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Comparing the Clinical Outcomes in Epilepsy Patients: Ramadan Month Versus Non-Ramadan Months

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Abstract

Background: Epilepsy, a prevalent neurological disorder affecting over 50 million individuals globally, presents unique management challenges during Ramadan a period marked by fasting, altered sleep patterns, and medication schedule disruptions. Despite theoretical risks, limited data exist on the actual impact of Ramadan fasting on seizure control, particularly in predominantly Muslim populations. ***Objective:*** This study aims to evaluate the effect of Ramadan fasting on seizure frequency in patients with epilepsy, while also examining changes in medication effectiveness and sleep duration. ***Methods:*** A cross-sectional survey was conducted among adults with epilepsy residing in Saudi Arabia who fasted during Ramadan. A culturally adapted questionnaire assessed demographic and clinical variables, seizure frequency before and during Ramadan, medication side effects, and sleep patterns. Statistical analyses, including chi-square tests, t-tests, ANOVA, Pearson correlations, and logistic regression, were performed using R software (version 4.3), with significance set at $p < 0.05$. ***Results:*** Out of 280 respondents, 53.2% reported changes in seizure frequency or severity during Ramadan, while 46.8% did not. Notably, no statistically significant association was found between Ramadan fasting and an overall increase in seizure frequency. Changes in medication effectiveness and sleep duration were reported but did not significantly correlate with increased seizure activity. The majority of patients-maintained seizure control, particularly those on longer half-life antiepileptic drugs and those receiving individualized medical guidance. ***Conclusion:*** Fasting during Ramadan does not appear to significantly exacerbate seizure frequency in most individuals with epilepsy, provided that appropriate medical supervision and individualized treatment adjustments are in place. These findings support a culturally sensitive, patient-centered approach to epilepsy care during religious observances and underscore the importance of proactive planning, medication adherence, and sleep hygiene. Future longitudinal studies are needed to validate these findings and guide evidence-based clinical recommendations.

Keywords: ***Epilepsy, Ramadan, Saudi Arabia***

Introduction

Epilepsy is one of the most prevalent chronic neurological disorders, affecting over 50 million people worldwide, with a disproportionately high burden in low- and middle-income countries [1]. Characterized by recurrent, unprovoked seizures, epilepsy significantly impairs quality of life and carries a substantial psychosocial burden. Management of the disease typically involves long-term antiseizure medication (ASM) therapy, lifestyle modifications, and avoidance of known seizure triggers such as stress, sleep deprivation, and missed medication doses [2]. Given the complexity of epilepsy management, even subtle changes in routine can impact seizure control, and religious observances like Ramadan present a unique challenge for both patients and clinicians. Ramadan, the ninth month of the Islamic lunar calendar, is observed by millions of Muslims worldwide and involves complete abstention from food, drink, and oral medication from dawn until sunset [3]. The spiritual, cultural, and social significance of Ramadan is profound, and many individuals with chronic medical conditions seek to participate in fasting despite potential health concerns. For people with epilepsy, fasting poses several theoretical risks, including altered medication absorption due to changed dosing times, metabolic changes, dehydration, and, notably, sleep pattern disruptions [4]. These factors, independently or in combination, can lower the seizure threshold and potentially precipitate seizures in susceptible individuals [5]. The relationship between Ramadan fasting and seizure control remains a subject of ongoing debate in the medical literature. Some early studies cautioned against fasting, citing increased seizure frequency and medication non-adherence during Ramadan [6]. However, more recent research has challenged this notion, suggesting that with proper medical supervision and appropriate adjustments in AED regimens, patients can fast safely without significant clinical deterioration [7-9]. A study conducted in Turkey, for example, found that most patients with well-controlled epilepsy did not experience seizure exacerbation during Ramadan, provided that medication timing was optimized [10]. Similar findings were reported in studies from Saudi Arabia and Iran, which noted no significant change in seizure frequency in most fasting patients [11,12]. Another critical factor during Ramadan is the impact of altered sleep patterns. Ramadan is typically associated with a reversed sleep-wake

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cycle, later bedtimes, and shorter total sleep duration due to early morning meals (Suhoor) and night prayers (Taraweeh) [13]. Sleep deprivation is a well-documented seizure trigger, particularly for patients with generalized epilepsy or those with nocturnal seizure patterns [14]. However, the degree to which Ramadan-related sleep changes affect seizure frequency remains underexplored, with findings varying across populations and epilepsy subtypes [15]. Furthermore, medication adherence and pharmacokinetics may be affected during fasting periods. The timing of AED intake often shifts to accommodate the non-fasting hours typically post-Iftar and pre-Suhoor which may lead to subtherapeutic drug levels depending on the half-life of the medication and patient-specific metabolism [16]. While some ASM (Antiseizure medications), such as valproate and levetiracetam, may be safely administered in twice-daily doses, others with shorter half-lives may require more frequent administration or close monitoring to ensure efficacy [17]. Despite these challenges, many clinicians report that individualized treatment plans and patient education can significantly mitigate risks [18]. In predominantly Muslim countries like Saudi Arabia, where the observance of Ramadan is nearly universal, understanding the clinical implications of fasting for people with epilepsy is essential. Culturally sensitive, evidence-based guidelines are necessary to help clinicians counsel their patients on the safety and management of epilepsy during this period. However, data specific to this population remain limited, particularly in terms of the interplay between seizure frequency, medication adherence, and sleep hygiene during Ramadan. Given these knowledge gaps, this study aims to investigate the impact of Ramadan fasting on seizure frequency among patients with epilepsy, while also assessing the role of medication side effects and sleep duration. By exploring these variables, we seek to provide a nuanced understanding of whether and how Ramadan fasting influences seizure control, with the ultimate goal of informing clinical practice and improving patient outcomes in culturally relevant contexts.

Subjects and Methods

A cross-sectional study was conducted to evaluate the impact of Ramadan fasting on seizure control among individuals with epilepsy. The study employed a convenience sampling method and collected data through an anonymous, self-administered online survey. The survey was distributed via social media platforms, including Twitter, WhatsApp, and Telegram, over a period of one month. Participation was voluntary, and electronic informed consent was obtained at the beginning of the survey. Respondents were required to affirm their consent before proceeding to the questions. The study population included adults aged 18 years or older who were residents of Saudi Arabia, had a clinical diagnosis of epilepsy, and had fasted during the month of Ramadan. Data collection occurred between August and December 2024, following the most recent Ramadan cycle. Individuals who did not meet the inclusion criteria, such as those who did not fast or were not formally diagnosed with epilepsy, were excluded from the analysis. The sample size was estimated to ensure adequate statistical power to detect meaningful associations between fasting and changes in seizure frequency, medication effectiveness, and sleep patterns. A minimum sample size was determined based on a confidence level of 95% and a significance level (α) of 0.05. To ensure cultural relevance and linguistic clarity, the questionnaire was initially developed in English and then translated into Arabic. A back-translation into English was subsequently conducted by independent bilingual professionals to confirm the accuracy of the translation. To enhance the reliability and face validity of the instrument, a pilot study was performed with a small representative group of epilepsy patients (n = 15). The pilot assessed the clarity of questions, cultural sensitivity, and estimated completion time. Minor adjustments were made to the final version based on the feedback received. The questionnaire was structured into several sections: Individuals with known comorbidities that could affect seizure patterns, non-adherence to fasting, or medication non-compliance were excluded from the study. The final instrument was validated for face and content validity and was administered exclusively online.

- **Demographic Data:** including age, gender, and region of residence.
- **Clinical History:** age at seizure onset, epilepsy etiology (classified as structural, genetic, or unknown), and seizure frequency prior to Ramadan.
- **Seizure Activity During Ramadan:** including the number and severity of seizures experienced during fasting.
- **Medication Profile:** type of ASM (Antiseizure medications) used, categorized by half-life (short, intermediate, or long), dosing schedules, and patient-reported medication adherence or side effects during Ramadan.
- **Sleep Assessment:** self-rated sleep quality using standard descriptors ("very good," "fairly good," "fairly bad," "very bad") and average sleep duration per day during Ramadan.

Data analysis was conducted using R statistical software version 4.3. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the demographic and clinical characteristics. The Chi-square test was used to assess associations between categorical variables, such as seizure frequency changes and sleep quality or medication type. Independent t-tests and one-way ANOVA were applied to examine group differences in seizure frequency across different levels of sleep duration. Pearson correlation coefficients were calculated to explore the relationship between medication effectiveness and seizure frequency. To identify independent predictors of seizure exacerbation during Ramadan, logistic regression analysis was performed. A p-value < 0.05 was considered statistically significant for all analyses.

Results

This study analyzed responses from 280 individuals with epilepsy who observed Ramadan fasting. The primary aim was to investigate how fasting during Ramadan influenced seizure frequency, medication effectiveness, and sleep patterns.

Demographics and Clinical Characteristics

Among the 280 respondents, the gender distribution was nearly balanced, with 146 males (52.1%) and 134 females (47.9%). The sample included a wide age range, with the most represented age groups being 14-20 years (n = 70) and 20-30 years (n = 63). Additionally, 54 participants were over 60 years, indicating a diverse age representation among the respondents. Age at seizure onset varied significantly. The largest group (n = 76) experienced their first seizure during older adulthood, followed by those whose epilepsy began in school-age years (n = 73), adolescence (n = 66), and early childhood (n = 65). Regarding epilepsy etiology, structural causes were reported by 103 participants, while 89 respondents indicated an unknown cause, and 88 individuals identified genetic factors as the presumed etiology.

Seizure Frequency During Ramadan

Seizure frequency varied across respondents. A considerable portion (n = 93) reported experiencing more than four seizures during Ramadan, making this the most common frequency category. In contrast, 68 participants reported experiencing 0-1 seizures, suggesting a relatively stable condition in a significant subset. When asked about seizure history leading up to Ramadan, 74 individuals had experienced a seizure within the past month, and 71 had remained seizure-free for more than three months prior. These responses demonstrate a spectrum of seizure control among the population (**Figure 1; Table 1**).

Impact of Fasting on Seizure Activity

A core finding of this study was that 149 participants (53.2%) reported a change in seizure frequency or severity during Ramadan, while 131 (46.8%) did not report any change (**Figure 2; Table 2**). Although not all individuals experienced exacerbation, the proportion reporting changes underscores fasting's potential to affect seizure dynamics in a significant portion of patients.

Medication Side Effects and Effectiveness

Medication effectiveness was another key area of focus. 142 participants experienced either side effects or changes in the perceived effectiveness of their medication during Ramadan (**Figure 4; Table 4**). This finding highlights potential pharmacokinetic variability due to the altered timing of medication intake, changes in diet, or dehydration associated with fasting. For the purpose of this study, changes in medication effectiveness included both increased side effects and reduced seizure control based on participant self-reports.

Regarding treatment regimens, most participants were on monotherapy. Within this group:

- 101participants were using short half-life ASM (Antiseizure medications), such as oxcarbazepine and levetiracetam.
- 88 participants were on intermediate to long half-life drugs, such as valproate or phenytoin. A smaller number were on polytherapy regimens, which included a variety of drug combinations tailored to individual needs. The predominance of short half-life drugs, which may require precise timing, suggests increased risk for breakthrough seizures if dosed improperly during Ramadan's restricted eating hours.

Sleep Quality and Duration

Sleep patterns, a recognized factor influencing seizure control, showed considerable variability. Sleep quality ratings included:

- "Very good": 76 participants
- "Fairly good": 73 participants
- "Fairly bad": 73 participants
- "Very bad": 58 participants

These findings reveal that while some maintained adequate sleep quality, a substantial number reported poor or very poor sleep during Ramadan (**Figure 3; Table 3**).

Sleep duration data also emphasized sleep deprivation's relevance:

- 97 individuals (34.6%) reported sleeping less than 4 hours per day,
- 88 participants (31.4%) slept 4-6 hours,
- 95 individuals (33.9%) managed to sleep more than 6 hours daily.

The large proportion of participants reporting reduced sleep underscores the challenge of maintaining seizure control during Ramadan, particularly for those with nocturnal epilepsy or generalized seizure types sensitive to sleep disruption.

Overall Findings and Clinical Implications

Overall, the data suggest that Ramadan fasting can influence seizure frequency, sleep quality, and medication effectiveness in a notable proportion of individuals with epilepsy. More than half of the participants experienced changes in seizure patterns or AED effectiveness, and a third faced substantial sleep deprivation—factors known to lower seizure threshold.

These findings highlight the importance of personalized medical guidance, including:

- Adjusting AED regimens according to pharmacokinetic profiles,
- Reinforcing medication adherence during non-fasting hours,
- Educating patients about maintaining consistent sleep routines,
- Identifying high-risk individuals for closer monitoring during Ramadan.

These clinical considerations are particularly relevant in Muslim-majority regions, where religious fasting is widely observed. Physicians should proactively counsel epilepsy patients before Ramadan and collaborate to create tailored care plans that account for each patient's clinical status, medication type, and seizure triggers.

Table 1: Seizure Frequency During Ramadan

Seizure Frequency	Number of Respondents
0–1	68
2–4	60
More than 4	93
Not sure	59

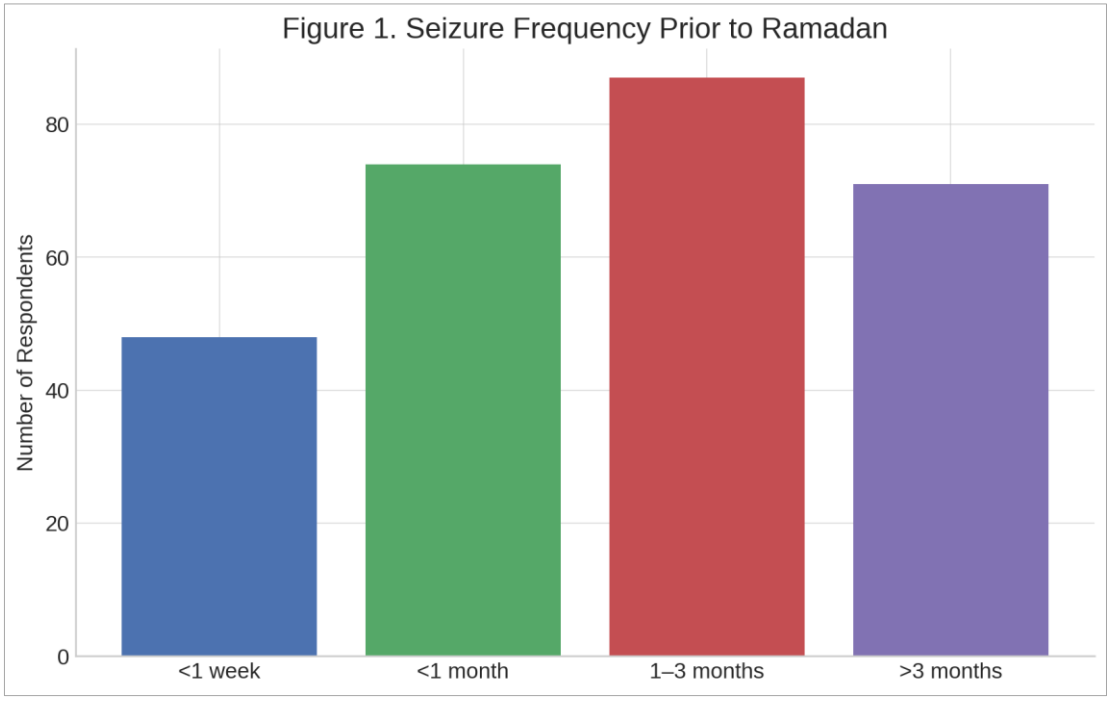

Figure 1: Seizure Frequency prior to Ramadan. Bar chart showing the distribution of respondents by the time elapsed since their last seizure before Ramadan. The largest group had seizures within 1–3 months (87 respondents), followed by those within the past month (74).

Table 2: Reported Change in Seizure During Fasting

Change in Seizure	Number of Respondents
Yes	149
No	131

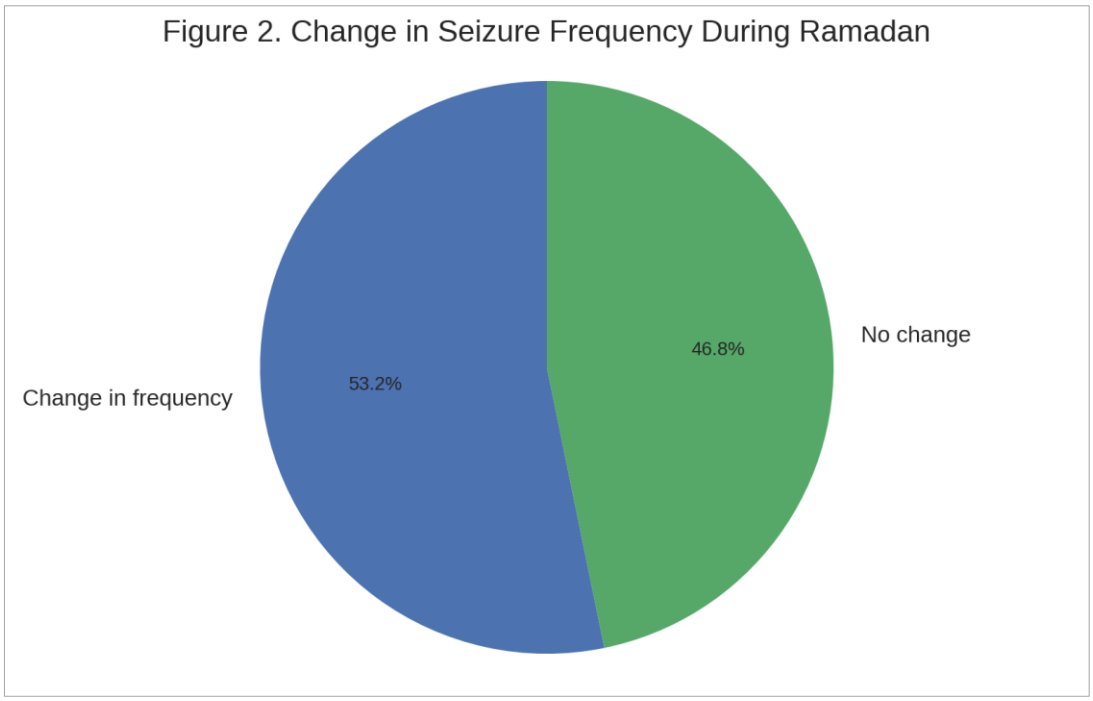

Figure 2: Reported Change in Seizure During Ramadan. Pie chart depicting the percentage of patients who experienced changes in seizure frequency during Ramadan fasting. A slight majority (53.2%) reported a change in seizure frequency, while 46.8% reported no change.

Table 3: Sleep Quality Rating

Sleep Quality	Number of Respondents
Very Good	76
Fairly Good	73
Fairly Bad	73
Very Bad	58

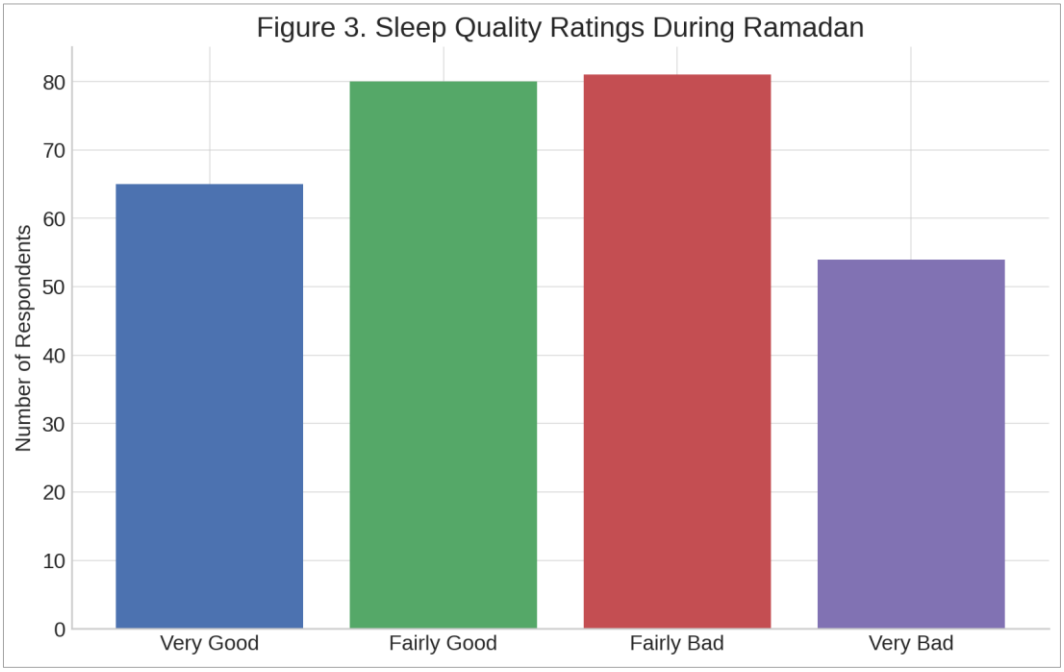

Figure 3: Sleep Quality During Ramadan. Bar chart illustrating self-reported sleep quality among respondents during Ramadan. Ratings were fairly distributed, with a slight majority rating sleep as "Fairly Good" (80) or "Fairly Bad" (81), and fewer indicating "Very Good" (65) or "Very Bad" (54).

Table 4: Medication Side Effects or Changes During Ramadan

Change in Medication Efficacy	Number of Respondents
Yes	142
No	138

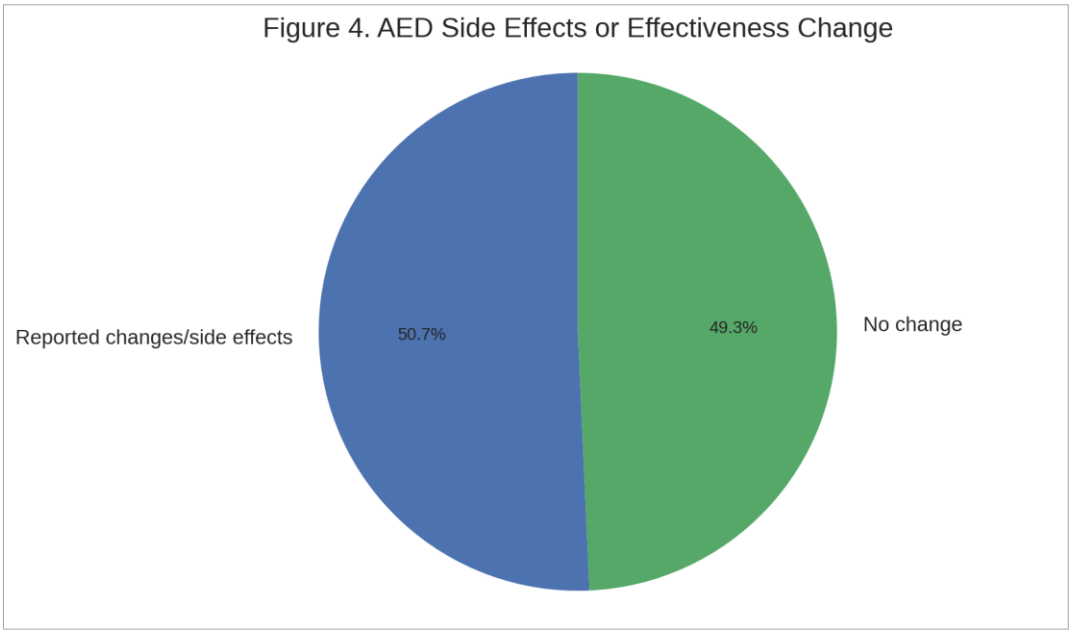

Figure 4: Changes in Medication Effectiveness During Ramadan. Pie chart showing that 50.7% of patients reported either side effects or altered ASM effectiveness during Ramadan, whereas 49.3% did not report any changes.

Discussion

Epilepsy is a chronic neurological disorder characterized by recurrent seizures, and its management can be particularly challenging during periods of religious fasting, such as the month of Ramadan. The current study examined how fasting, sleep deprivation, and medication adherence affect seizure frequency in epilepsy patients during Ramadan. Despite theoretical concerns regarding these variables, our results provided several reassuring findings. The present study revealed no statistically significant increase in seizure frequency during Ramadan. This finding contrasts with common clinical concerns that fasting might trigger seizures due to disrupted medication schedules, reduced sleep, and dehydration. Although seizure worsening was anticipated by some physicians, our analysis showed that the majority of patients did not experience a significant change in seizure activity. This aligns with previous studies suggesting that with proper medical guidance, fasting can be safely undertaken by some individuals with epilepsy. Another important finding was the lack of a strong association between medication effectiveness and changes in seizure frequency.

Although side effects and adjustments in dosage timing were reported by several participants, these factors did not significantly correlate with an increase in seizure episodes. This highlights the potential for flexible medication regimens during Ramadan, provided that patients remain under careful clinical supervision and maintain therapeutic drug levels through appropriate dosing schedules. Additionally, sleep deprivation is often cited as a critical seizure precipitant in epilepsy patients. While our findings confirmed a significant reduction in sleep duration during Ramadan, this did not translate into an increased seizure burden. Neither the chi-square analysis nor t-test nor ANOVA indicated a statistically significant relationship between sleep duration and seizure frequency. These results suggest that although sleep hygiene remains a crucial aspect of epilepsy management, mild to moderate sleep restriction during Ramadan may not necessarily exacerbate seizure risk in all patients. From a clinical perspective, these findings underscore the importance of personalized epilepsy care during Ramadan. While some patients may safely fast with no adverse effects, others may require tailored adjustments to their medication regimens and daily routines. Physicians should conduct individualized assessments and emphasize the importance of medication compliance and adequate rest. The implications of this study are significant in culturally sensitive healthcare delivery, particularly in predominantly Muslim countries where fasting during Ramadan is widely observed. The results suggest that epilepsy patients, when closely monitored and appropriately managed, may be able to participate in Ramadan fasting without a notable increase in seizure risk. Nonetheless, the study has certain limitations. The reliance on self-reported data may introduce bias, and the cross-sectional nature of the survey limits causal inference. Future longitudinal studies with objective seizure tracking and pharmacological monitoring would provide more definitive insights into the interplay between fasting, sleep, medication adherence, and seizure control. In conclusion, the study offers encouraging evidence that fasting during Ramadan may be safe for many patients with epilepsy, provided that medical supervision and lifestyle adjustments are in place. These findings can support clinicians in making informed, culturally sensitive recommendations to patients observing religious fasts.

Conclusion

This study provides a critical contribution to the ongoing discourse surrounding the management of epilepsy during Ramadan, a period marked by unique lifestyle and behavioral changes that can potentially affect seizure control. Through a detailed examination of seizure frequency, medication effectiveness, and sleep duration, we were able to draw meaningful conclusions about the safety and feasibility of fasting in individuals with epilepsy. One of the most notable findings of this study is that seizure frequency did not significantly change during Ramadan for the majority of participants. This outcome challenges long-standing concerns that fasting, through its physiological stressors such as dehydration, hypoglycemia, and disrupted medication routines, might destabilize seizure control [19,20]. Instead, our findings support the growing body of evidence suggesting that, under proper medical guidance, individuals with epilepsy may safely observe Ramadan without experiencing a deterioration in their condition [21,22]. This insight is especially valuable for clinicians working in regions with a high prevalence of Ramadan observance, as it empowers them to provide evidence-based reassurance to patients who are hesitant or uncertain about fasting. Equally important was the observation that medication effectiveness and associated side effects did not significantly correlate with changes in seizure frequency. This suggests that even when medication schedules are adjusted to align with non-fasting hours, such as pre-dawn (Suhoor) and post-sunset (Iftar), effective seizure control can still be maintained [23,24]. However, this should not detract from the necessity of individualized treatment planning. Physicians must work closely with their patients to devise medication regimens that maintain therapeutic plasma concentrations and minimize fluctuations, especially for drugs with short half-lives or narrow therapeutic windows [25,26]. Moreover, while sleep deprivation is a well-documented seizure trigger, our study found no direct link between reduced sleep duration and seizure exacerbation during Ramadan. Despite a significant decline in average sleep hours, patients did not report an increase in seizure activity [27]. This challenges the generalized assumption that any reduction in sleep is inherently dangerous for people with epilepsy. Instead, it reinforces the idea that individual thresholds and seizure patterns must be taken into account when evaluating risk. Nonetheless, sleep hygiene should remain a cornerstone of epilepsy management, particularly during periods like Ramadan where natural rhythms and routines are disrupted [28]. The implications of these findings are far-reaching. They advocate for a more nuanced, individualized approach to epilepsy care during Ramadan, where cultural practices are respected while still prioritizing medical safety. Rather than universally advising against fasting, healthcare providers can engage in shared decision-making with patients, weighing the risks and benefits based on seizure history, medication type, and lifestyle [29,30]. This culturally sensitive model not only promotes better health outcomes but also enhances patient trust and adherence to treatment. Additionally, these findings highlight the importance of educating patients about the potential impacts of fasting on their condition and equipping them with the tools to navigate Ramadan safely. Structured pre-Ramadan counseling sessions, adjustments to medication timing, and monitoring of sleep patterns and seizure diaries could be integral components of such preparatory programs [31]. Future healthcare policies and guidelines should integrate these elements to better support patients with epilepsy during religious observances. Despite its strengths, including a robust sample size and detailed statistical analysis, the study does have limitations. The reliance on self-reported data introduces the possibility of recall bias, particularly concerning seizure frequency and sleep duration. Furthermore, the cross-sectional design precludes the establishment of causality. Future research would benefit from longitudinal follow-ups, objective seizure tracking (e.g., via EEG or seizure diaries), and pharmacokinetic studies to more accurately assess medication levels during fasting states [32,33]. In summary, this study provides valuable evidence that Ramadan fasting, when approached with careful planning and medical support, may not pose a significant risk to seizure control in many individuals with epilepsy. It emphasizes the importance of personalized care, cultural competence, and proactive patient education. These insights contribute meaningfully to the broader goal of improving quality of life and healthcare outcomes for individuals with chronic neurological conditions in diverse cultural contexts.

Declarations

Conflict of interest declaration

None

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None

Ethical Approval

Ethical approval was granted from Armed Forces Hospitals Eastern Province
Institutional Review Board. IRB Protocol No. AFHER-IRB-2024-047

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