

Prevalence of Migraine Headache in Taif City, Saudi Arabia

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Abstract

Background: Migraine is a public health problem and it is the third most common cause of disability among individuals below the age of 50. In spite of the multiplicity of the studies concerned with exploring the disease epidemiology and nature worldwide, data from Saudi Arabia are lacking. The aim of this study was to study the prevalence of migraine in Taif city, Saudi Arabia.

Methods: This was a cross-sectional study conducted on 354 individuals in Taif city. Data were collected via a self-administered questionnaire including demographic variables, clinical variables, and therapeutic variables. Data were fed into the computer and analyzed using SPSS software.

Results: Among the 354 recruited participants, 54% were females, and 46% were males. Migraine occurred in 89.9% of urban inhabitants. About 24% of migraineurs were unemployed, and 16% were non-working students. Headache occurred in 86.9% of females and 71.6% of males ($P = 0.002$). Gender was significantly correlated with migraine prevalence (odds ratio (OR) = 0.28). About 47% reported pain score of 4 - 6. Seeking medical advice was encountered in 32.4% of females and 26.6% of males. Nausea occurred in more than one-third of patients before and during headache. Only 31.4% of participants knew about migraine triggers. Family history was found in 64% of participants.

Conclusions: Migraine is prevalent in Taif city. It is more prevalent among females, and among urban areas. Migraine is associated with high rates of unemployment. Most Saudi migraineurs encounter throbbing, moderately severe headache, that does not wake them from sleep. Females report more severe headaches, whereas more men take medications. Nausea is the most common associated symptom with migraine. Only one-third of Saudi migraineurs know about migraine triggers. Family history of migraine is very common among Saudi migraineurs.

Keywords: Migraine; Taif; Prevalence

Introduction

Migraine is estimated to be the third cause of disability, according to the Global Burden Disease (GBD) 2015, in individuals under the age of 50 [1]. It can be severe enough to impair quality of life and daily activities. The most accepted pathophysiological hypothesis for migraine is the trigemino-vascular theory. Trigeminal nerve fibers surrounding basal meningeal and cerebral vessels are thought to be stimulated, and subsequently release various inflammatory mediators such as vaso-inhibitory peptide (VIP), calcitonin gene-related peptide (CGRP), and substance P. These substances cause local neurogenic inflammation, provoke vasodilatation, and further stimulate other nerve fibers. Pain impulses are transmitted centrally to the thalamus and sensory cortex [2].

Common migraine triggers include long fasting, hypoglycemia, sleep disturbance, psychological stress, hormonal changes such as oral contraceptive pills, menstruation, and ovulation), and some medications (such as nitroglycerin, reserpine, and estrogen) [2]. Migraine can occur with aura (typical migraine) or without aura (classical migraine). Migraine can also evolve through many stages, namely prodrome, aura, headache attack, and post prodrome [3]. The prodrome usually precedes the headache by up to 1 day. During this stage, the patient may experience irritability, mood swings, appetite changes, anorexia or food craving, sleep disturbances, and salt and water retention. It is commonly encountered among patients with typical migraine (migraine with aura). Migraine aura represents a focal cerebral dysfunction that precedes the headache onset in 10-20% in migraineurs [4]. It usually lasts shortly for 5 - 20 min on average. Migraine aura may be visual (e.g. blurred vision, fortification spectra, scintillations, micropsia, macropsia, or black dots), sensory, motor, autonomic, cognitive, behavioral, or dizziness. The headache stage usually last for hours and may continue to several days (status migrainosus) [5]. It is typically severe and interfere with daily activities and, sometimes, with sleep. During the post prodrome stage, the migraineur feel exhausted and lethargic, or less commonly energized and elated [3].

Migraine is a public health problem that has been extensively studied during the past decades. It is prevalent among adolescence and young adults. In spite of the multiplicity of

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Table 1. The IHS Criteria for Migraine [6]

Migraine without aura
A. At least five attacks fulfilling criteria B-D.
B. Headache attacks lasting 4 - 72 h (untreated or unsuccessfully treated)
C. Headache has at least two of the following four characteristics:
1. Unilateral location
2. Pulsating quality
3. Moderate or severe pain intensity
4. Aggravation by or causing avoidance of routine physical activity (e.g., walking or climbing stairs)
D. During headache at least one of the following:
1. Nausea and/or vomiting
2. Photophobia and phonophobia
E. Not better accounted for by another ICHD-3 diagnosis.
Migraine with aura
A. At least two attacks fulfilling criteria B and C
B. One or more of the following fully reversible aura symptoms:
1. Visual
2. Sensory
3. Speech and/or language
4. Motor
5. Brainstem
6. Retinal
C. At least two of the following four characteristics:
1. At least one aura symptom spreads gradually over ≥ 5 min, and/or two or more symptoms occur in succession
2. Each individual aura symptom lasts 5 - 60 min
3. At least one aura symptom is unilateral
4. The aura is accompanied, or followed within 60 min, by headache
D. Not better accounted for by another ICHD-3 diagnosis, and transient ischemic attack has been excluded

the studies addressing the prevalence of migraine in different countries, local studies in Saudi Arabia are limited, and studies from Taif city are sparse. Thus, this study was conducted.

Patients and Methods

Subjects and study design

This is a cross-sectional study using a pre-designed questionnaire conducted through an online survey during August 2017. The survey was approved by the ethical board of Taif University, and the survey was undertaken among the patients suffering from headache in Taif city, Saudi Arabia.

International Headache Society (IHS) criteria

It is not feasible to diagnose migraine on basis of clinical examination in a population-based survey with large number in-

cluded. The advantage of IHS criteria in such cases is that they have a standardized and structured method for integrating a medical history as a base for diagnosis. The IHS categories for migraine are migraine without aura (IHS 1.1) and migraine with aura (IHS 1.2) [6]. The IHS criteria for migraine are presented in Table 1. For patients to be classified as a migraineur respondent, they must have experienced five or more headaches in their lifetime fulfilling the various criteria indicated in Table 1.

We conducted a cross-sectional survey study using a pre-specified questionnaire, distributed as hard copies by research collaborators. Our questionnaire was structured by a series of questions about headaches and related symptoms to finally determine whether the respondent met the aforementioned HIS criteria (A-E) to be classified as a migraineur. The questionnaire was translated into Arabic and the questions were re-phrased in everyday language if whenever needed. The IHS criteria subclassify people experiencing non-migraine headaches into tension-type and cluster headaches; however, this differentiation was not needed in our survey and would substantially add meaningless effort and time. Therefore, people

Table 2. Prevalence of Migraine in Different Study Groups Sorted by Gender

Diagnosis	Female		Male	
	N	Prevalence (%)	N	Prevalence (%)
Migraineurs with aura	26	16.3	13	6.7
Migraineurs without aura	10	6.3	1	0.5
Headachers	103	64.4	125	64.4
Non-headachers	21	13.1	55	28.4
Total	160	100.0	194	100.0

reporting non-migraine headaches were classified as headaches. The third class of respondents were those who reported no headache in the past year (non-headaches).

Data collection

Surveys were conducted by local teams at each hospital. The survey packet contained a cover letter and a questionnaire with Arabic and English versions. The survey has been handed to each patient to read and decide whether to participate or not.

Statistical analysis

All collected data were transferred into a spreadsheet for further analysis. Standard descriptive measures were calculated for each question/item individually. For data analysis, SPSS 24 for Windows (SSPS Inc., Chicago, IL, USA) were used. Prevalence is expressed as a proportion and 95% confidence intervals (CIs) were calculated for all patients with excluding those with any associated diseases from the analysis.

Migraineur status was modeled as a binary dependent variable (yes/no) using multiple logistic regression to examine associations with covariates of age, gender, habitat, marital status, employment status, educational level and smoking tobacco.

Results

Three hundred and fifty-four individuals were recruited to this study. Females constituted 54.3%, and males constituted 45.7% of the recruited sample. Among the 354 studied individuals, the gender specific prevalence of headache was almost equal (64.4%) among genders. However, aura occurred in 16.3% of females and only in 6.7% of males. The gender specific distribution of headache is depicted in Table 1, Table 2, and Figure 1.

Demographic variables among genders

Table 3 shows the various demographic variables which were

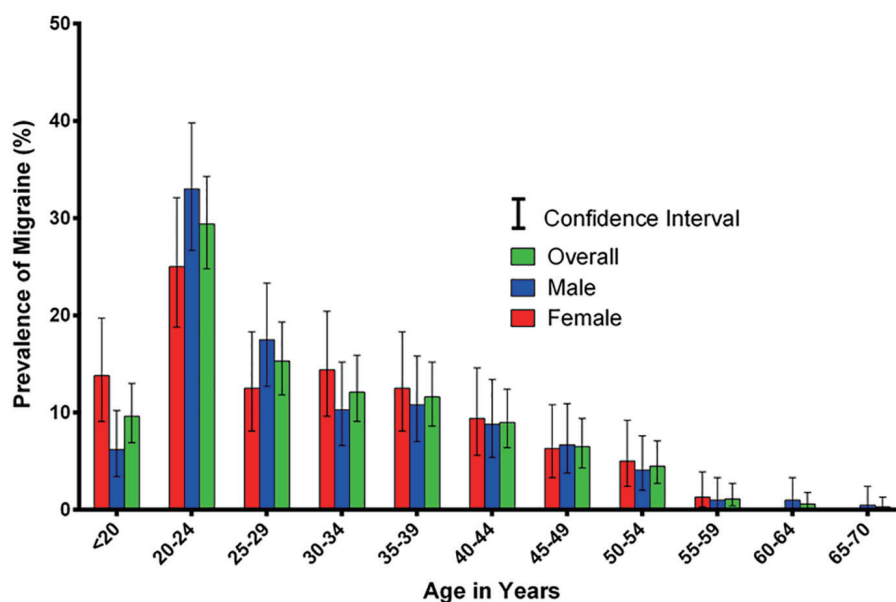


Figure 1. Sex-specific prevalence of migraine with associated CI sorted by age.

Table 3. Different Demographic Characteristics Among Study Participants

	Female		Male		Total		P
	N	%	N	%	N	%	
Habitat							
City	151	94.4%	167	86.1%	318	89.8%	0.010*
Town/village	9	5.6%	27	13.9%	36	10.2%	
Marital status							
Divorced	6	3.8%	1	0.5%	7	2.0%	0.056
Married	74	46.3%	88	45.4%	162	45.8%	
Single	78	48.8%	105	54.1%	183	51.7%	
Widow	2	1.3%	0	0.0%	2	0.6%	
Employed	47	29.4%	95	49.0%	142	40.1%	< 0.001†
Retired	2	1.3%	15	7.7%	17	4.8%	
Employment status							
Student “not working”	53	33.1%	46	23.7%	99	28.0%	
Student “working”	10	6.3%	7	3.6%	17	4.8%	
Unemployed	48	30.0%	31	16.0%	79	22.3%	
Education Level							
Bachelor’s	101	63.1%	104	53.6%	205	57.9%	0.232
Diploma	6	3.8%	11	5.7%	17	4.8%	
High school/or less	43	26.9%	69	35.6%	112	31.6%	
Master	7	4.4%	9	4.6%	16	4.5%	
PhD	3	1.9%	1	0.5%	4	1.1%	
Smoking tobacco							
No	155	96.9%	123	63.4%	278	78.5%	< 0.001†
Yes	5	3.1%	71	36.6%	76	21.5%	

*The Chi-square statistic is significant ($P < 0.05$). †The Chi-square statistic is significant ($P < 0.001$). N: number of observations.

studied; some of these showed statistically significant differences. The vast majority of studied individuals were city rather than country-side inhabitants, with figures of 89.8% and 10.2%, respectively. Females living in cities (94.4%) were significantly higher than males (89.8%) ($P = 0.010$). No statistically significant difference was encountered as regards either the marital states or the educational level among studied subjects. Forty percent of participants were unemployed and 28% were non-working students. Among females, 29.4% were unemployed and 30% were non-working students, whereas 16% and 23.7% of men were unemployed and non-working students, respectively ($P < 0.001$). More than three-fourths (78.5%) of participants were non-smokers, with smokers constituting 36.1% of males and 3.1% of females ($P < 0.001$).

Migraine characteristics, medications usage, and response

Migraine headache was experienced by 78.5% of studied subjects. Table 4 shows the characteristics of migraine headache, medications used, and outcome of treatment among males and

females. Migraine headache was significantly more prevalent among females (86.9%) than males (71.6%) ($P = 0.002$). More than half of the recruited individuals reported that they had more than five previous attacks of headache, with values of 62.6% and 55.8% among females and males, respectively ($P < 0.001$). As regards the duration of headache, males seemed to have shorter headaches than females. Fifty-eight percent of males reported that their headache lasted less than 4 h, whereas only 34.5% had such short headaches. Status migrainosus (headache lasting more than 72 h) was more encountered among females with a figure of 5.6% compared to only 1.4% among males. However, the differences were not statistically significant. The vast majority of the studied individuals reported pain scores ranging from 4 to 6. Among females, 37.4%, 32.4%, and 15.8% reported pain scores of 4 - 6, 6 - 9, and > 9, respectively, whereas 54.7%, 22.3%, and 5% of males reported scores of 4 - 6, 6 - 9, and > 9, respectively ($P = 0.002$). The type of headache was also statistically different among the studied groups. Throbbing headache was reported by 49.6% and 56.8% of females and males, respectively. Next came the pressure headache with values of 46.6% and 42.4% among females and males, respectively ($P = 0.001$).

Table 4. Characteristics Migraine and Associated Diagnostics/Medications Among Study Participants

	Female		Male		Total		P
	N	%	N	%	N	%	
Headache							
No	21	13.1%	55	28.4%	76	21.5%	0.002*
Yes	139	86.9%	139	71.6%	278	78.5%	
Headache frequency							
2 - 4	29	20.9%	36	25.9%	65	23.4%	< 0.001†
Five times and more	87	62.6%	68	48.9%	155	55.8%	
Less than 2 times	23	16.5%	35	25.2%	58	20.9%	
Headache duration							
1 - 3 days	25	18.0%	9	6.5%	34	12.2%	0.108
13 - 24 h	13	9.4%	7	5.0%	20	7.2%	
6 - 4 h	34	24.5%	31	22.3%	65	23.4%	
7 - 12 h	11	7.9%	9	6.5%	20	7.2%	
Less than 4 h	48	34.5%	81	58.3%	129	46.4%	
More than 3 days	8	5.8%	2	1.4%	10	3.6%	
Pain score							
1 - 3	20	14.4%	25	18.0%	45	16.2%	0.002*
4 - 6	52	37.4%	76	54.7%	128	46.0%	
6 - 9	45	32.4%	31	22.3%	76	27.3%	
> 9	22	15.8%	7	5.0%	29	10.4%	
Pain type							
Burning pain	6	4.3%	1	0.7%	7	2.5%	0.001*
Pressure pain	64	46.0%	59	42.4%	123	44.2%	
Throbbing pain	69	49.6%	79	56.8%	148	53.2%	
Examined by a doctor							
No	94	67.6%	102	73.4%	196	70.5%	< 0.001†
Yes	45	32.4%	37	26.6%	82	29.5%	
Investigations done							
Blood tests	10	7.2%	3	2.2%	13	4.7%	0.001*
CT	10	7.2%	6	4.3%	16	5.8%	
EEG (electroencephalogram)	4	2.9%	6	4.3%	10	3.6%	
MRI	1	0.7%	1	0.7%	2	0.7%	
MRT	5	3.6%	0	0.0%	5	1.8%	
None	108	77.7%	122	87.8%	230	82.7%	
X-ray	1	0.7%	1	0.7%	2	0.7%	
Headache medications							
No	61	43.9%	57	41.0%	118	42.4%	0.009*
Yes	78	56.1%	82	59.0%	160	57.6%	
Improvement by medications							
Always	28	35.9%	31	37.8%	59	36.9%	0.003*
Never	1	1.3%	1	1.2%	2	1.3%	
Sometimes	49	62.8%	50	61.0%	99	61.9%	

The Chi-square statistic is significant ($P < 0.05$). †The Chi-square statistic is significant ($P < 0.001$). N: number of observations.

Table 5. History and Nature of the Attacks Among Study Participants

	Female		Male		Total		P
	N	%	N	%	N	%	
Symptoms before attack							
Muscle weakness	3	1.9%	7	3.6%	10	2.8%	0.002*
Nausea	33	20.6%	21	10.8%	54	15.3%	
None	58	36.3%	63	32.5%	121	34.2%	
Numbness in the skin	2	1.3%	4	2.1%	6	1.7%	
Sensitivity to light	16	10.0%	6	3.1%	22	6.2%	
Sensitivity to noise	7	4.4%	9	4.6%	16	4.5%	
Sight disorders	15	9.4%	26	13.4%	41	11.6%	
Speech defects	2	1.3%	3	1.5%	5	1.4%	
Vomiting	2	1.3%	0	0.0%	2	0.6%	
Symptoms during attack							
Nausea	58	36.3%	21	10.8%	79	22.3%	< 0.001†
None	31	19.4%	71	36.6%	102	28.8%	
Sensitivity to light	25	15.6%	29	14.9%	54	15.3%	
Sensitivity to noise	19	11.9%	17	8.8%	36	10.2%	
Vomiting	5	3.1%	1	0.5%	6	1.7%	
Symptoms after attack							
Muscle weakness	8	5.0%	6	3.1%	14	4.0%	0.108*
Nausea	9	5.6%	10	5.2%	19	5.4%	
None	94	58.8%	99	51.0%	193	54.5%	
Numbness in the skin	2	1.3%	2	1.0%	4	1.1%	
Sensitivity to light	9	5.6%	4	2.1%	13	3.7%	
Sensitivity to noise	6	3.8%	6	3.1%	12	3.4%	
Sight disorders	5	3.1%	8	4.1%	13	3.7%	
Speech defects	3	1.9%	3	1.5%	6	1.7%	
Vomiting	2	1.3%	1	0.5%	3	0.8%	
Knowing the trigger							
No	80	50.0%	87	44.8%	167	47.2%	0.002*
Yes	59	36.9%	52	26.8%	111	31.4%	
Waking up by pain							
Always	16	10.0%	7	3.6%	23	6.5%	0.001
Never	63	39.4%	79	40.7%	142	40.1%	
Sometimes	59	36.9%	52	26.8%	111	31.4%	
Family history of headache							
No	42	30.2%	58	41.7%	100	36.0%	< 0.001†
Yes	97	69.8%	81	58.3%	178	64.0%	

*The Chi-square statistic is significant ($P < 0.05$). †The Chi-square statistic is significant ($P < 0.001$). N: number of observations.

As regards medical advice seeking, less than one-third of the recruited subjects had seen doctors. Only 32.4% of females and 26.6% of males reported that they were seen by a doctor. Most of them did not have any investigation for their headache, with values of 77.7% of females and 87.8% of males. CT brain

seemed to be the most common investigation done among 7% of females and 4.3% of males, followed by blood tests and EEG ($P = 0.001$). Males received medications more than females; results of analysis showed that 56.1% of females and 59% of males received medications for their headache. Among

Table 6. Logistic Regression Between Different Co-Variables and Migraine Prevalence

Predictors	B	SE	Adjusted OR (95% CI)†	P
Age	-0.03	0.02	0.97 (0.93 - 1.02)	0.219
Gender	-1.28	0.42	0.28 (0.12 - 0.63)	0.002*
Habitat	-0.77	0.77	0.46 (0.1 - 2.11)	0.320
Marital status	-0.46	0.37	0.63 (0.3 - 1.3)	0.211
Employment status	-0.22	0.12	0.8 (0.64 - 1.01)	0.060
Education level	0.06	0.15	1.06 (0.79 - 1.42)	0.694
Smoking tobacco	0.01	0.51	1.01 (0.37 - 2.76)	0.978

B: logistic regression coefficient; SE: standard error of logistic regression coefficient; OR: odds ratio; CI: confidence interval; P: probability value. *Statistically significant (< 0.05). †Adjusted relative odds are odds ratio for migraine status relative to the reference group (= 1.0) for each covariate, after adjusting for all covariates by logistic regression.

males, 37.8% reported that the always improved, whereas only 35.9% of females reported so ($P = 0.003$).

Nature of migraine attacks

Table 5 demonstrates the nature and characteristics of migraine attacks. The vast majority of patients reported no associated symptoms before, during, or after migraine attacks. However, many others reported nausea, vomiting, weakness, sensitivity to light, noise, sight disturbance, or speech problems. Nausea was found to be the most prominent manifestation experienced by patients before, during, and after the migraine attack. Before attack, 20.6% of females and 10.8% of males reported nauseating sensation. Nausea was also reported by 36.3% of females and 10.2% of males during the attack, and 5.6% of males and 5.2% of males after the attack. Sensitivity to light was as common as nausea after migraine attacks, which was reported by 5.6% and 2.1% of females and males, respectively. Vomiting, on the other hand, was the least symptom experienced before, during, or after the attack of migraine. It was reported by 1.3% of females before the attack, 3.1% of females and 1% of males during the attack, and 1.3% of females and 0.5% of males after the attack, respectively. Less than one-third of participants (31.4%) reported that they could identify the migraine triggers; males could identify triggers more than females ($P = 0.0027$). Forty-one percent of men reported that their headache had never awakened them from sleep, and 39.4% of females also reported so. Family history of migraine was reported among 69.8% of participating females and 58.3% of participating males.

Correlation between demographic variables and migraine

Logistic regression was performed to explore the correlation between different co-variables and migraine prevalence. Age, gender, habitat, marital status, employment status, educational level, and smoking were all studied. Gender was found to be the only demographic variable that was significantly correlated with migraine prevalence ($P = 0.002$). The odds ratio was 0.28 indicating that males were only 0.28 times riskier of devel-

oping migraine than females. Logistic regression of different variables is demonstrated in Table 6.

Discussion

Migraine headache is a common neurological disorder affecting Saudi population. The prevalence of headache in Taif city was found to be higher than prevalence reported in different studies. For instance, headache was reported in 53.2% of individuals studied in Brazil in 2005 [7], 33.8% in Nairobi [8], and 27.9% in Kuwait [9]. Females seemed to be significantly more affected than males ($P = 0.002$), with an odds ratio of 0.28 for the gender difference. This finding is consistent with previous literature studies that stated that migraine headache was more prevalent among females [7, 10, 11]. High prevalence of migraine among females can be attributed not only to hormonal changes, but also to central cortical excitability [12, 13]. Migraine headache was also found to be more prevalent among city habitants than countryside habitants. The stressful life in the city, and the lack of meditation and relaxing country nature can be the reasons behind the high prevalence of migraine among city inhabitants.

Migraine was significantly associated with high rates of unemployment ($P < 0.001$). Up to one half of males and two-thirds of females were either unemployed or non-working students. In agreement with our results, Stewart et al [14] reported in their study that migraine, especially chronic migraine, had a negative impact on employment, and that 19% of chronic migraineurs were less likely to be working for pay compared with episodic migraineurs. The severity of migraine attack can explain such negative impact on occupational aspects. Marital status, educational level, and tobacco smoking were not significantly correlated with migraine prevalence when logistic regression was performed.

Females and males reported their pain intensity differently. Although the vast majority of both genders reported that their pain score ranged from 4 to 6, more females had scores from 6 to 9, and scores more than 9 ($P = 0.002$). Furthermore, less females reported that they improved after taking medications ($P = 0.003$). This can be explained by the sex difference proved previously by Fillingim et al [15], in their review article, when

they stated that males and females have different thresholds for pain sense and different response to analgesic medications. On the contrary, males seemed to be keener on seeking medical advice ($P < 0.001$) and receiving medications ($P = 0.009$). Females less interest in medications may be due to their lower response, their higher pain tolerance, socioeconomic issues, or other causes. More than three-fourths of the recruited sample did not undergo any investigation for their headache.

As regards the clinical presentation of headache, throbbing nature was experienced by around half of female and male participants, which is consistent with the nature of the classical migraine headache [3]. It never awake up to 40% of participants from sleep. More than one-third of recruited subjects reported no associated symptoms with migraine. Nausea, weakness, numbness, visual, and speech symptoms were reported and showed a significant gender difference. This goes in line with Buse et al [16] who observed significant gender differences in migraine associated symptomology, aura, and headache-related disability. Nausea was the most common experienced symptoms before, during, or after the headache in our study. In disagreement with us, Menon et al [17] reported that phonophobia and photophobia were more common than nausea among both males and females.

Only one-third of our studied participant had previous knowledge about migraine triggers, and females seemed to be more ignorant about them than males ($P = 0.002$). This figure is close to the results reported by Wober et al [18] which indicated that migraineurs could identify less than half of the migraine triggers.

Family history of migraine was high among the studied population encountered in more than two-thirds of subjects. Females showed more positive family history of migraines than men. This is in agreement with previous literature studies that indicated high prevalence of positive family history among migraine patients [11, 19].

Conclusions

Migraine is prevalent in Taif city, Saudi Arabia. It is more prevalent among females, and among urban areas. Migraine causes negative consequences and is associated with high rates of unemployment. Most Saudi migraineurs encounter throbbing, moderately severe headache, that does not awake them from sleep. Females report more severe headaches, whereas men seek medical advice more and take medications. Nausea is the most common associated symptom with migraine. Only one-third of Saudi migraineurs possess a background knowledge about migraine triggers. Family history of migraine is very common among Saudi migraineurs.

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Competing Interests

The authors declare that they have no competing interests.

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