sometimes due to factors beyond the patient's control. This classification has significant benefits for health care professionals in that, it offers understanding of medication-taking behaviors which consequently affects the interventions chosen to improve adherence⁽¹⁵⁾.

WHO had classified factors associated with non-adherence into five domains: the socioeconomic, healthcare system, condition-related, therapy related and patient related factors⁽¹⁶⁾. These domains included factors which have been associated with patient adherence to AEDs, such as medication type, dose, side effects, disease duration and severity. Support systems, patient-physician therapeutic communication and personal understanding of illness are also factors. In fact, ensuring that patients have good understanding of the reasons for taking AEDs could be the key for adherence of patients to AEDs⁽¹⁷⁻¹⁹⁾.

Nurses have been widely involved in the management of patients with complex medical conditions, including patients with epilepsy⁽²⁰⁾. They should demonstrate effective communication with epileptic patients, starting from the first interaction during the clinic visit and throughout performing initial assessment of patients' condition and needs. In addition, patients with epilepsy would be more likely to discuss their health care needs with nurses rather than physicians. Moreover, trustful therapeutic relationship between nurses and patients could improve patients self care and help nurses to identify barriers which could hinder adherence to AEDs⁽²¹⁾. Additionally, nurses could promote best health outcomes of epileptic patients by providing them information about the disease, self-management skills, and discussing treatment regimens with patients and their families. In addition, they should help patients in finding appropriate community resources and teach the public how to promote positive attitudes toward epileptic patients. This would improve patient satisfaction, emotional status, self confidence, overall quality of life and medication adherence of epileptic patients^(21, 22).

In fact, multiple strategies are needed to identify barriers or factors that could be associated with medication adherence among epileptic patients. These factors should be elicited and properly managed by nurses in order to ensure effective patients' adherence to antiepileptic medications⁽²³⁾.

Aim of the study

The study aimed to identify factors associated with medication adherence among epileptic patients.

Research question:

What are the factors associated with medication adherence among epileptic patients?

II. MATERIALS AND METHOD

Materials:

Research design:

A descriptive research design was utilized to conduct this study.

Setting:

The study was conducted at the outpatient clinic of the Alexandria Epilepsy Center at El. Hadara Orthopedic and Traumatology University Hospital, Alexandria, Egypt.

Subjects:

A convenience sample of 100 epileptic patients was selected from patients showing up at the above mentioned setting.

Sample size calculation: EPI INFO program was used to estimate the sample size applying the following parameters:

1. Population size = 240 for 3 months.
2. Expected frequency = 50%

3. Acceptable error = 10%
4. Confidence co-efficient = 95%
5. Minimum sample size = 84

The patient inclusion criteria were:

1. Adult male and female patients.
2. Aged from 20 up to 60 years old.
3. Diagnosed of epilepsy for at least 1 year.
4. Able to communicate verbally.
5. Receiving antiepileptic drugs as a standard treatment for epilepsy.
6. Had stable clinical condition at the time of assessment.
7. Free from psychotic disorders.
8. Free from any other chronic diseases.
9. Not scheduled for brain surgery.

Tools of the study: In order to fulfill the aim of the study, three tools were used for data collection.

Tool I: Biosociodemographic data structured questionnaire: It was developed by the researchers based on review of the recent relevant literature ^(13,14, 20) to obtain information about biosociodemographic data of the studied patients. It consisted of two parts as the following:

Part I: Sociodemographic data: this part was used to collect data about the patient's sociodemographic characteristics. It included; age, sex, residence, marital status, level of education, occupation and monthly income from the patient's point of view

Part II: Patients' clinical data: This part was utilized to obtain data about the clinical history of the patients such as; onset of the disease (Years), family history of epilepsy, presence of aura, the type of prescribed medications and precipitating factors for seizures.

Tool II: Korean Version of the Hill-Bone Medication Adherence Subscale (HBMA-K):

This subscale was adopted from the original Hill-Bone Compliance Scale which was developed by Kim, et al (2000) ⁽²⁴⁾. It was used to assess patients' adherence to antiepileptic medications. It consisted of nine categories which had been evaluated for every patient in the study sample in order to assess patients' adherence whether poor, moderate or high.

Scoring system:

Each one of the nine categories was scored on four point Likert scale as follows: (1) indicating "none of the time", (2) indicating "some of the time", (3) indicating "most of the time" and (4) indicating all of the time". The scale had total score ranged from 9 to 36. It was calculated for every patient, converted into percent value and judged according to the following categories: patient who had score less than 60% was classified as poorly adherent, 60 to less than 75% moderately adherent and 75 to 100% highly adherent.

Tool III: Factors Associated with Epileptic Patients' Adherence to Medications Checklist:

This tool was developed by the researcher after reviewing the recent related literature ^(19,20,25,26). It was used to assess factors associated with epileptic patients' adherence to medications. It included three main dimensions as follows: educational, social and economic Dimensions (8 items), disease and therapy related dimensions (8 items), and physical as well as psychological factors related dimensions (8 items).

It covered 24 statements with Yes or No answer. It was calculated as number and percent.

Method:

1. An official permission was secured from the study setting administrative staff to carry out the study after explanation of the study aim.

2. Tool I and III were developed by the researcher based on review of relevant literature and tool II was adopted.
3. The study tools were revised by five experts in the fields of Medical Surgical Nursing and Neuropsychiatry to test the tools for content validity, completeness and clarity of the items, and then the necessary modifications were carried out accordingly.
4. Reliability of the tools was tested using Cronbach's alpha test (= 0.84) which indicated that, the tools were reliable.
5. A pilot study was conducted on 10 patients who fulfilled the inclusion criteria to test the clarity, objectivity, feasibility, relevancy and applicability of the study tools. Accordingly, the necessary modifications were done. These patients were not included in the study sample.

6. Data collection:

- a. Data was collected within seven months, during the period between February and August 2019.
- b. It was conducted throughout patient's personal interview during the patients' visits at the study setting.
- c. The researcher collected data using the study tools by interviewing every patient on an individual base in the waiting room of the out-patient clinic for 20-30 minutes.
- d. The studied patients' sociodemographic and clinical data were initially obtained using tool I.
- e. The total score of tool II was calculated for all patients of the study sample and accordingly the studied patients were classified into three groups which were poorly, moderately and highly adherent to antiepileptic medications.
- f. The studied patients in the three groups were assessed using tool III and a comparison was conducted to evaluate the differences between them in relation to the factors associated with their adherence to antiepileptic medications.

Ethical Considerations:

An ethical Committee permission was obtained to conduct the study. The purpose of the study was explained to all the studied patients. Their approval and readiness to be included in the study were obtained initially before participation. All patients were assured about the privacy and confidentiality to participate in the study.

Statistical analysis of the data:

- Statistical analysis was done using IBM SPSS statistics program version 21⁽²⁷⁾.
- Variables were summarized by frequency and percent.
- Chi-square test was used to study significant association between two categorical variables. Fisher's exact was used if more than 20% of total expected cell counts <5.
- All statistical tests were judged at 0.05significance level.

III. RESULTS

Table (1) presents distribution of the studied epileptic patients according to their medication adherence. It can be noticed from the table that nearly half of the studied patients (47 %) had poor adherence to medication. The rest of them had either moderate or high adherence to medication (21 % and 32 % respectively).

Table (1): Frequency Distribution of the Studied Epileptic Patients According to Their Medication Adherence:

Score of The Hill-Bone Medication Adherence Subscale	Studied epileptic patients (N= 100)	
	No	%
Poorly adherent: 75 – 100 %	47	47.0
Moderately adherent: 60 - < 75 %	21	21.0
Highly adherent: < 60 %	32	32.0

Table (2): shows distribution of the studied epileptic patients in relation to sociodemographic characteristics. The table shows that the mean age of the studied patients was 35.49 in the poorly adherent group compared to that of the moderately and highly adherent groups 30.00 and 31.00 respectively. More than half (55.3%) of the poorly adherent group of patients was males whereas; they were females in the moderately and highly adherent groups (52.4% and 62.5% respectively). Higher percentages of married studied patients (59.6% and 56.3%) were found in the poorly and highly adherent groups, respectively, whereas, the majority (52.4%) of the moderately adherent group of the studied patients were single. Regarding the level of education, it can be noticed that, the highest percentage (42.6%) of the poorly adherent group were illiterate. However, the majority (71.4% and 81.4%) of the moderately and highly adherent groups respectively had primary level of education. In relation to residence, occupation and income, the majority of the studied patients in the three groups, were in urban, unemployed and had not enough income i.e.: (63.8%, 61.9% and 65.6%), (63.8%, 76.2% and 71.9%) and (93.6%, 90.5% and 96.9%) of patients in the three studied groups respectively. Statistical significant associations were noticed between the studied epileptic patients adherence to medication and their age as well as level of education where $p = .000$ and $.002$ respectively.

Table (2): Frequency Distribution of the Studied Epileptic Patients in Relation to Sociodemographic Characteristics.

Sociodemographic Characteristics	Poorly adherent (N= 47)		Moderately adherent (N= 21)		Highly adherent (N= 32)		Statistical test
	No	%	No	%	No	%	
Age (in years):							
Min - Max	20 - 60		20 - 54		20 - 55		T = 31.710
Mean ± SD	35.49 ± 11.415		30.00 ± 9.176		31.00 ± 8.747		P = .000*
Sex:							
Male	26	55.3	10	47.6	12	37.5	X ² = 2.423 P = .298
Female	21	44.7	11	52.4	20	62.5	
Marital status:							
Single	17	36.2	11	52.4	12	37.5	FET=4.853 P = .541
Married	28	59.6	9	42.9	18	56.3	
Divorced	1	2.1	1	4.7	0	0.0	
Widow	1	2.1	0	0.0	2	6.2	
Level of education:							
Illiterate	20	42.6	3	14.3	2	6.2	FET=18.318 P = .002*
Primary	17	36.2	15	71.4	26	81.4	
Secondary	7	14.8	0	0.0	2	6.2	
University	3	6.4	3	14.3	2	6.2	
Residence:							
Urban	30	63.8	13	61.9	21	65.6	X ² = .077 P = 1.000
Rural	17	36.2	8	38.1	11	34.4	
Occupation:							
Unemployed	30	63.8	16	76.2	23	71.9	X ² = 6.165 P = .187
Sedentary	2	4.3	0	0.0	4	12.5	
Non-sedentary	15	31.9	5	23.8	5	15.6	
Income:							
Not enough	44	93.6	19	90.5	31	96.9	FET=1.104 P = .567
Enough	3	6.4	2	9.5	1	3.1	

T = Student t test

X² = Chi square test

FET = Fisher's Exact Test

* = Significant at P ≤ 0.05

Table (3): displays distribution of the studied epileptic patients in relation to clinical factors. The table reveals that half (51.1%) of the poorly adherent group of patients had onset of disease less than 10 years compared to (42.8% and 34.4%) of patients in the moderately and highly adherent groups, respectively. Regarding the family history and the type of prescribed medication, the majority of the studied patients in all groups had no family history of epilepsy and had polytherapy type of medication, (76.6%, 66.7% and 62.5%) and (61.7%, 57.2% and 65.6%) respectively. Furthermore, more than half of the studied patients in the poorly adherent group (57.4%) had no aura, however, the majority of patients in the moderately and highly adherent groups (85.7% and 81.2%) respectively had aura. Additionally, more than half of the studied patients in the poorly adherent group (59.6%) had stress as a precipitating factor of seizures, whereas (33.3% and 65.5%) respectively had insufficient sleep and hunger in the moderately and highly adherent groups of the studied patients. Onset of disease, presence of aura and precipitating factors of seizures were significantly associated with the studied epileptic patients' medication adherence, where $p = .000, .000$ and $.000$ respectively.

Table (3): Frequency Distribution of the Studied Epileptic Patients in Relation to Clinical Factors.

Clinical Factors	Poorly adherent (N= 47)		Moderately adherent (N= 21)		Highly adherent (N= 32)		Statistical test
	No	%	No	%	No	%	
Onset of disease (in years):							
< 10	24	51.1	9	42.8	4	12.5	FET = 27.882 P = .000*
10 < 20	15	31.9	9	42.8	11	34.4	
20 < 30	8	17.0	3	14.4	7	21.9	
30 < or equal 40	0	0.0	0	0.0	10	31.2	
Family history:							
No	36	76.6	14	66.7	20	62.5	$X^2 = 1.942$ $P = .379$
Yes	11	23.4	7	33.3	12	37.5	
Prescribed medication:							
Mono-therapy	18	38.3	9	42.8	11	34.4	$X^2 = .391$ $P = .823$
Poly-therapy	29	61.7	12	57.2	21	65.6	
Presence of aura:							
No	27	57.4	3	14.4	6	18.8	$X^2 = 17.813$ P = .000*
Yes	20	42.6	18	85.7	26	81.2	
Precipitating factors of seizures:							
Hunger	5	10.6	7	33.3	21	65.6	$X^2 = 32.144$ P = .000*
Insufficient sleep	6	12.8	7	33.3	2	6.2	
Stress	28	59.6	4	19.0	3	9.4	
Menstruation (in females)	8	17.0	3	14.4	6	18.8	

FET = Fisher's Exact Test X^2 = Chi square test * = Significant at $P \leq 0.05$

Table (4): presents educational, social and economic factors associated with medication adherence of the studied epileptic patients. It can be noticed from the table that all of the educational, social and economic factors had statistically significant relationships with medication adherence of the studied epileptic patients, where $p = .036, .000, .000, .000, .000, .007,$ and $.000$ respectively, except one factor about increase, decrease or stop the dose without the doctor's advice was not significantly associated with medication adherence of the studied epileptic patients, where $p = .369$.

Table (4): Educational, Social and Economic Factors Associated with Medication Adherence of the Studied Epileptic Patients:

Factors	Poorly adherent (N= 47)		Moderately adherent (N= 21)		Highly adherent (N= 32)		Statistical test
	No	%	No	%	No	%	
Doctor does not give instructions on treatment to you: Yes No	31 16	66.0 34.0	20 1	95.2 4.8	8 24	25.0 75.0	$X^2 = 6.637$ P = .036*
You can read and understand the medical guidelines for treatment: Yes No	7 40	14.9 85.1	19 2	90.5 9.5	32 0	100.0 0.0	$X^2 = 67.892$ P = .000*
Family members help you to take medication regularly: Yes No	15 32	31.9 68.1	7 14	33.3 66.7	32 0	100.0 0.0	$X^2 = 40.099$ P = .000*
There is difficulty in transportation to go to the health institution to follow up: Yes No	34 13	72.3 27.7	18 3	85.7 14.3	0 32	0.0 100.0	$X^2 = 52.020$ P = .000*
The name list of treatment in a day is full that they can forget some names: Yes No	41 6	87.2 12.8	19 2	90.5 9.5	3 29	9.4 90.6	$X^2 = 58.120$ P = .000*
You increase, decrease or stop the dose without the doctor's advice: Yes No	23 24	48.9 51.1	6 15	28.6 71.4	2 30	6.2 93.8	$X^2 = 2.980$ P = .369
Health care institutions are far away from home and difficult for you to buy medicine: Yes No	36 11	76.6 23.4	15 6	71.4 28.6	0 32	0.0 100.0	$X^2 = 9.913$ P = .007*
You have health insurance providing you with medicine: Yes No	0 47	0.0 100.0	21 0	100.0 0.0	31 1	96.9 3.1	$X^2 = 95.471$ P = .000*

X^2 = Chi square test

* = Significant at $P \leq 0.05$

Table (5): displays disease and therapy related factors associated with medication adherence of the studied epileptic patients. The table reveals that most of the disease and therapy related factors were significantly associated with medication adherence of the studied epileptic patients, where $p = .017, .000, .041, .000$ and $.000$ respectively. Considerable factors about thinking that the disease is chronic, doctor constantly changes treatment regimen and the drug causes unwanted side effects had no statistically significant relationships with medication adherence, where $p = .566, .379$ and $.298$ respectively.

Table (5): Disease and Therapy Related Factors Associated with Medication Adherence of the Studied Epileptic Patients:

Factors	Poorly adherent (N= 47)		Moderately adherent (N= 21)		Highly adherent (N= 32)		Statistical test
	No	%	No	%	No	%	
You think that this disease is chronic and can't be cured: Yes No	47 0	100.0 0.0	21 0	100.0 0.0	32 0.0	100.0 0.0	FET = 1.309 P = .566

You have no fits daily so you don't take medicine:	Yes	28	59.6	8	38.1	9	28.1	$X^2 = 8.120$ P = .017*
	No	19	40.4	13	61.9	23	71.9	
Symptoms increase despite taking medicine:	Yes	33	70.2	13	61.9	1	3.1	$X^2 = 36.769$ P = .000*
	No	14	29.8	8	38.1	31	96.6	
The treatment period is long so you can't take it regularly:	Yes	34	71.7	20	95.2	4	12.5	$X^2 = 6.378$ P = .041*
	No	13	28.3	1	4.8	28	87.5	
The doctor constantly changes the treatment regimen:	Yes	27	57.4	15	71.4	31	96.9	$X^2 = 1.686$ P = .379
	No	20	42.6	6	28.6	1	3.1	
Taking medicine regularly is a stigma in society:	Yes	47	100.0	0	0.0	14	43.8	$X^2 = 46.646$ P = .000*
	No	0	0.0	21	100.0	18	56.2	
The drug causes unwanted side effects:	Yes	40	85.1	21	100.0	32	100.0	$X^2 = .958$ P = .298
	No	7	14.9	0	0.0	0	0.0	
Taking medication regularly affects daily life activities such as feeling fatigued:	Yes	42	89.4	16	76.2	2	6.2	$X^2 = 57.697$ P = .000*
	No	5	10.6	5	23.8	30	93.8	

FET = Fisher's Exact Test X^2 = Chi square test * = Significant at $P \leq 0.05$

Table (6): shows physical and psychological factors associated with medication adherence of the studied epileptic patients. The table clarifies that certain physical and psychological factors were significantly associated with medication adherence of the studied patients where $p = .000, .000, .000$ and $.000$ respectively. On the other hand, vision, hearing and movement problems as well as fear of unwanted drug side effects had no statistical significant relationships with medication adherence of the studied epileptic patients where $p = .536, .792, .339$ and $.145$ respectively.

Table (6): Physical and Psychological Factors Associated with Medication Adherence of the Studied Epileptic Patients:

Factors	Poorly adherent (N= 47)		Moderately adherent (N= 21)		Highly adherent (N= 32)		Statistical test
	No	%	No	%	No	%	
Vision problems make you unable to read the instructions for using the medicine:							$X^2 = .697$ P = .536
Yes	42	89.4	16	76.2	30	93.8	
No	5	10.6	5	23.8	2	6.2	
Hearing problems make it difficult to communicate with your doctor:							FET = .531 P = .792
Yes	3	6.4	1	4.8	3	9.4	
No	44	93.6	20	95.2	29	90.6	
Memory problems make you forget doses or take overdoses:							$X^2 = 38.712$ P = .000*
Yes	46	97.9	20	95.2	14	43.8	
No	1	2.1	1	4.8	18	56.2	
Problems with movement make you unable to take medicine or bring it from the pharmacy:							FET = 2.126 P = .339
Yes	1	2.1	2	9.5	1	3.1	
No	46	97.9	19	90.5	31	96.9	
You have fear of unwanted side effects:							$X^2 = 1.215$ P = .145
Yes	43	91.5	20	95.2	32	100.0	
No	4	8.5	1	4.8	0	0.0	

Fear of dependence on treatment:								
Yes	43	91.5	1	4.8	1	3.1	$X^2 = 75.778$ P = .000*	
No	4	8.5	20	95.2	31	96.9		
Feeling anger, anxiety and stigmatized by the disease:								
Yes	46	97.9	21	100.0	1	3.1	$X^2 = 91.050$ P = .000*	
No	1	2.1	0	0.0	31	96.9		
Your doctor or nurse frustrates you:								
Yes	30	63.8	10	47.6	0	0.0	$X^2 = 33.488$ P = .000*	
No	17	36.2	11	52.4	32	100.0		

X^2 = Chi square test FET = Fisher's Exact Test * = Significant at $P \leq 0.05$

IV. DISCUSSION

Epilepsy remains a socially stigmatized and disabling chronic disease which might lead to frequent physical injury, psychological impairment, poor quality of life, and shortened lifetime. One powerful goal of therapy that should be achieved is medication adherence. The majority of patients with epilepsy could effectively control their illness through adherence to antiepileptic drugs (AEDs). Failure to have control over seizure in epileptic patients might be attributed to poor adherence to (AEDs). Thus, identification of the factors associated with adherence to (AEDs), is important to improve overall outcomes of epileptic patients management^(28, 29). Therefore, the current study was conducted to identify factors associated with medication adherence among epileptic patients.

The present study findings revealed that nearly half of the studied epileptic patients had poorly adherence to medication, while the rest had moderate to high levels of adherence. This could be attributed to reason for poor adherence of patients to medication might be due to poor patient awareness about epilepsy and the role of antiepileptic medication in controlling the seizures. Lack of health education given by the nurses to epileptic patients might be a great leading factor to poor medication adherence of them. This finding was supported by Niriayo et al (2019), who reported in their similar study that more than half of their studied epileptic patients were non-adherent to medication.⁽³⁰⁾ Contradicting to the present study findings was the findings of Gurumurthy et al (2017) and Kassahun et al (2018). They had found in their previous studies that the majority of their studied patients had highly medication adherence.^(31, 32)

The current study findings indicated that the mean age of the poorly adherent group of patients was little higher than that of both the moderately and highly adherent groups of patients. Moreover, nearly half of patients in the poorly adherent group were illiterate, while the majority of patients in the moderately and highly adherent groups had a primary level of education. In addition, both of the age and educational level of patients had statistical significant association with epileptic patients' adherence to medication. This could be justified by the fact that when age increases, patients would have more difficulty in following instructions owing to decreased cognitive functions or other physical difficulties such as problems in swallowing medications, so adherence might be decreased with aging.

Furthermore, high educational level could be significant predictor of good adherence. As educational level increases, patients' awareness about the disease and the importance of adhering to medications will increase. Additionally, illiteracy could be the main hindering factor associated with poor medication adherence, owing to the inability of those patients to read and write guidelines or instructions of taking their medication properly.

These findings were in agreement with Cooper et al (2016) who claimed in their similar study that poor adherence to medication was observed among patients with higher age groups⁽³³⁾. On the other hand, these findings were not in line with Geraldine and Julie (2017) who reported in their study that the higher medication adherence rates appeared in older ages of their studied epileptic patients⁽³⁴⁾. Surprisingly, the present study findings were not supported by the reports of Paschal et al (2014) in their study who showed that poor medication adherence had been significantly associated with higher education levels of patients⁽²⁸⁾.

In the present study the other sociodemographic characteristics such as sex, marital status, residence, occupation and income were not significantly associated with medication adherence of the studied epileptic patients.

Regarding the clinical factors, the present study revealed statistical significant association between the onset of disease and medication adherence. It showed that half of the studied epileptic patients in the poorly adherent group had recent onset of epilepsy i.e. less than 10 years. This could be attributed to the newly exposure to the disease associated with lack

of knowledge and experience that might lead to poor adherence to medication. Similarly, this finding was in agreement with that of Niriayo et al (2019) who stated that nearly two thirds of their studied patients had been diagnosed with epilepsy for 5 years ago, meaning that they had recent onset of disease⁽³⁰⁾.

Furthermore, the presence of aura and precipitating factors of seizures were significantly associated with the studied patients' medication adherence. The study findings showed that more than half of the poorly adherent group of patients had no aura and stress as a precipitating factor of seizures. The sudden attack of fits without proceeding with an aura might affect the patients physical, psychological and social well being as well as leading to patients' poor quality of life and lack of adherence to medication. Moreover, continued exposure to stressful events precipitating seizures could encourage misuse and noncompliance to treatment regimen by patients, thus contributing to poor adherence to medication.

In relation to the WHO related domains, the present study findings indicated significant associations between poor adherence of patients to medication and the majority of factors included in each specific domain. Regarding the educational, social and economic domain, the main significant factors were no instructions given by physician, patients could not read or understand treatment guidelines, no help by family members to take medication, difficulty in going to health institution to buy medication, forgetting medication and patients had no health insurance to get their medications. There is no doubt that enough instructions given by health care professionals added to social support by family members and economic wellbeing are considered the corner stones to medication adherence among patients with epilepsy. In the same line, Niriayo et al (2019) and Gurumurthy et al (2017) stated that forgetfulness to take medication and low socioeconomic levels were significantly associated with poor adherence to medication^(30,31).

In relation to the disease and therapy related factors, the present study revealed that having no fits daily, increase of symptoms despite taking medication, long term period of treatment, social stigma and effects on daily living activities with taking medication, were significantly associated with poor adherence to medication. These findings were supported by Hasiso and Desse (2016) who reported that their patients stated that they had no improvement of symptoms or control over seizures despite taking medication⁽²⁹⁾. Furthermore, negative beliefs about taking medication as having social stigma and feeling fatigued; which had been reported by the studied epileptic patients in the current study might lead to their poor adherence to medication.

Finally, the physical and psychological factors that were significantly associated with poor adherence to medication included: forgetting doses due to memory problem, fear of dependence on medication, anger, anxiety and feeling frustrated by doctor or nurse. These findings were in the same line with Geraldine and Julie (2017) who suggested in their similar study that missing doses, depression and anxiety as being contributing factors to poor medication adherence⁽³⁴⁾. Definitely, the improved physical abilities of patients, emotional stability and psychological wellbeing could be correlated to epileptic patients' compliance to their treatment plan, so higher levels of patients' adherence to medication would be enhanced^(35, 36).

V. CONCLUSION

Based on the findings of the current study, it can be concluded that, nearly of the studied epileptic patients were poorly adherent to their antiepileptic medications. Age, level of education, onset of disease, presence of aura and seizures precipitating factors were significantly associated with the medication adherence of the studied patients. Additionally, several factors of the educational, social, economic, disease and therapy related, physical and psychological domains were significantly associated with medication adherence among epileptic patients of the study.

VI. RECOMMENDATIONS

- [1] Nurses should provide health education to epileptic patients about epilepsy and its treatment regimens that would improve their medication adherence and believes effectively.
- [2] Medication related issues including therapeutic action, dose, possible side effects and precautions should be discussed by nurses with epileptic patients in order to increase their awareness and adherence.
- [3] Public health education should be enhanced by nurses to provide positive attitudes toward epileptic patients, thus improve their psychosocial wellbeing.
- [4] Developing health insurance services to epileptic patients that might help them get their medication easily with the minimum costs should be advocated.

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