

# FREQUENCY OF MIGRAINE HEADACHE IN PATIENTS WITH EPILEPSY: A CROSS-SECTIONAL STUDY

Original Research

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## ABSTRACT

**Background:** Migraine and epilepsy are prevalent neurological disorders that often coexist, potentially due to shared pathophysiological mechanisms such as cortical hyperexcitability and neurotransmitter imbalances. Migraine headaches significantly impact quality of life and may contribute to the disease burden in epilepsy patients. Despite growing evidence of their association, the frequency of migraines in epilepsy patients remains underexplored in many populations. Identifying the prevalence of migraines among epilepsy patients is crucial for improving clinical management and optimizing treatment strategies.

**Objective:** To determine the frequency of migraine headaches in patients with epilepsy.

**Method:** This prospective observational cross-sectional study was conducted at Pakistan Emirates Military Hospital from February 2024 to October 2024. A total of 385 patients diagnosed with epilepsy were included using simple random sampling. Patients aged 18 years or older, diagnosed with epilepsy based on clinical and diagnostic criteria, and providing informed consent were eligible. Those with other neurological disorders, psychiatric conditions, or chronic pain syndromes were excluded. Data on demographics, seizure characteristics, and migraine symptoms were collected using a structured questionnaire and confirmed through clinical evaluation based on the International Classification of Headache Disorders (ICHD-3) criteria. Statistical analysis was performed using SPSS version 26.0. Descriptive statistics, chi-square tests, and cross-tabulations were used to analyze associations between epilepsy characteristics and migraine prevalence.

**Results:** Out of 385 patients, 234 (60.77%) were male and 151 (39.22%) were female, with a mean age of  $45.41 \pm 1.14$  years. Migraine was reported in 258 (67.01%) patients. Among them, 162 (62.8%) had episodic migraines, while 96 (37.2%) experienced chronic migraines. Generalized epilepsy was more strongly associated with migraines, with 173 (74.9%) cases compared to 85 (55.8%) in focal epilepsy. Gender differences in migraine prevalence were not statistically significant ( $p > 0.05$ ). Patients on polytherapy reported a higher frequency of migraines than those on monotherapy.

**Conclusion:** Migraine headaches are highly prevalent among epilepsy patients, particularly those with generalized epilepsy. The findings emphasize the need for routine headache screening in epilepsy patients to ensure timely diagnosis and appropriate management. Future research should explore targeted treatment strategies addressing both conditions simultaneously.

**Keywords:** Antiepileptic drugs, Comorbidity, Cross-sectional study, Epilepsy, Headache, Migraine, Prevalence

## INTRODUCTION

Migraine headaches and epilepsy are two prevalent neurological disorders that frequently affect individuals across various age groups. While traditionally considered distinct conditions, emerging research suggests a notable association between the two. Epilepsy is a chronic disorder of the central nervous system, characterized by recurrent, unprovoked seizures, affecting approximately 1% of the global population (1). Migraine, on the other hand, is a primary headache disorder that manifests as severe, pulsating headaches often accompanied by nausea, vomiting, and heightened sensitivity to light and sound. With an estimated global prevalence of 12-15%, migraines impose a substantial burden on affected individuals (2). The overlapping occurrence of these conditions has garnered increasing attention in clinical and research domains, as studies indicate that patients with epilepsy may be at a heightened risk of experiencing migraines compared to the general population (3).

The interplay between epilepsy and migraine extends beyond mere coincidence, with evidence suggesting that shared neurophysiological mechanisms may contribute to their co-occurrence. Alterations in cortical excitability, neurotransmitter imbalances, and genetic predispositions have been proposed as potential links between these disorders (5). Additionally, the type of epilepsy, patient age, and the medications used to manage seizures may influence the likelihood of developing migraines (4). Antiepileptic drugs (AEDs), a mainstay of epilepsy treatment, have been shown to exert varying effects on migraine frequency and severity, with some demonstrating a protective role while others potentially exacerbating migraine occurrence (6,7). Moreover, certain epilepsy subtypes, including focal and generalized epilepsy, have been associated with an increased risk of migraines, suggesting that underlying seizure pathology may play a role in migraine susceptibility (8).

Despite growing recognition of the comorbidity between epilepsy and migraine, gaps remain in understanding the precise nature of their relationship, particularly regarding the frequency and contributing factors of migraines in epilepsy patients. A deeper exploration of this association is crucial for optimizing patient care, refining treatment strategies, and mitigating the overall disease burden. This study aims to investigate the frequency of migraine headaches in individuals with epilepsy, synthesizing existing literature to elucidate potential mechanisms underlying this co-occurrence. By integrating current research, this review seeks to enhance clinical understanding and inform evidence-based management approaches for patients experiencing both epilepsy and migraine.

## METHODS

This study was a prospective observational investigation with a cross-sectional design, conducted to examine the frequency of migraine headaches in patients diagnosed with epilepsy. Data were collected at a single point in time, allowing for an assessment of migraine prevalence within the epilepsy patient population. The study was carried out at Pakistan Emirates Military Hospital, a tertiary care center providing specialized healthcare services to military personnel and their families. The research spanned from February 2024 to October 2024, ensuring an adequate sample size and comprehensive data collection. Ethical approval was obtained from the Institutional Review Board (IRB) (Approval Reference: [Insert IRB Number]), and all participants provided informed consent before inclusion in the study. Confidentiality and anonymity of patient data were maintained throughout the research process in accordance with ethical guidelines. A total of 385 patients diagnosed with epilepsy were recruited using a simple random sampling technique, ensuring an unbiased representation of the epilepsy population. Inclusion criteria required participants to be aged 18 years or older, diagnosed with epilepsy based on established clinical and diagnostic criteria, and willing to provide informed consent. Patients with any form of epilepsy, including focal or generalized seizures, and those receiving any type of antiepileptic drug (AED) therapy, were eligible. Exclusion criteria were defined to minimize confounding variables, excluding individuals with a history of other neurological disorders such as stroke, brain tumors, or multiple sclerosis. Additionally, patients with traumatic brain injury, severe psychiatric disorders (e.g., major depression or psychosis), or conditions potentially interfering with migraine diagnosis, such as chronic pain syndromes, were not included.

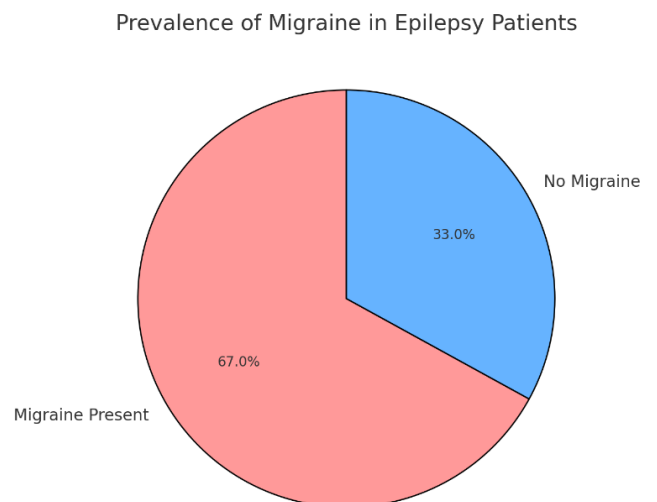
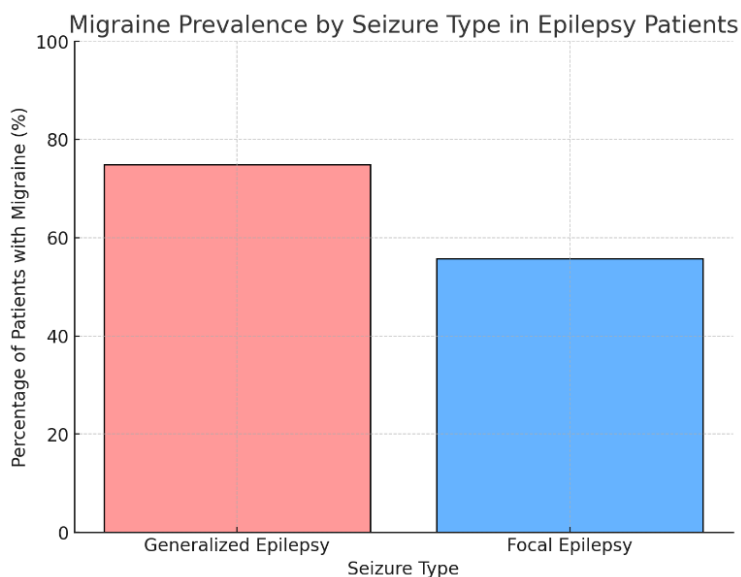
Data were collected using a structured questionnaire administered to each participant. The questionnaire covered demographic details (age, gender, medical history), seizure history, and headache characteristics. To determine migraine prevalence, the International Classification of Headache Disorders (ICHD-3) criteria were applied. Participants were asked about headache frequency, duration, and

intensity, along with associated symptoms including nausea, vomiting, photophobia, and phonophobia. Clinical assessments were conducted by a trained neurologist to confirm migraine diagnoses based on ICHD-3 guidelines. Additionally, patients' medical records were reviewed to verify epilepsy diagnoses, seizure types, frequency, and AED regimens, ensuring the accuracy of clinical data. Data analysis was performed using SPSS version 26.0. Descriptive statistics were applied to determine the frequency, percentage, and mean values of key variables such as age, gender, and migraine prevalence among epilepsy patients. Associations between categorical variables, including seizure type, age, and gender, with migraine occurrence, were analyzed using cross-tabulation and chi-square tests. Findings were presented in tables and graphs to facilitate interpretation. The methodological approach ensured rigorous data collection and analysis, contributing to a comprehensive understanding of the relationship between epilepsy and migraine.

## RESULTS

A total of 385 patients diagnosed with epilepsy were included in the study. The mean age of participants was  $45.41 \pm 1.14$  years, ranging from 18 to 80 years. The majority were male, accounting for 234 (60.77%) of the cohort, while 151 (39.22%) were female. The epilepsy classification indicated that 231 (60.0%) patients had generalized epilepsy, including tonic-clonic and absence seizures, whereas 154 (40.0%) had focal epilepsy, comprising simple partial and complex partial seizures. The frequency of seizures varied among participants, with 130 (33.77%) experiencing seizures less than once per month and 255 (66.23%) experiencing more frequent seizures, some occurring multiple times per week. Migraine prevalence among epilepsy patients was notably high, with 258 (67.01%) individuals reporting a history of migraine headaches. Among them, 162 (62.8%) experienced episodic migraines, defined as migraine attacks occurring fewer than 15 days per month, while 96 (37.2%) had chronic migraines, characterized by headaches occurring more than 15 days per month. Regarding migraine symptoms, 225 (87.2%) reported nausea or vomiting, 198 (76.7%) experienced photophobia, and 180 (69.8%) had phonophobia. Auras, including visual disturbances or sensory changes preceding the headache, were noted in 52 (20.2%) cases.

Gender-based differences in migraine prevalence were minimal, with 160 (68.38%) male patients and 98 (64.90%) female patients reporting a history of migraines. The difference was not statistically significant ( $p > 0.05$ ). However, epilepsy type appeared to influence migraine occurrence, as 173 (74.9%) of patients with generalized epilepsy reported migraines compared to 85 (55.8%) of those with focal epilepsy, suggesting a stronger association between migraines and generalized epilepsy. The study also explored the influence of antiepileptic drug (AED) therapy on migraine occurrence. Of the total cohort, 220 (57.1%) patients were receiving monotherapy with a single AED, while 165 (42.9%) were on polytherapy with multiple AEDs. Patients on monotherapy, particularly those prescribed levetiracetam, reported fewer migraine episodes compared to those receiving polytherapy, where drug interactions may contribute to an increased migraine frequency.



## DISCUSSION

The findings of this study indicate a significant comorbidity between epilepsy and migraine, with a notably high prevalence of migraines among epilepsy patients. The reported migraine prevalence of 67.01% is substantially higher than the general population's estimated prevalence of 12-15% (1). This aligns with prior research, which has consistently demonstrated an increased likelihood of migraine in individuals with epilepsy compared to non-epileptic individuals (3). The higher prevalence of migraine in epilepsy patients suggests a possible shared pathophysiological basis, with both conditions potentially linked to alterations in cortical excitability, neurotransmitter imbalances, and genetic predispositions (8). The type of epilepsy appeared to influence migraine prevalence, as 74.9% of patients with generalized epilepsy reported experiencing migraines, compared to 55.8% of those with focal epilepsy. This suggests that generalized epilepsy may be more strongly associated with migraine occurrence, possibly due to a greater degree of cortical involvement and widespread neuronal excitability, which are implicated in both seizure activity and migraine pathogenesis (7). The findings are consistent with previous research, which has suggested that tonic-clonic seizures, a common feature of generalized epilepsy, may have a stronger association with migraine compared to focal seizures (8).

Gender differences in migraine prevalence were observed, but the slightly higher rate in male patients (68.38%) compared to female patients (64.90%) did not reach statistical significance. This contrasts with the general population, where migraine is more prevalent among females, particularly during reproductive years, likely due to hormonal influences (9). The absence of a significant gender-based difference in this study may reflect the distinct neurophysiological mechanisms underlying migraine in epilepsy patients compared to those in the general population. The relationship between antiepileptic drug (AED) therapy and migraine occurrence was another important aspect of this study. Patients on polytherapy reported a higher frequency of migraines than those on monotherapy, indicating that certain AEDs or drug interactions might contribute to migraine exacerbation (11). Levetiracetam, a commonly prescribed AED, appeared to have a neutral or protective effect on migraine frequency, while other AEDs, such as valproate and topiramate, are known for their dual role in seizure control and migraine prevention (12,13). However, the impact of AEDs on migraine occurrence may be influenced by multiple factors, including individual patient susceptibility, seizure type, and underlying neurophysiological conditions.

The study also highlighted that episodic migraines were more common than chronic migraines in epilepsy patients, with 62.8% experiencing episodic migraines and 37.2% reporting chronic migraines. Chronic migraines, defined as occurring more than 15 days per month, are associated with greater disability and a higher risk of comorbid psychiatric conditions such as depression and anxiety, which can further complicate epilepsy management (14,15). Given this association, comprehensive treatment strategies incorporating both seizure control and migraine prophylaxis may be necessary for patients with frequent migraine episodes (16). Despite its strengths, including a well-defined sample and standardized diagnostic criteria, this study has certain limitations. The cross-sectional design prevents the determination of causal relationships between epilepsy and migraine, necessitating longitudinal studies to explore the temporal association and predictive factors for migraine development in epilepsy patients (17). Additionally, reliance on self-reported migraine data introduces the possibility of recall bias, and further validation through objective clinical assessments or imaging studies could strengthen the findings (18).

Future research should focus on exploring the long-term effects of AED therapy on migraine frequency, identifying potential biomarkers for migraine susceptibility in epilepsy patients, and investigating targeted treatment approaches that address both conditions simultaneously. Understanding the underlying mechanisms linking epilepsy and migraine could lead to improved management strategies and better quality of life for affected individuals.

## CONCLUSION

The findings of this study highlight a strong association between epilepsy and migraine, with a notably high prevalence of migraine headaches among epilepsy patients, particularly those with generalized epilepsy. This comorbidity underscores the need for increased clinical awareness and comprehensive management strategies that address both conditions concurrently. Understanding the interplay between epilepsy and migraine is essential for optimizing treatment approaches, minimizing the burden of symptoms, and improving the overall quality of life for affected individuals. Future research should focus on refining therapeutic interventions and exploring the underlying mechanisms that contribute to this significant neurological overlap.

## Author Contribution

Author	Contribution
Tayba Zain*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Khurram Haq Nawaz	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Shaher Bano	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Ayesha Zubair	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Maham Syed	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Munawar Khan	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

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