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Research paper

Impact of Depressive Symptoms on Antiepileptic Drug Adherence Among Epilepsy Patients

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Abstract

Background: Epilepsy patients frequently develop depression among psychiatric illnesses because these conditions diminish both their ability to stick to their medication regimen and their life satisfaction.
Methods: Researchers conducted a cross-sectional study that involved 300 adult epilepsy patients. They utilized three assessment instruments, including the Patient Health Questionnaire-9 (PHQ-9), Morisky Medication Adherence Scale (MMAS-8), and Quality of Life in Epilepsy Inventory (QOLIE-31). Multiple regression and correlation are data analysis methods. Data was collected from September 2024 to March 2025.
Results: In this sample of 300 participants, 188 males comprised 63% of the total, while women made up the remaining 37%, with 112 participants. Most patients presented with moderate to severe depressive symptoms, which strongly affected their medication adherence levels while also producing negative impacts on their quality of life. A total of 69 people (23%) claimed they did not experience seizures during the past 6 months, whereas 111 participants (37%) stated they had encountered one seizure, and another 95 (32%) responded they had multiple monthly seizures. The analysis through regression revealed depressive symptoms as the strongest predictor for substandard use of AED medications ($\beta = .754$, $p < .01$).
Conclusion: The presence of depressive symptoms acts as a key obstacle for proper AED use while producing substantial negative effects on epilepsy patients' quality of life. Professional psychological testing and combined mental health treatments should be conducted regularly to help achieve better outcomes in clinical care.

Keywords: *Epilepsy; Depression; Antiepileptic Drugs; Medication Adherence; Quality of Life.*

1. Introduction

Epilepsy represents a long-lasting neurological condition characterized by seizure occurrence and additional mental and intellectual effects [1]. An estimated 70 million people worldwide are afflicted by the disorder of epilepsy, which is now classically viewed as a complex disorder with profound genetic and environmental influences [2], [3].
Socio-economic, sociocultural, and health service factors are extensive considerations for this disorder in determining the prevalence and incidence rates [4]. Epilepsy is a common brain disorder that has many causes, and although antiepileptic drugs are effective for 60-70% of patients, treatment adherence is a significant barrier, especially in refractory epilepsy. The potential of pharmacogenetic studies for tailoring treatment emphasizes the need to identify and intervene on issues such as depressive symptoms that might affect adherence and other treatment outcomes [5].
Depressive disorders are the most common associated disorders found in epilepsy patients, and most remain untreated, with detrimental effects on adherence to antiepileptic drugs and treatment outcomes [6]. A study reported that 23.1% of individuals with epilepsy have active depression, with an odds ratio of 2.77, which indicated a strong relationship between epilepsy and depression [7].

Depression is the most common comorbidity of epilepsy. It is derived from psychological stressors and neurobiological factors that include seizures and antiepileptic drugs [8]. Patients with intractable epilepsy, especially those who suffer from temporal lobe seizures or who are on polytherapy, are often affected by depression [9].

Poor adherence to antiepileptic drugs (AEDs) among adults suffering from epilepsy may be linked to a myriad of factors, including depression, anxiety, poor self-management, and weak physician-patient relationships. This nonadherence affects quality of life due to poor seizure control and underscores the need for regular follow-ups on adherence [10]. Adherence to antiepileptic drug therapy is critical, but it is often poor due to various impediments. Barriers that prevent patients from fully complying with their antiepileptic drug therapy regimens can include poor communication between patients and healthcare providers, lack of patient education, complicated prescribing regimens, and failure to implement reminders [11].

Antiepileptics improved therapy adherence by administering antiepileptic drugs once or twice daily and working collaboratively with patients and clinicians to optimize treatment [12]. The extent of depression in epilepsy patients has a significant effect on the levels of adherence to antiepileptic drugs, severity of seizures, and quality of life [13].

Due to the importance of psychological well-being in epilepsy treatment outcomes, research is still needed, especially concerning understanding depressive symptoms and their impact on AED adherence. Better insights into this relationship would open avenues for integrated treatment approaches and mental health screening for epilepsy patients. The study will investigate the influence of depressive symptoms on adherence to AEDs in patients with epilepsy, thereby identifying barriers to treatment compliance and informing interventions to address mental health and neurological consequences.

Epilepsy is one of the most widespread neurological disorders, requiring sustained treatment with antiepileptic drugs (AEDs) to manage seizures and ensure a better quality of life for the patients. Nonadherence to AED treatment, however, still poses a great hurdle to effective therapy and direly influences clinical outcomes such as increased seizure frequency, hospitalizations, and even death. So, every effort must be made to ensure adherence to the treatment regimen for the optimal management of epilepsy, as numerous factors make patients tend to avoid the required regimen.

A lot of people who have epilepsy are known to show depressive symptoms. Well, it has been proven that depressed patients may worsen the control of epilepsy, and their cognitive and emotional functions decline, and a significant decrease in life quality. Unfortunately, there is still a tendency to underdiagnose and undertreat depressive symptoms in people living with epilepsy, which only complicates their clinical management.

Increasing evidence suggests that depression plays an important role in adherence to medications. Depression can bring about cognitive and motivational impairments such as forgetfulness, lethargy, and hopelessness, which may interfere with one's ability or willingness to take medication exactly as prescribed. The interaction of depression with nonadherence to antiepileptic drugs concerns us most because it is likely to reinforce itself, driving poor adherence and worsening the patient's depressive symptoms and seizure frequency into a continuing downward spiral with dire prognostic implications.

However, such research, studying the factors influencing AED adherence, is less concerned with the aspect of the effects of depressive symptoms. Understanding this relationship merits the cause for enhancing clinical outcomes, and in terms of designing interventions. Recognizing depressive symptoms as one of the factors hindering medication adherence in patients would lead to more patients receiving better-tailored treatment plans that cater to their psychological as well as neurobiological needs.

This study bridges the existing literature gap concerning the impact of depressive symptoms on adherence to AEDs among individuals with epilepsy. It aims at addressing further studies on the subject to better manage adherence through the development of comprehensive strategies on mental health screening or intervention in routine epilepsy services to enhance patient outcomes, besides increasing adherence.

2. Objectives

The primary goal of the study is to measure how depressed the patient is and how he/she adhere to antiepileptic drugs (AEDs). For depression severity measurement, the Patient Health Questionnaire-9 (PHQ-9) will be used to assess the severity of adherence according to the Morisky Medication Adherence Scale (MMAS-8). Also, this study is about determining the relationship between depressive symptoms and AED adherence, concerning how being depressed hinders patients from the ability or even willingness to adhere to their medication regimen. Another study aims to investigate the mediators and moderators of depression with AED adherence, demographic and clinical characteristics like age, gender, seizure type, and duration of epilepsy. The study also includes the Quality of Life in Epilepsy Inventory (QOLIE-31), which will determine the effect of depressive symptoms and drug adherence on quality of life in general among epileptic patients in terms of emotional, cognitive, and social functioning.

3. Materials and methods

3.1. Study design

This study used a cross-sectional and correlational research design to understand the association between depressive symptoms and adherence to antiepileptic drug (AED) regimens among patients with diagnosed epilepsy. A cross-sectional design was preferred since AED adherence and depressive symptoms are being assessed concurrently, thus providing a snapshot of how these variables relate within the patient population.

3.2. Participants and setting

The study included epilepsy patients aged 18 years and older who had been given treatment with antiepileptic drugs (AEDs) for at least three months to ensure that the patients were under stable treatment. The patients' recruitment occurred through a neurology clinic or epilepsy treatment center; inclusion criteria included a patient's diagnosis of epilepsy based on clinical history and neurological assessments. Furthermore, AEDs had to be taken for a minimum of three months, and the patients were also required to provide informed consent or be able to complete the assessment tools of the study. Exclusion criteria included patients with major cognitive impairment that would hinder their capacity to complete ratings and those with significant psychiatric disorders other than depression, to stay purely focused on depressive symptoms. Patients with comorbid neurological disorders influencing AED adherence or depressive symptoms were also excluded from the study. Data collection took place from September 2024 to March 2025.

3.3. Sample size and technique

Our estimated sample size was 300 participants, calculated using the WHO sample size formula for proportions:

$n = (Z^2 \times p \times (1 - p)) / d^2$

Where Z represents the standard normal deviate corresponding to the desired confidence level (1.96 for 95% confidence), p is the expected population proportion (0.90), and d is the absolute precision or margin of error (0.05). Substituting these values into the formula:

$n = (1.96^2 \times 0.90 \times (1 - 0.90)) / (0.05)^2 = (3.8416 \times 0.90 \times 0.10) / 0.0025 = 138$

To enhance statistical power, allow subgroup analysis, and account for possible non-responses or incomplete data, the final sample size was increased to 300 participants. The sampling technique was convenience sampling, in which the participants were selected based on their availability and readiness to participate during regular visits to the clinic or epilepsy treatment centers. This method was mainly adopted for ease of administration and to ensure demographic diversity of the epilepsy population, allowing inclusion of participants from different age groups, genders, and clinical profiles (e.g., different seizure types and epilepsy durations).

4. Data collection tools

Structured questionnaires and scales were administered to study participants as they arrived for their scheduled clinic visits. The Morisky Medication Adherence Scale (MMAS-8) is a validated 8-item self-report scale for the measurement of medication adherence. It produces a score reflecting the level of adherence (low, medium, or high) as determined from participant responses; the scale is intended to capture intentional and unintentional forms of nonadherence, including forgetting doses, discontinuing medications, and stopping treatments resulting from side effects. Through a multitude of yes/no or Likert-type scale questions, MMAS-8 assesses adherence behaviors. A score generated based on the responses indicates the level of adherence in low, medium, or high terms. The MMAS is reliable (alpha=.83). It was developed by Dr. Donald E. Morisky and his colleagues in 1986 (see Table 9) [14]. The Patient Health Questionnaire is a 9-item self-rated scale assessing the severity of depressive symptomatology. Each item is rated along a 4-point continuum from "not at all" to "nearly every day." A score of 10 or above indicates moderate to severe depression. PHQ-9 has good reliability with a Cronbach's α of 0.89. It was developed by Robert L. Spitzer, Janet B.W. Williams, and Kurt Kroenke in 1999 (see Table 10) [15]. This research study adopted the Quality of Life in Epilepsy (QOLIE-31) scale to measure the impact of epilepsy and its treatment on the quality of life of patients. This scale is especially relevant as it reflects how epilepsy affects an individual across a wide variety of health dimensions, such as emotional, social, cognitive, and physical functioning. QOLIE-31 has a total of 31 entries and subdivides them into seven domains: Seizure Severity, Emotional Well-Being, Cognitive Functioning, Social Functioning, Overall Quality of Life, Energy/Fatigue, Medication Effects. The instrument shows a high internal consistency. Range of Cronbach's Alpha from 0.77 to 0.99; some studies even report values higher than 0.9. It was developed in 1998 by several people, including Joyce A. Cramer, Kenneth Perrine, Orrin Devinsky, among others (see Table 11) [16].

4.1. Procedure

After getting ethical approval, participants were approached during their scheduled follow-up visits at the various clinics. Those who met the inclusion criteria were then informed about the study, and written informed consent was obtained. Participants were then required to fill in the questionnaires under the supervision of the researcher to guarantee accurate data collection.

4.2. Data analysis

IBM SPSS Statistics version 26 software (IBM Corp., Armonk, NY, USA) was used for analysis. The research used descriptive statistics and chi-square tests, together with Pearson correlation and multiple regression analysis, to study the association between depressive symptoms and adherence rates for antiepileptic medications. A p-value of less than 0.05 was considered statistically significant.

4.3. Ethical considerations

Participants' confidentiality and anonymity were always maintained during the study. The ethical approval was provided by the Institutional Review Board (IRB) of the NeuroWave Research Center, Islamabad, Pakistan, with IRB-2025-0027. Participation was voluntary because participants were allowed to withdraw their participation at any point without any repercussions.

5. Results

Table 1: Demographic Characteristics of Participants (N=300)

Variable	f	%
Age	-	-
Under 18 years	4	1
18-25 years	157	52
26-35 years	125	42
36-45 years	14	5
Gender	-	-
male	188	63
female	112	37
Marital status	-	-
single	82	27
married	139	46

divorced	61	20
widowed	18	6
Educational level	-	-
no formal education	79	26
bachelors	129	43
masters	77	26
Doctorate	15	5
Employment status	-	-
student	42	14
employed	120	40
unemployed	125	42
retired	13	4
Monthly income	-	-
below 25,000	163	54
25000-50,000	114	38
51,000-100,000	23	8
Duration of epilepsy	-	-
less than 1 year	151	50
1-5 years	115	38
6-10 years	31	10
more than 10 years	3	1
Type of epilepsy	-	-
Focal	100	33
General	145	48
Unknown	55	18
Medication for gastrointestinal symptoms	-	-
One	102	34
Two	154	51
Three or more	44	15
Seizures frequency in last 6 months	-	-
None	69	23
Once	111	37
Monthly	95	32
Weekly	21	7.0
Daily	4	1
Smoking status	-	-
Smoker	133	44
Non-smoker	167	56
Family history of epilepsy	-	-
yes	95	32
no	103	34
Not sure	102	34

Note. f=frequency, %=percentage.

Table 1 presents a complete breakdown of the study participants' (N = 300) demographic features. Most participants (n = 157) aged between 18–25 years made up 52% of the total, then those aged 26–35 years old were 125 people, and a total of 42%. The population below 18 years composed 1% of the total (n = 4), whereas the 36–45 years age group consisted of 5% (n = 14) of participants.

The participant population showed men outnumbered women with 188 (63%) against 112 (37%) females. The participant sample included 134 (46%) married subjects, followed by single respondents, 82 (27%), and divorcees, 61, who comprised 20%, and 18 (6%) widowed individuals, respectively.

The participant group having a bachelor's degree was the largest (n = 129, 43%), while participants with no formal education (n = 79, 26%) and those with a master's degree (n = 77, 26%) followed closely behind. Participants with a doctorate (n = 15, 5%) were the least represented. The survey revealed that the largest group of participants identified as unemployed (n = 125, 42%), but employment status included 120 participants (40%), while 42 individuals (14%) were students, and 13 (4%) were retired. Almost sixty percent (n = 163, 54%) earned less than 25,000 PKR, while 38% (n = 114) received between 25,000 to 50,000 PKR in monthly salary, and 8% (n = 23) earned between 51,000 to 100,000 PKR.

The participants revealed their epilepsy duration with half facing the condition for under a year (n = 151, 50%) while others stayed within the 1–5-year range (n = 115, 38%) and 6–10-year sector (n = 31, 10%) and the few experienced more than ten years (n = 3, 1%). General epilepsy represented the greatest number (n = 145) at 48%, while focal epilepsy gave way to 33% (n = 100), and unknown type came after at 18% (n = 55).

Most patients used two medications for gastrointestinal symptoms (51%, n=154) while 34 % (n=102) used one drug and 15% (n=44) were on three or multiple medications. The most common response for past six-month seizure occurrences was patients experiencing seizures only once (n = 111, 37%) with the rest of the participants reporting either monthly seizures (n = 95, 32%) or no seizures at all (n = 69, 23%) or weekly seizures (n = 21, 7%) or daily seizures (n = 4, 1%).

The study population included 133 (44%) smokers among 300 participants, while the rest (56%) identified as non-smokers. Among the respondents questioned about epilepsy history in their families, 95 people (32%) confirmed a diagnosis and 103 people (34%) denied it, while 102 participants (34%) remained undecided.

Table 2: Intercorrelations between the Study Variables

Variable	Patient Health Questionnaire	Morisky Medication Adherence Scale	Quality of Life in Epilepsy
Patient Health Questionnaire	-	.747**	-.818**
Morisky Medication Adherence Scale	.747**	-	-.609**
Quality of Life in Epilepsy	-.818**	-.609**	-

Note. *=p<0.05, **=p<0.001 considered significant; correlation= Pearson Correlation.

Table 2 data demonstrate strong connections between the three variables under study. Depressive symptoms identified through the Patient Health Questionnaire show a positive connection to antiepileptic medication non-adherence measured through the Morisky Scale (r = .747, p < .001) that confirms participants with acute depressive symptoms follow their antiepileptic treatment worse. The evaluation of depressive symptoms and quality of life in epilepsy (QOLIE-31) yielded an extremely negative correlation (r = –.818, p < .001), which shows that stronger depression corresponds to significantly reduced quality of life assessment results. The research data reveals that a strong negative relationship exists between medication adherence and quality of life (r = –.609, p < .001), showing that medication adherence deterioration leads to decreased quality of life assessment. The research illustrates how depression generates a strong relationship between reduced medication adherence together with impaired quality of life in epilepsy patients.

Table 3: Comparison Among Variables (Gender)

Variable	Male (N=188)	Female (N=112)	t	P	Cl 95%		Cohen's D
	M±S.D	M±S.D			LL	UL	
Patient Health Questionnaire	20.4±2.9	21.0±2.9	-1.659	0.05	-1.279	.109	2.11
Morisky Medication Adherence Scale	14.1±2.8	14.7±2.9	-1.720	<0.001	-1.273	.086	2.11
Quality of Life in Epilepsy	4.90±.91	4.8±.89	1.295	0.02	-.073	.354	1.12

Note. M=mean, SD=standard deviation, LL=Lower limit, UL=Upper limit; Cl=confidence interval; Independent t-test.

Table 3 presents data about gender variations in three variables measuring the Patient Health Questionnaire (PHQ) scores and both Morisky Medication Adherence Scale values and Quality of Life in Epilepsy scores. A minimal distinction in mean Patient Health Questionnaire scores emerges as males scored M = 20.4 (SD = 2.9) while females scored M = 21.0 (SD = 2.9), yielding a t-value of -1.659 and p-value of .05. This indicates a possible small difference. The confidence interval spans from -1.279 to .109 while the Cohen's d value stands at 2.11, indicating a substantial effect size. The results from medication adherence tests revealed significant differences between men and women, with males scoring 14.1 points (SD = 2.8) and females scoring 14.7 points (SD = 2.9) (t = -1.720, p = .000). The calculated Cohen's d value demonstrates another large effect size (d = 2.11). Quality of life measurements showed males scoring 4.90 on average (SD = 0.91) compared to females who scored slightly lower at 4.8 (SD = 0.89). A t-value measuring 1.295, together with a p-value of .02, shows statistical significance while demonstrating a moderate effect size through Cohen's d score at 1.12. The data indicates that gender represents a possible factor that affects scores recorded on these health-related tests.

Table 4: Comparison of Variables (Number of Antiepileptic Medications Currently Taking)

Variable	One (N=102)	Two (N=154)	Three or more (N=55)	p	F (2,297)	η2
	M±S.D	M±S.D	M±S.D			
Patient Health Questionnaire	20.1±2.7	20.8±3.0	21.1±3.2	0.043	0.895	0.006
Morisky Medication Adherence Scale	13.8±2.7	14.5±2.9	14.9±2.9	0.035	0.598	0.004
Quality of Life in Epilepsy	4.9±.82	4.8±.89	4.7±1.1	0.136	1.943	0.013

Note. M=mean, S. D=standard deviation, F=F-ratio, η2=effect size; One-way ANOVA.

Table 4 shows that a one-way ANOVA was used to explore any differences in psychological well-being, medication compliance, and quality of life between patients who took one, two, three, or more antiepileptic drugs. The study results showed significant differences among the groups in terms of Patient Health Questionnaire (PHQ) scores (p = 0.043), whereby a higher number of medications was associated with an insignificant increase in psychological distress (although the effect size was positive and was low, 0.006). Similarly, there was a considerable difference in Morisky Medication Adherence Scale scores (p = 0.035), which showed higher medication adherence in those who took more medications, with a similarly tiny effect size (eta-square = 0.004). There were no significant results in regards to the Quality of Life in Epilepsy scores between the groups (p = 0.136), but the trend indicated that the more medications there were, the worse the quality of life; furthermore, the effect size was small (2 = 0.013). In general, although there are certain statistical differences, they do not seem to have a meaningful practical implication based on such small effect sizes.

Table 5: Comparison of Variables (Seizure Frequency in the Last 6 Months)

Variable	None (N=69)	Once (N=111)	Monthly (N=95)	Weekly (N=21)		Daily (N=4)	p	F (4,295)	η2
	M±S.D	M±S.D	M±S.D	M±S.D		M±S.D			
Patient Health Questionnaire	19.8±2.7	20.6±2.9	20.9±3.2	21.6±2.2		24.0±.816	0.006	3.698	0.048
Morisky Medication Adherence Scale	13.7±2.3	14.3±3.3	14.6±2.8	15.05±9	2.72	16.0±2.0	0.137	1.758	0.023
Quality of Life in Epilepsy	5.0±.85	4.9±.88	4.8±1.0	4.50±	.746	4.2±.49	0.137	1.759	0.023

Note. M=mean, S. D=standard deviation, F=F-ratio, η2=effect size; One-way ANOVA.

Table 5 presents the comparison of the impacts on the levels of psyche stress, drug adherence, and quality of life between various seizure frequency groups in the previous six months. The frequencies of seizures were statistically associated with the rise in Patient Health Questionnaire (PHQ) scores with frequencies ranging between M = 19.8 (SD = 2.7) in participants who did not experience seizures to M = 24.0 (SD = 0.82) in those who had daily attacks (p = 0.006, F = 3.698, 0.048). Even though Morisky Medication Adherence scores also improved according to seizure frequency (M = 13.7 to 16.0) and Quality of Life in Epilepsy scores also decreased (M = 5.0 to 4.2), the statistical difference was not significant (both p = 0.137) and with effect sizes which were too small to be considered meaningful (both 0.023). On the whole, the concept of psychological distress was meaningfully linked to the seizure frequency only, whereas the adherence and quality of life were insignificant and responsive in the expected directions.

Table 6: Multiple Regression for Morisky Medication Adherence Scale and Quality of Life in Epilepsy

Variable	B	95% Cl		S.E	β	P
		LL	UL			
Constant	5.234	1.221	9.247	2.039	-	0.011
Patient Health Questionnaire	-0.738	-0.867	-0.609	0.066	-0.754**	<0.001
Quality of Life in Epilepsy	-0.026	-0.447	0.396	0.214	-0.008**	0.904

Note. constant: Morisky Medication Adherence Scale, B=coefficient, S. E=standard error, β =standardized coefficient, LL=Lower limit, UL=Upper limit; Cl=confidence interval, **=p<0.01 considered significant.

Table 6 presents the multiple regression analysis that investigated the association between psychological distress (PHQ) and quality of life (QOLIE) and medication adherence based on the Morisky Medication Adherence Scale. The findings signify that medication adherence is an important outcome that is significantly and negatively predicted by Patient Health Questionnaire (PHQ) scores (B = -0.738, SE = 0.066, 8 = -0.754, p < 0.001), such that an increase in psychological distress is related to a decrease in medication adherence. The confidence interval of 95 (CI: -0.867 to -0.609) does not pass through zero, which presents this association as strong. On the contrary, the Quality of Life in Epilepsy (QOLIE) questionnaires were not significant in predicting adherence (B = -0.026, SE = 0.214, B -0.008, p = 0.904), and the confidence interval runs through zero (-0.447 to 0.396), meaning that there is no significant difference. The intercept (continuous) of the model was significant (B = 5.234, p = 0.011), thus indicating the hypothetical baseline adherence score at the zero level of both predictors. The other aspect, psychological distress, was the only significant negative predictor of medication adherence in this model.

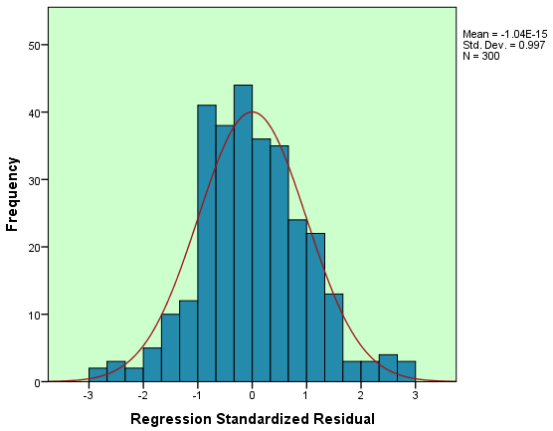

Fig. 1: Histogram Showing the Distribution of Regression Standardized Residuals for the Morisky Medication Adherence Scale.

Figure 1 indicates that the regression standardized residuals exhibited an approximately normal distribution of the Morisky Medication Adherence Scale with a mean of approximately zero and a standard deviation of approximately one. This implies that the hypothesis of normal distribution is not violated, and this favors the fitness of the regression model.

Table 7: Descriptive Statistics of Demographic Variables (Current Use of Antiepileptic Medications, Seizure Frequency in Last 6 Months, Psychological Conditions)

Variables	f	Seizure Frequency in Last 6 Months					p	x^2	Psychological Conditions			p	x^2
		None	Once	Monthly	Weekly	Daily			Yes	No	Not sure		
Current use of antiepileptic medications	-	-	-	-	-	-	<0.001	3.90	-	-	-	<0.001	7.31
One	102	23	40	29	9	1	-	-	40	30	32	-	-
Two	154	37	54	52	9	2	-	-	40	57	57	-	-
Three or more	44	9	17	14	3	1	-	-	15	16	13	-	-

f=frequency; %=percentage; p=level of significance; p-values calculated using the chi-square test; the significance level is set at p < 0.05.

Table 7 shows descriptive data about whether patients are using antiepileptic medications presently, together with data about seizure frequency during the previous six months and psychological conditions status. The analysis revealed a substantial relationship between antiepileptic medication dosage level and seizure occurrence through statistical chi-square testing, which produced a 3.90 result (p < 0.001). Patients who used one antiepileptic drug mainly experienced seizure frequencies between monthly and daily occurrences (29% monthly, 9% weekly), whereas people taking multiple drugs displayed similar seizure frequency patterns. The data suggests that people with more severe epilepsy conditions often face treatment resistance since they need multiple medicines. Research demonstrated a significant statistical association between patients who take medications and their psychological health conditions (χ^2 = 7.31, p < 0.001). People who take multiple medications show increased uncertainty about their psychological state, which promotes the requirement of medical treatment that combines epilepsy care with mental health treatment.

Table 8: Descriptive Statistics of Demographic Variables (Duration of Epilepsy, Seizure Frequency in Last 6 Months, Psychological Conditions)

Variables	f	Seizure Frequency in the Last 6 Months					p	x^2	Psychological Conditions			p	x^2
		None	Once	Monthly	Weekly	Daily			Yes	No	Not sure		
Duration of epilepsy	-	-	-	-	-	-	0.02	9.11	-	-	-	<0.001	2.53
Less than 1 year	151	37	55	45	13	1	-	-	49	13	8	-	-
1-5 years	115	21	45	40	7	2	-	-	47	51	53	-	-
6-10 years	31	11	9	9	1	1	-	-	38	41	36	-	-
More than 10 years	3	0	2	1	0	0	-	-	9	11	11	-	-

f=frequency; %=percentage; p=level of significance; p-values calculated using the chi-square test; the significance level is set at p < 0.05.

Table 8 shows the descriptive statistics for duration of epilepsy, seizure frequency in the last 6 months, and psychological conditions. Epilepsy duration demonstrates a statistically significant relationship with seizure frequency based on the χ^2 test results of 9.11 with p = 0.02. Patients experiencing epilepsy for less than one year reported relatively frequent seizure occurrences (37% with none and 13%

weekly), yet individuals with epilepsy exceeding ten years showed decreased seizure reports, suggesting improved seizure control. The relationship between psychological conditions and epilepsy duration proved significant as measured by $\chi^2 = 2.53$, where $p < 0.001$ was established. The onset duration of epilepsy has an impact on psychological conditions, with individuals who suffered one year or less experiencing lower reports compared to people who experienced epilepsy longer than one year.

6. Discussion

The research output reveals a substantial connection between depressive symptoms, which influence AED treatment adherence in persons who experience epilepsy. The results of our research support earlier studies by demonstrating that depressive symptoms decrease antiepileptic drug (AED) adherence levels. The research revealed that individuals who showed more depressive symptoms had reduced medication adherence rates that resulted in diminished quality of life [10], [17]. Our analysis showed depression created a direct link to decreased quality of life among epilepsy patients. Previous research tracks with these findings because depression acts as a negative factor that damages both the quality of life and treatment adherence in epilepsy patients [18].

The data from our investigation showed female participants reported higher depressive symptoms compared to male participants, which confirms earlier findings on the increased vulnerability of females towards depression. The results confirm that gender plays an important role in how people experience depression [19]. Our research showed that women adhered better to their medicine prescriptions than men, even though previous studies had shown men demonstrating superior adherence. The research findings suggest gender-related factors affecting medication adherence show differences among populations and treatment settings, which need further evaluation [20]. This could have cultural reasons, increased involvement of women in healthcare, or reporting bias in self-evaluation. Such gender disparities create a case to conduct additional studies based on objective measures of adherence in a variety of settings.

The research data showed that males scored better on quality-of-life measures in comparison to females, even though the difference was moderate. Research has previously indicated no gender effects, yet our findings demonstrate potential variations between men and women in epilepsy-related quality of life perceptions [21].

Our study findings suggested a difference in depressive symptoms as antiepileptic medication use increased, though not statistically significant. Research shows that AED polytherapy or high-dose treatment leads to negative mood effects, which supports the need for individualized medication planning [22]. The relationship between medication adherence and several antiepileptic drugs used was observed, but the data were not statistically significant. This supports earlier literature suggesting that tweaking dosing schedules and optimizing treatment in a collaborative care context may potentially enhance adherence to treatment and overall treatment effect in epilepsy [12]. Our study results, along with previous research, show that antiepileptic medicine at higher doses tends to lower quality of life, but these findings were not statistically significant. The observed pattern requires additional examination through research with larger subject samples [23].

Previous research demonstrates that more frequent seizures result in deteriorated quality of life, together with mental health decline. The results of this research integrate depressive symptoms as a factor causing diminished quality of life in individuals experiencing seizures [24]. The data shows that patients adhere better to their medication treatments when their seizure counts increase, contrary to previous studies linking poor adherence to poor seizure results. The adherence patterns of epilepsy patients appear influenced by various elements beyond seizure frequency alone [25].

We found that psychological distress played an important role in predicting a lower level of medication adherence among epilepsy patients. It is in line with already existing studies that revealed that patients with greater intensities of depression exhibited lower adherence to antiepileptic medications and the need to consider mental health when it comes to enhancing treatment [13]. Contrary to our results, where the quality of life was not significantly predictive of the degree of adherence to medications, another study indicated that the quality of life scores were superior in individuals with better adherence. This difference can be explained by the difference in measures, statistical methods, or may be due to the presence of psychological factors peculiar to epilepsy [26].

Our study demonstrated that patients on multiple antiepileptic drugs (AEDs) experienced enhanced seizure activity, although this contradicts certain past research on non-adherence being a leading cause of increased seizure incidents [27]. The research data confirmed that patients with psychological conditions took more medications because earlier studies had demonstrated appropriate use of psychotropic drugs for youth exhibiting mental health disorders and functional deficits [28].

We found that the current epilepsy duration was linked with lower seizure frequency, indicating better control of seizures with time. This is in line with current literature that states that seizure management is vital to avoid physical injury, psychiatric effects, and poor quality of life. The treatment of seizures within the first weeks and months of an episode is significant to enhancing further outcomes in epilepsy [29]. In our study, we discovered that psychological symptoms are more prevalent with the duration of epilepsy. This is in line with the earlier studies indicating that psychological well-being plays a more significant role in quality of life than clinical aspects like frequent attacks or side effects of drugs [30].

The overall treatment outcomes and patient well-being become better because of paying attention to depression. Patient care has to develop psychological support in the context of a comprehensive approach that is patient-focused.

7. Practical implications

Findings of this research highlight the urgency of the inclusion of mental health assessments into regular epilepsy care. Depressive symptoms should be screened in epileptic patients since they constitute one of the risk factors for non-adherence to medication. To treat them, special interventions, including cognitive-behavioral therapy (CBT) for depression, the use of telepsychiatry to deliver psychologically distant guidance, and mobile apps to remind about taking medications, can be considered in a complex therapy. Interdisciplinary management, including neurologists, primary care providers, and psychologists, is necessary to treat epilepsy, both neurologically and psychologically. The control over the clinical side of epilepsy could be left to neurologists, support of the mental health aspect to the psychologists, and overall organization of the care to primary care physicians, so that the clinics could address each aspect of the health of this patient. Also, by making treatment strategies gender-sensitive, socioeconomically affected, and ethnically-driven, it is suggestible that further improvement of clinical outcomes and patient satisfaction will be achieved.

8. Limitation

This study has a few limitations. First, it is cross-sectional in design and, therefore, fails to bring out the causal relationship between depression symptoms and adherence to medication and seizure outcomes. The relationship should be longitudinal to make it clear in the direction and time nature of these relations. Second, it is research using self-reported (PHQ-9, MMAS-8) evidence that is subject to social desirability bias or recall bias. To enhance the accuracy of measurements, future studies need to incorporate objective measurement of adherence (i.e., a pharmacy refill record or electronic devices). Third, formal models of mediation or moderation were not applied to ascertain the possible impacts of demographic and clinical factors (i.e., gender and frequency of seizures) on the association between depression and adherence, even though analyses had been carried out to evaluate the contribution of both demographic and clinical variables. In the future, this limitation should be tackled by advanced statistical modeling.

9. Future directions

In the future, longitudinal and experimental studies must be conducted to determine the causal relationship between depressive symptoms and medication adherence. They should consider interventions that include cognitive-behavioral therapy, telepsychiatry, as well as mobile health technologies to test their value in enhancing adherence as well as psychological outcomes among epilepsy patients. It has also been recommended that moderating and mediating factors such as health literacy, social support, and stigma should be studied so as to advance the psychosocial aspects that shape adherence behaviors. Also, digital aids to adherence (smartphone apps, electronic pill counters) may be evaluated to achieve more precise estimates of medication adherence. The stratification of research results according to gender, socioeconomic status, and cultural background should also have a place to justify any gap they cannot find in the pattern of adherence, like in this study, wherein women adhere better. Lastly, studies on culturally specific integrated care models that may involve the integration of mental health care with treatment of epilepsy should be carried out to enhance prognosis in various groups of people.

10. Conclusion

The study demonstrates that epilepsy patients with depressive symptoms demonstrate poor adherence to their antiepileptic drug (AED) medications. The level of depression in patients directly impacted their medication adherence level and quality of life measures. Epilepsy patients benefit from routine mental health screenings as recommended for their regular healthcare. The relationship between AED compliance and gender, as well as seizure frequency, was less prominent than depressive symptoms. Treatment outcomes, together with patient well-being, improve when depression receives proper attention. Patient care needs to integrate psychological support within an integrated approach that focuses on the patient. Studies should investigate depression management strategies to boost patient adherence levels and life quality.

Table 9: The Morisky Medication Adherence Scale (MMAS-8)

Items	Responses
Do you sometimes forget to take your medications?	-
People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medicine?	-
Have you ever cut back or stopped taking your medication without telling your doctor because you felt worse when you took it?	-
When you travel or leave home, do you sometimes forget to bring along your medication?	-
Did you take your medicine yesterday?	-
When you feel like your disease is under control, do you sometimes stop taking your medicine?	-
Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	-
How often do you have difficulty remembering to take all your medicine?	-

Dr. Donald E. Morisky and his colleagues. (1986). [14].

Table 10: Patient Health Questionnaire-9 (PHQ-9)

Items	Responses
Little interest or pleasure in doing things	-
Feeling down, depressed, or hopeless	-
Trouble falling or staying asleep, or sleeping too much	-
Feeling tired or having little energy	-
Poor appetite or overeating	-
Feeling bad about yourself — or that you are a failure or have let yourself or your family down	-
Trouble concentrating on things, such as reading the newspaper or watching television	-
Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	-
Thoughts that you would be better off dead or of hurting yourself in some way	-

Robert L. Spitzer, Janet B.W. Williams, and Kurt Kroenke. (1999). [15].

Table 11: Quality of Life in Epilepsy Inventory-31 (QOLIE-31)

Items	Response
Overall, how would you rate your quality of life?	-
Did you feel full of pep?	-
Have you been a very nervous person?	-
Have you felt so down in the dumps that nothing could cheer you up?	-
Have you felt calm and peaceful?	-
Did you have a lot of energy?	-
Have you felt downhearted and blue?	-
Did you feel worn out?	-
Have you been a happy person?	-
Did you feel tired?	-

Have you worried about having another seizure?	-
Did you have difficulty reasoning and solving problems (such as making plans, making decisions, learning new things)?	-
Has your health limited your social activities (such as visiting with friends or close relatives)?	-
How has the QUALITY OF YOUR LIFE been during the past 4 weeks (that is, how have things been going for you)?	-
In the past 4 weeks, have you had any trouble with your memory?	-
Trouble remembering things people tell you.	-
Trouble concentrating on reading	-
Trouble concentrating on doing one thing at a time	-
Leisure time (such as hobbies, going out)	-
Driving	-
How fearful are you of having a seizure during the next month?	-
Do you worry about hurting yourself during a seizure?	-
How worried are you about embarrassment or other social problems resulting from having a seizure during the next month?	-
How worried are you that medications you are taking will be bad for you if taken for a long time?	-
seizures	-
memory difficulties	-
work limitations	-
social limitations	-
Physical effects of antiepileptic medication	-
mental effects of antiepileptic medication	-
How good or bad do you think your health is?	-

Joyce A. Cramer, Kenneth Perrine, Orrin Devinsky, and others. (1998) [16].

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