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Original Article

The Impact of Fasting on Migraine in Saudi Arabia 2025

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Abstract

Background: Migraine is a common neurological disorder that may be triggered by lifestyle changes, including fasting during Ramadan. Although many patients report worsening symptoms during fasting, evidence from Saudi Arabia remains limited. This study aimed to evaluate the impact of Ramadan fasting on migraine frequency, severity, and contributing factors among adult patients with migraine. ***Methods:*** A retrospective cross-sectional study was conducted at King Fahad Medical Complex, Dhahran, Saudi Arabia. Medical records of 277 adult migraine patients were reviewed, and additional information was collected via structured telephone interviews. Data were analyzed using SPSS version 28. Descriptive statistics summarized patient demographics and clinical characteristics, while Chi-square and Exact Probability tests assessed associations between fasting-related migraine and clinical variables. A p-value <0.05 was considered significant. ***Results:*** Of 277 participants, 75.1% were female, and 83.4% reported severe migraine (VAS 7–10). During Ramadan, 75.8% (210/277) experienced fasting-related migraines, with 59.0% reporting more than five daily attacks. Most participants managed their attacks by resting (89.5%), while few used medications (5.2%) or broke their fast (4.3%). Factors significantly associated with fasting-related migraine included longer migraine history (p=0.001), higher pain severity (p=0.002), current medication use (p=0.001), prior emergency visits (p=0.017), shorter sleep duration (p=0.016), and poorer sleep quality (p=0.049). Notably, 61.9% reported no change in migraine frequency or severity compared to non-fasting months, while 21.0% experienced worsening and 6.2% noted improvement. ***Conclusion:*** Ramadan fasting significantly influences migraine experiences, with many patients reporting increased attack frequency and severity, particularly those with chronic migraine history, severe baseline pain, or poor sleep. Pre-Ramadan counseling on hydration, sleep hygiene, and medication adjustments is recommended to reduce fasting-related migraine burden.

Keyword: ***fasting, migraine, headache, Ramadan.***

Introduction

Migraine is a common neurological disorder characterized by recurrent headache [1]. and it is a neurovascular condition that affect more than a million individuals globally [2]. which can be influenced by various triggers such as stress, sleep disturbance and dietary habit [3]. fasting, particularly during religious observances such ramadan, has shown that a potential trigger for migraine attack [4-6]. During ramadan, observant muslims fast from down until sunset, abstaining from all food and drink including water [7]. Several physiological changes occur during fasting, such as sleep, dehydration, and metabolic shifts, all of which can affect brain function and potentially lead to migraine episodes [8].

This proposal aims to examine the impact of fasting on migraine frequency, severity, and identify contributing factors affecting migraine control among patients diagnosed with migraine.

Understanding the association between fasting and migraine attacks can help inform dietary guidelines and migraine management strategies, particularly for individuals who fast regularly due to religious observances like Ramadan.

General Objectives

To evaluate the impact of Ramadan fasting on the frequency, duration, and severity of migraine attacks in individuals with migraine

Specific Objectives

- To analyse the impact of sleep disturbances during fasting periods on migraine occurrence
- To compare the impact of fasting on migraine with and without aura
- To compare the migraine frequency during Ramadan vs non-Ramadan months

Methodology

Study Design

This study will be a retrospective cross-sectional chart review study conducted in King Fahad medical complex, Saudi Arabia. All adult patient diagnosed with migraine in KFMMC will be included. All data will be extracted from HIS database system using a customized data collection sheet (attached) and from telephone interview to collect additional information. Verbal Consent will be taking from

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the patient before answering the data collection sheet questions. Commutative data then will be proceed using SPSS.

Study Area/Setting: KFMMC in Dahran.

Study Subjects: Adult patients diagnosed with migraine in KFMMC will be studied.

Inclusion criteria: All adult migraine patients

Exclusion criteria: Pediatric age group diagnosed with migraine.

Sample Size: Sample size is 278 subjects. It was calculated using online Raosoft calculator, keeping 95% confidence level and 5% margin of error (http://www.raosoft.com/samplesize.html).

Sampling Technique: The sampling technique is cluster sampling. All adult patients diagnosed with migraine will be included in the study.

Data Management /instrument and Analysis Plan: All data that will be taken from the data collection sheet will be entered in Microsoft Excel. Then, the data will be imported into Statistical Package for the Social Sciences (SPSS) version 22 for analysis. Numerical variables will be described as mean and standard deviation, while the categorical variables will be described as frequencies and proportions. numerical and categorical variables will then be compared statistically using t-test and Chi-square, respectively. The test will be declared significant if P value < 0.05.

Data Analysis

All collected data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS), version 28 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the bio-demographic and clinical characteristics of the participants. Categorical variables were expressed as frequencies and percentages.

For inferential analysis, the Pearson Chi-square test (χ^2) was used to assess associations between categorical variables, such as the relationship between migraine occurrence during fasting and factors like gender, migraine duration, severity, medication use, emergency visits, and sleep patterns. Where appropriate, especially when the expected cell count was less than 5, the Exact Probability test was applied to ensure statistical validity. A p-value of less than 0.05 was considered statistically significant.

Results

Table 1 presents the bio-demographic characteristics and clinical profile of 277 adult patients diagnosed with migraine at KFMMC, Dahran. The majority of participants were female (208, 75.1%), with males accounting for only 24.9% (69). Regarding the duration of migraine history, nearly half (136, 49.1%) reported experiencing migraines for 1–5 years, while 23.5% (65) had a history of 6–10 years, and 17.3% (48) had been affected for over a decade. A smaller proportion (28, 10.1%) had been diagnosed for less than a year. Exactly, 63.2% (175) of patients reported no preceding symptoms before a migraine episode. The most common aura-related symptoms were visual disturbances (66, 23.8%) and dizziness (54, 19.5%). Less frequently reported symptoms included numbness and ataxia (each 22, 7.9%), dysarthria (11, 4.0%), weakness (9, 3.2%), and others such as nausea (3, 1.1%) and dyspnea (1, 0.4%). As for headache intensity, the vast majority (231, 83.4%) experienced severe migraine pain (VAS score 7–10), while only 12.6% (35) and 4.0% (11) reported moderate (VAS 4–6) and mild (VAS 1–3) pain, respectively. Most participants (225, 81.2%) were currently taking medications for migraine, and a smaller proportion (47, 17.0%) had required emergency room visits or hospital admissions due to migraine attacks. Regarding comorbidities, 220 patients (79.4%) reported no other chronic conditions. However, some reported conditions included diabetes mellitus (22, 7.9%), hypertension (19, 6.9%), hypothyroidism (3, 1.1%), depression (3, 1.1%), and other illnesses (10, 3.6%).

Table 2 illustrates the characteristics and management of migraine among participants during Ramadan fasting. Out of the total 277 participants, 210 individuals (75.8%) reported experiencing migraines specifically during fasting. Among these 210 participants, the majority (124, 59.0%) experienced frequent attacks exceeding five times per day, while 31.9% had 3–5 attacks, and only 9.0% reported 1–2 attacks daily. Regarding the timing of migraine onset during fasting, most participants (152, 72.4%) indicated no specific time of occurrence, while 15.7% experienced migraines early in the fasting period and 11.9% later in the day. Concerning management strategies, resting was the most commonly adopted method (188, 89.5%), whereas a smaller proportion used medications (11, 5.2%) or chose to break the fast (9, 4.3%). Notably, only 1.0% (2 individuals) reported taking no action during attacks. When asked about the timing of their last migraine episode before Ramadan, 47.7% had experienced an attack within a month, 41.5% within the last week, and 10.8% reported no episodes for over a month.

Figure 1 illustrates the reported changes in migraine frequency and severity during fasting compared to non-fasting periods, as well as the number of analgesic use days during Ramadan compared to Sha'ban among the 277 participants. A majority of participants (130, 61.9%) reported no change in the frequency or severity of migraines during fasting. However, 44 individuals (21.0%) experienced increased frequency, and 23 (11.0%) reported increased severity. Interestingly, a smaller group (13, 6.2%) noted a decrease in migraine frequency or severity during fasting. Regarding the number of analgesic use days, most participants (236, 85.2%) indicated that their analgesic use remained the same as in Sha'ban. In contrast, 21 participants (7.6%) reported using more analgesics during Ramadan, while 20 (7.2%) reported using fewer.

Table 3 presents the distribution of sleep duration and perceived sleep quality among migraine patients during Ramadan. The majority of participants (177, 63.9%) reported sleeping between 4 to 6 hours per night, while 86 individuals (31.0%) achieved 7 to 9 hours of sleep. A small percentage reported sleeping less than 4 hours (10, 3.6%), and only 4 participants (1.4%) slept more than 9 hours. Regarding sleep quality, over half of the participants (145, 52.3%) rated their sleep as good, while 36.1% (100) described it as fair. Poor sleep quality was reported by 28 individuals (10.1%), and only 4 participants (1.4%) considered their sleep excellent.

Table 4 highlights the distribution of neurological and associated symptoms reported by participants with and without migraines during fasting. Among those who experienced fasting-related migraines, the most common symptom reported was the absence of any preceding symptoms (131, 62.4%), which was comparable to the group without fasting migraines (44, 65.7%). Visual disturbances were more frequently reported in the fasting migraine group (53, 25.2%) compared to those without migraines during fasting (13, 19.4%). Similarly, dizziness was more common among fasting migraine sufferers (45, 21.4%) than non-sufferers (9, 13.4%). Other neurological symptoms, such as numbness (8.1% vs. 7.5%), ataxia (9.5% vs. 3.0%), and dysarthria (4.8% vs. 1.5%) were also more prevalent among those with fasting-related migraines. Less commonly reported symptoms included weakness, dyspnea,

nausea, and miscellaneous complaints, which occurred at low but slightly higher rates in the fasting group.

Table 5 explores factors associated with experiencing migraines during fasting among the study participants. Significant factors included the duration of migraine history (p = 0.001), with participants experiencing migraines for 6–10 years having the highest rate of migraines during fasting (60 out of 65; 92.3%). Those with less than one year of migraine history were less likely to experience fasting-related migraines (46.4%). Migraine severity, as measured on the Visual Analog Scale (VAS), was also significant (p = 0.002), with 79.2% of participants reporting severe migraines (VAS 7–10) experiencing migraines during fasting, compared to only 36.4% with mild severity. Current use of medications for migraines was strongly associated with fasting migraines (p = 0.001), where 83.1% of those on medication experienced migraines during fasting, versus 44.2% of those not on medication. Participants with a history of emergency room visits or hospital admissions for migraines were more likely to experience migraines during fasting (89.4%, p = 0.017). Regarding sleep, both sleep duration (p = 0.016) and sleep quality (p = 0.049) during Ramadan showed significant associations. Higher migraine rates were observed among those sleeping less than 6 hours per night (80.0% for <4 hours and 80.8% for 4–6 hours) and those reporting poor or fair sleep quality (82.1% and 81.0%, respectively).

Table 1: Bio-demographic and headache data of study participants diagnosed with migraine in KFMMC, Dahran (N=277)

Variables	No	%
Gender		
Male	69	24.9%
Female	208	75.1%
How long have you been experiencing migraines		
< 1 year	28	10.1%
1-5 years	136	49.1%
6-10 years	65	23.5%
> 10 years	48	17.3%
Symptoms might precede a headache		
None	175	63.2%
Visual disturbance	66	23.8%
Dizziness	54	19.5%
Numbness	22	7.9%
Ataxia	22	7.9%
Dysarthria	11	4.0%
Weakness	9	3.2%
Others	5	1.8%
Nuases	3	1.1%
Dyspnea	1	.4%
Severity of migraines on VAS		
1 - 3 (Mild)	11	4.0%
4 - 6 (Moderate)	35	12.6%
7 - 10 (Severe)	231	83.4%
Are you currently on any medications for migraines		
Yes	225	81.2%
No	52	18.8%
Emergency room visits or hospital admissions for migraines		
Yes	47	17.0%
No	230	83.0%
Other co-morbidities		
None	220	79.4%
DM	22	7.9%
HTN	19	6.9%
Hypothyroidism	3	1.1%
Depression	3	1.1%
Others	10	3.6%

Table 2: Migraine Characteristics and Management Among Participants During Ramadan (N = 277)

Data	No	%
Experienced migraines specifically during fasting		
Yes	210	75.8%
No	67	24.2%
Frequency of attacks per day during Ramadan (n=210)		
1-2 times	19	9.0%
3-5 times	67	31.9%
> 5 times	124	59.0%

When do your migraines typically occur while fasting (n=210)		
Early in the fasting period (morning)	33	15.7%
Later in the fasting period (afternoon/evening)	25	11.9%
No specific time	152	72.4%
How do you typically manage your migraines during fasting (n=210)		
None	2	1.0%
Have rest	188	89.5%
Medications	11	5.2%
Breaking the fast	9	4.3%
When was your last episode before Ramadan? (n=277)		
Within a week	115	41.5%
Within a month	132	47.7%
More than a month ago	30	10.8%

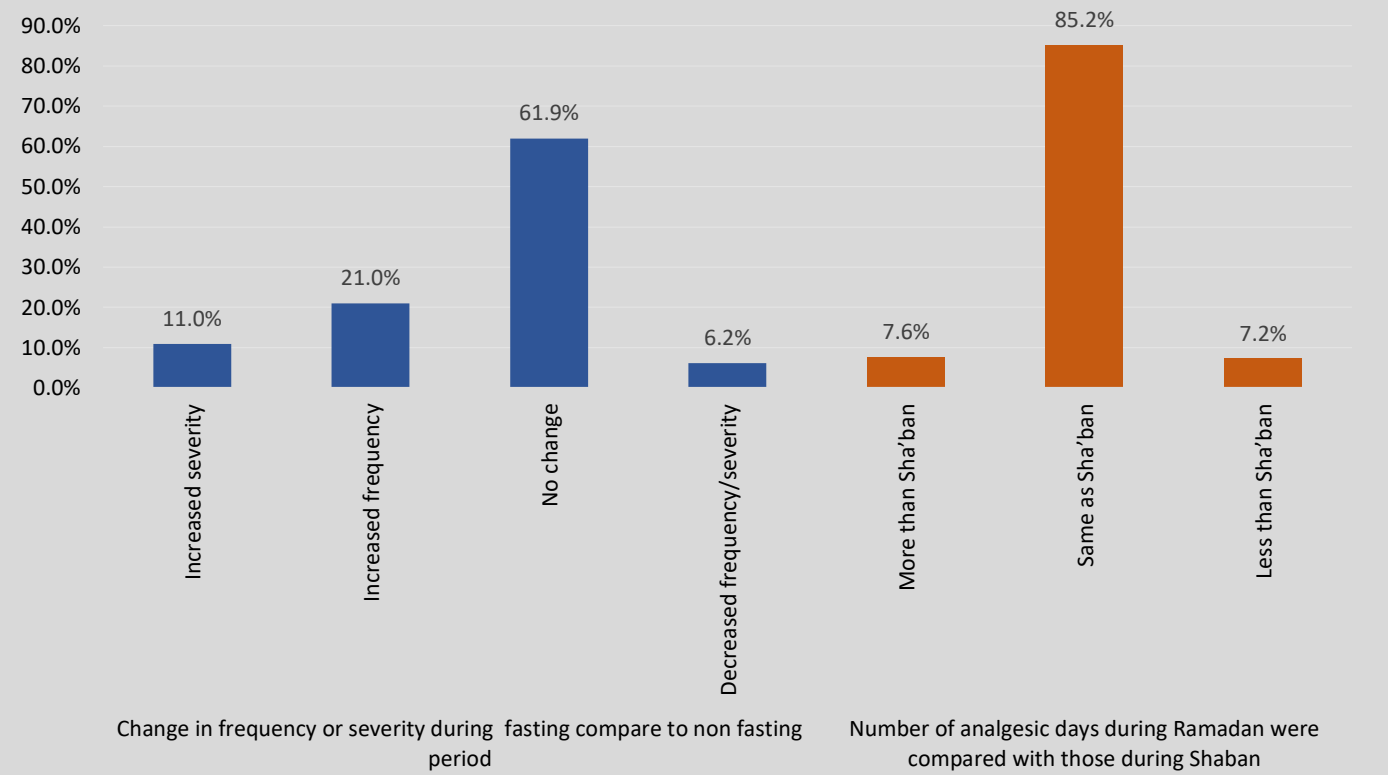

Figure 1: Figure 1. Effect of Fasting on Migraine Frequency, Severity, and Analgesic Use During Ramadan Compared to Non-Fasting Periods (N = 277)

Table 3: Sleep Duration and Sleep Quality Among Participants During Ramadan (N = 277)

Sleep	**No**	**%**
Sleep duration in hours during Ramadan		
< 4 hours	10	3.6%
4-6 hours	177	63.9%
7-9 hours	86	31.0%
> 9 hours	4	1.4%
Sleep quality during Ramadan		
Poor	28	10.1%
Fair	100	36.1%
Good	145	52.3%
Excellent	4	1.4%

Table 4: Distribution of Neurological and Associated Symptoms Among Participants with and Without Fasting-Related Migraines

Symptoms	**Experienced migraines specifically during fasting**			
	Yes		**No**	
	No	**%**	**No**	**%**
None	131	62.4%	44	65.7%
Visual disturbance	53	25.2%	13	19.4%
Dizziness	45	21.4%	9	13.4%

Numbness	17	8.1%	5	7.5%
Weakness	8	3.8%	1	1.5%
Ataxia	20	9.5%	2	3.0%
Dysarthria	10	4.8%	1	1.5%
Dyspnea	1	.5%	0	0.0%
Nausea	3	1.4%	0	0.0%
Others	4	1.9%	1	1.5%

Table 5: Factors associated with experiencing migraines during fasting Among Study participants

Factors	Experienced migraines specifically during fasting				p-value
	Yes		No		
	No	%	No	%	
Gender					.454
Male	50	72.5%	19	27.5%	
Female	160	76.9%	48	23.1%	
Other co-morbidities					.674
Yes	42	73.7%	15	26.3%	
No	168	76.4%	52	23.6%	
How long have you been experiencing migraines					.001*
< 1 year	13	46.4%	15	53.6%	
1-5 years	100	73.5%	36	26.5%	
6-10 years	60	92.3%	5	7.7%	
> 10 years	37	77.1%	11	22.9%	
Severity of migraines on VAS					.002*
1 - 3 (Mild)	4	36.4%	7	63.6%	
4 - 6 (Moderate)	23	65.7%	12	34.3%	
7 - 10 (Severe)	183	79.2%	48	20.8%	
Are you currently on any medications for migraines?					.001*
Yes	187	83.1%	38	16.9%	
No	23	44.2%	29	55.8%	
Emergency room visits or hospital admissions for migraines					.017*
Yes	42	89.4%	5	10.6%	
No	168	73.0%	62	27.0%	
Sleep duration in hours during Ramadan					.016*^
< 4 hours	8	80.0%	2	20.0%	
4-6 hours	143	80.8%	34	19.2%	
7-9 hours	55	64.0%	31	36.0%	
> 9 hours	4	100.0%	0	0.0%	
Sleep quality during Ramadan					.049*^
Poor	23	82.1%	5	17.9%	
Fair	81	81.0%	19	19.0%	
Good	104	71.7%	41	28.3%	
Excellent	2	50.0%	2	50.0%	

*P: Pearson X^2 test ^: Exact Probability test; * P < 0.05 (significant)*

Discussion

The current study explored the impact of Ramadan fasting on migraine characteristics among adult patients in Saudi Arabia. Generally, the findings reveal that while a majority of participants did not perceive significant changes in their migraine patterns during fasting, a considerable subgroup experienced exacerbation in attack frequency and severity, indicating the heterogeneous nature of migraine responses to fasting. This matches the broader literature indicating that fasting may act as a trigger in susceptible individuals due to metabolic shifts, dehydration, and sleep disruption [9-11]. Most participants did not report a consistent time for the onset of migraine during fasting hours, suggesting that triggers may be cumulative or vary across individuals. In managing their symptoms, the vast majority relied on conservative measures such as resting, while only a small proportion used medications or chose to break their fast to relieve pain. This may reflect cultural or religious motivations to continue fasting despite discomfort, and possibly a lack of clear guidance on migraine management during Ramadan.

When participants were asked to compare their migraine experiences during fasting versus non-fasting periods, responses varied. While some individuals reported a worsening of symptoms, others noted no significant change or even slight improvement. Despite these differences in migraine experience, most participants did not alter their analgesic use, which may reflect limited access to medications during fasting hours, suboptimal treatment planning, or a lack of awareness regarding migraine management strategies during Ramadan. These observations are consistent with findings from multiple studies conducted globally. In Egypt, a prospective cohort study involving 292 migraine patients reported a significant increase in migraine frequency during Ramadan compared to the preceding month, Shaban, with most exacerbations occurring during

the first ten days of fasting (median 4 vs. 3 attacks; p = 0.009) [12]. A similar pattern was noted in Saudi Arabia, where a study of 293 migraineurs found significantly higher numbers of migraine days, increased analgesic use, and greater severity scores during Ramadan compared to Shaban [13]. Likewise, research from Algeria involving 101 patients revealed a marked rise in migraine attacks, headache days, and the need for rescue medications during the fasting month [14]. In addition to behavioral and lifestyle changes, emerging biological mechanisms have also been proposed. A recent Saudi sub-analysis identified elevated levels of calcitonin gene-related peptide (CGRP) on the first day of fasting, which were associated with fasting-induced headaches, suggesting that neurochemical changes may play a role in triggering migraines during Ramadan [15]. Together, these findings indicate that Ramadan fasting is frequently associated with an increase in migraine frequency, severity, and medication use, mainly early in the fasting period, and that contributing factors likely include sleep disruption, dietary shifts, dehydration, and underlying biochemical changes.

One of the central objectives of this study was to assess the impact of sleep disturbances on migraine during Ramadan. The data clearly indicate that reduced sleep duration and poorer sleep quality were significantly associated with increased migraine burden. This is consistent with previous research showing that sleep deprivation and irregular sleep patterns are potent migraine triggers [16,17]. Ramadan's altered circadian rhythm, featured by late-night meals and early morning prayers, may disrupt melatonin secretion and sleep architecture, thereby contributing to migraine exacerbation [18]. A Saudi-based study by Al-Hashel *et al*.[19] similarly reported that sleep disturbance during Ramadan was linked to increased headache frequency among migraineurs, supporting the relevance of sleep hygiene.

Although aura symptoms were less prevalent, patients with aura appeared more vulnerable to increased severity and duration of attacks during fasting. This observation simulates findings from other studies, where migraine with aura was more sensitive to fasting-related triggers, possibly due to cortical spreading depression being more easily provoked under metabolic stress [20,21]. However, the literature remains uncertain, with some studies suggesting no significant difference in fasting response between aura subtypes, with the need for further neurophysiological investigation.

Importantly, the current study's findings must be interpreted within the Saudi sociocultural background, where fasting is both a religious and communal practice, often accompanied by significant lifestyle changes. The predominance of female participants and the high rate of medication use reflect broader epidemiological patterns in migraine prevalence and management in the region [22,23]. The observed association between longer migraine history and increased vulnerability during fasting suggests a possible cumulative sensitization effect, which warrants further longitudinal research.

Study limitations

This study was conducted at a single tertiary care center, which may limit the generalizability of findings to broader populations across Saudi Arabia. The dependence on self-reported data introduces potential recall and reporting biases, particularly regarding migraine frequency, severity, and sleep patterns. The cross-sectional design restricts causal inference between fasting and migraine changes. Additionally, the study did not control for confounding factors such as hydration status, dietary intake, stress levels, or medication adherence during Ramadan, which may influence migraine outcomes.

Conclusion and Recommendations

In conclusion, this study revealed that Ramadan fasting can significantly influence migraine experiences among affected cases, with many reporting increased frequency and severity of attacks during the fasting period. These effects were more reported in patients with a longer history of migraine, higher pain severity, current medication use, prior emergency visits, and those experiencing poor sleep quality or reduced sleep duration during Ramadan. Despite these challenges, most participants did not modify their analgesic use. Given the strong associations between fasting and worsened migraine symptoms, it is essential for healthcare providers to proactively support patients who fast. We recommend pre-Ramadan counseling that includes strategies for maintaining hydration, optimizing sleep, and timing medications appropriately. Individuals with severe or chronic migraines may benefit from modified care plans to lessen fasting-related complications. Public awareness campaigns can also play a role in promoting safe fasting practices for those with neurological conditions.

List of abbreviations

KFMMC: King Fahad Military Medical Complex
HIS: Hospital Information System
VAS: Visual Analog Scale
SPSS: Statistical Package for the Social Sciences
CGRP: Calcitonin Gene-Related Peptide
DM: Diabetes Mellitus
HTN: Hypertension
IRB: Institutional Review Board

Declarations

Ethics approval and consent to participate

The study was approved by the Institutional Review Board (IRB) of King Fahad Military Medical Complex, Dhahran, Saudi Arabia (IRB approval number: IRB-KFMMC-2025-Neurology-Migraine-Fasting). Verbal consent was obtained from all participants prior to data collection through telephone interviews. All methods were performed in accordance with relevant guidelines and regulations.

Data Availability

The datasets generated and analyzed during the current study are not publicly available due to institutional confidentiality policies but are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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Authors' contributions

A.A. (Abdolaziz Al-Ghamdi) conceptualized and designed the study, performed data interpretation, and wrote the first draft. A.Ag. (Adeeb Alangari) contributed to statistical analysis, and manuscript revision.

A.M. (Abdullah Memish), B.A. (Bader Alrowaished), and Z.A. (Ziyad Alshagawi) participated in data verification, literature review, and final manuscript editing.
All authors read and approved the final manuscript.

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