

# Prevalence of migraine among the general population, and its effect on the quality of life in Jeddah, Saudi Arabia

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## ABSTRACT

**الأهداف:** تقدير مدى انتشار الصداع النصفي، وتقييم نوعية الحياة (QOL) ومقارنة QOL بين مرضى الصداع النصفي وعامة السكان في جدة، المملكة العربية السعودية.

**المنهجية:** أجريت دراسة وصفية مقطعية في عام 2021م على 2058 بالغاً وافقوا وأكملوا الاستبيان. تم استخدام مقياس ID-migraine لفحص الصداع النصفي وبناءً عليه تم تقسيم المشاركين إلى 3 مجموعات (صداع طبيعي، صداع غير صداع نصفي، صداع نصفي). لتقييم ومقارنة QOL بين مجموعة الصداع النصفي والسكان العاديين، تم استخدام مقياس SF-36.

**النتائج:** بلغ انتشار الصداع النصفي 37.2% مع انتشار أعلى بين الإناث 81.1% وكان الأعلى بين الطلاب 43.3%. كانت الأعراض الأكثر شيوعاً والمرتبطة بالصداع النصفي هي رهاب الضوء بنسبة 94.6% وكانت أكثر المثبرات التي تم الإبلاغ عنها شيوعاً هي الحرمان من النوم والتوتر والقلق. عند استكشاف العلاقة بين الصداع النصفي وQOL، كان لدى المرضى الذين يعانون من الصداع النصفي درجات أقل في جميع المجالات الثمانية لـ QOL مقارنة بالمجموعة العادية. كان تحديد الدور بسبب الصحة البدنية هو المجال الأكثر تضرراً.

**الخلاصة:** وجدت الدراسة الحالية انتشاراً عالياً للصداع النصفي في جدة. كانت ساعات النوم غير الكافية من أكثر المسببات المبلغ عنها. يؤثر الصداع النصفي بشكل كبير على جميع جوانب QOL مقارنة بالسكان العاديين.

**Objectives:** To estimate the prevalence of migraine headaches, assess the quality of life (QoL) of migraine patients, and compare the QoL between migraine patients and the general population in Jeddah, Kingdom of Saudi Arabia.

**Methods:** A descriptive cross-sectional study was carried out in 2021 on 2058 adults who agreed to participate in the study and completed a questionnaire. The ID-migraine scale was used to screen for migraine, and participants were divided into 3 groups (normal, non-migraine headaches, and migraine headache). To assess and compare the QoL between the migraine group and the normal population, the 36-item short-form survey was used.

**Results:** The prevalence of migraine headaches was 37.2%, with a higher prevalence among females (81.1%), and the highest prevalence was observed among students (43.3%). The most common manifestation associated with migraine headaches was photophobia (94.6%), and the most frequently reported triggers were sleep deprivation, stress, and anxiety. In our analysis of the association between migraine headaches and patient QoL, migraine patients showed lower scores in all 8 domains of QoL in comparison with the normal group. Role limitation due to physical health was the most affected domain.

**Conclusion:** The current study showed a high prevalence of migraine in Jeddah. Insufficient sleep was the most frequently reported trigger. Migraine significantly affects all aspects of QoL in comparison with the normal population.

**Keywords:** prevalence, migraine, population, quality, life, Jeddah

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Migraine is a type of headache disorder characterized by frequent attacks that necessitate a dark room, a comfortable bed, and a cool towel. Stress, changes in sleep patterns, weather, or routines, slight dehydration, certain foods, coffee, smoking, abrupt exposure to light or strong smells, and medication usage are all common causes for these attacks.<sup>1</sup>

Migraine headaches are throbbing headaches that usually occur on one side of the head and are accompanied by nausea, vomiting, photophobia, and phonophobia.<sup>2</sup> It is typically a lifetime condition that affects persons under the age of 35 years and worsens over time.<sup>3</sup>

Migraine is the third most common disabling disease, with the Global Burden of Disease 2000 (GBD) ranking it as the 19th leading cause of years lost due to disability (YLD). In 2013, migraine was classified as the 6th leading cause of YLD.<sup>4</sup>

Although the actual cause of migraine is unknown, it has been hypothesized to be attributable to short-term changes resulting from the release of chemical substances in the brain, which cause irritation to the blood vessels and induce swelling and the firing of pain signals.<sup>5</sup>

Migraine headaches can be primarily categorized into 3 types: i) headaches with an aura, in which the sufferers experience warning signs such as flashes prior to the onset of the headache; ii) headaches without an aura, which constitute the most common type of migraine headaches and present with no warning signs before the onset of headache; and iii) silent migraines, in which patients experience symptoms of an aura without a headache.<sup>6</sup>

Migraine has a significant impact on the personal, social, emotional, and physical lives of the patients who experience it. In addition to causing marked functional impairment, which negatively influences academic and occupational performance, it also imposes a major burden on the society in terms of financial costs.<sup>3,7,8</sup> Every year, more than 20 million days are lost owing to migraines, with an average of more than 4 days lost per month.<sup>9</sup> In the United States (US) and the United Kingdom, 50% of migraine patients were estimated to have sought a medical consultation.<sup>10</sup> The average emergency department visits by migraine sufferers was estimated to be 3.3 visits per year.<sup>7</sup>

The financial costs resulting from migraine are a major burden on countries, and the mean annual cost has been estimated to be more than 2600 US dollars (USD) for every patient with episodic migraine and more than 8000 USD for patients with chronic migraine.<sup>7</sup> In terms of the social costs, migraine patients tend to avoid interactions with their family

and close friends during attacks, which also prevents them from engaging in hobbies and doing everyday tasks.<sup>7</sup> Moreover, dealing with migraine may increase the risk of many diseases, such as anxiety, depression, hypertension, cardiovascular, cerebrovascular events, syncope, and restless leg syndrome.<sup>7-11</sup> In addition, migraine cause a huge impairment in the quality of life (QoL) in comparison to that in healthy individuals.<sup>2,3,12</sup> Measurement of QoL and disability in migraine patients have emerged as essential complementary steps for the management of the disease.<sup>2</sup>

The first step for efficient and proper management of migraine headaches is accurate diagnosis.<sup>13</sup> Migraine has a well-established diagnostic criterion (International Headache Society Diagnostic Criteria for Migraine Headache With and Without Aura).<sup>9</sup> Headache risk factors, triggers, and concomitant conditions have all been addressed in a comprehensive management approach.<sup>14</sup> Acute (abortive) treatments for migraine include acetaminophen and non-steroidal anti-inflammatory drugs, as well as preventive (prophylactic) treatments such as divalproex, metoprolol, topiramate, timolol, and propranolol. Both techniques are required for patients who experience severe headaches on a regular basis.<sup>15,16</sup>

Considering the disabling effects of migraine on people's productivity, a better understanding of patients' QoL will facilitate the management of this disease. However, the existing research on the prevalence of migraine headaches and their effects on the QoL in the general population in Jeddah, Kingdom of Saudi Arabia (KSA) is limited. Thus, this study aimed to assess the effect of migraine headache on quality of life among the general population in Jeddah.

**Methods.** This descriptive cross-sectional questionnaire-based online study was approved by the Institutional Review Board at King Abdulaziz University Hospital, Riyadh, KSA. The study was according to principles of Helsinki Declaration. This study used a convenience sampling technique that was carried out between April and June 2021 in Jeddah. The response rate was 71.4% and the total number of participants who agreed to participate in the questionnaire survey was 2132, but after excluding participants who had a history of neurologic disorders and those who did not complete the questionnaire, the final study population consisted of 2058 participants. Participation in the study was voluntary, and the participants were guaranteed privacy and confidentiality. A letter of consent was included at the beginning of the questionnaire. The inclusion criteria were adult female and male participants of

any nationality, between ages 18-60 years, and lived in Jeddah, while the exclusion criteria were participants out of the specified age.

The participants completed a self-administered questionnaire in a Google form and was distributed through social media platforms (WhatsApp, Telegram, Twitter) assessing the following aspects: age, gender, nationality, city of residence, district, educational level, occupation, chronic illnesses, smoking and shisha usage, height, weight, and family history of migraine headaches. Migraine was assessed using a 3-item ID migraine test.<sup>17</sup> Subsequently, participants were divided into 3 groups (migraine headaches, non-migraine headaches, and no headaches or normal). Participants with migraine headaches were asked about the frequency of headaches per month and headache triggers (exposure to bright light, loud noises, soft drinks, coffee or tea, a certain type of food, hunger, medications, tension or anxiety, depression, exercise, lack of sleep, excessive sleeping, specific smells, smoking cigarettes, shisha consumption, or passive smoking). Female participants were asked if the headache was linked to their menstrual cycle.

The severity of the headache was assessed using the numeric pain rating scale (NPRS), which was an 11-point numeric scale with scores ranging from 0 representing "no pain," to 10 representing the "worst pain imaginable." The 36-item short-form survey (SF-36) was used to compare QoL and health between migraine patients and the normal population. The SF-36 had 36 items that covered 8 domains: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions. Each SF-36 domain was represented by a score, and the total score ranged from 0-100, where 100 indicated having the highest QoL related to health whereas zero indicated the lowest QoL.

**Statistical analysis.** Data analysis was performed using the Statistical Package for Social Sciences software, version 22 (IBM Corp., Armonk, NY, USA). Qualitative data were expressed as numbers and percentages and Chi-squared test ( $\chi^2$ ) was applied to test the relationship between variables. Quantitative data were expressed as mean and standard deviation (mean $\pm$ SD), and the Mann-Whitney test and Kruskal Wallis test were used for non-parametric variables. A *p*-value of <0.05 was considered significant.

**Results.** A total of 2058 participants aged 18-60 years completed the questionnaires. Most of the participants were females (66.8%), Saudi (90.1%), and

non-smokers (89.1%). The estimated prevalence of non-migraine headache was 18.9% (females: 73.3%, males: 26.7%), while the estimated prevalence of migraine headaches was 37.2% (females: 81.1%, males: 18.9%; **Table 1**).

Patients who experienced chronic headaches were significantly younger than those in the normal group; the mean age of the study population was 30.3 $\pm$ 11.5 years, and the mean age of the migraine headache group was 29.6 $\pm$ 10.91, non-migraine headache group was 29.3 $\pm$ 11.3, and normal participants was 31.3 $\pm$ 11.92 years (*p*=0.001). The mean body mass index of the study population was 24.7 $\pm$ 5.3 kg/m<sup>2</sup>, and the corresponding value for the migraine headache was 24.8 $\pm$ 5.5, non-migraine headache was 24.9 $\pm$ 5.6, and normal groups was 24.5 $\pm$ 5.1 kg/m<sup>2</sup>, with no significant difference observed among the groups (*p*=0.494).

In assessments of family history, 49.1% of migraine patients reported positive family history, while the corresponding value in patients with non-migraine headaches was 23.1% and in the normal group it was 17.1% (*p*=0.000). In our sample, migraine prevalence was the highest among students (43.3%; *p*<0.000). In assessments of smoking habits no significant differences were observed between patients with migraine (and other participants (*p*=0.403).

Evaluations of the headache frequency among migraine patients showed that 44.4% experienced 1-2 attacks per month, and only 10.1% experienced more than 6 attacks. The most common reported manifestations associated with migraine headaches were photophobia (94.6%), limitation of activity (83.0%), and nausea (76.0%). On the other hand, the most frequently observed triggering factors in the migraine group were sleep deprivation (94%), stress and anxiety (81.6%), sounds (78.7%), hunger (62.3%), excess sleep (53.9%), and depression (50.4%), while the least frequently reported triggers were drug consumption (17.2%), exercise (18.0%), smoking or shisha consumption (18.4%), and food consumption (21.3%). Approximately two-thirds (70%) of the female patients reported that their migraine headaches were affected by the menstrual cycle. The numeric pain rating scale assessments revealed a mean severity score of 7.0 $\pm$ 2.0.

Finally, on exploring the association between migraine headache and QoL and compare the findings with those obtained for the normal group, significant differences were observed in all aspects of QoL, including physical functioning, limitations due to physical health, limitations due to emotional problems, energy and fatigue, emotional wellbeing, social functioning, pain, and general health (*p*<0.000). The role limitation due

to physical health was the most affected scale, with a median of 25.0 in migraine patients compared to 100.0 in the normal population (**Table 2**).

**Discussion.** This study aimed to estimate the prevalence of migraine in Jeddah, KSA, and 37.2% of the population showed positive responses for migraine in our sample. This percentage is higher than that reported in a systematic review published in 2020, in

which the prevalence of migraine in the Arab countries ranged between 2.6% and 32%, with the highest prevalence reported in KSA.<sup>18</sup> Another study conducted among medical students in Jeddah, KSA, showed that the prevalence of migraine was 26.3%, which was consistent with the findings of a study conducted in Riyadh.<sup>19,20</sup> Some other studies have reported lower prevalence rates of migraine in Asian, African, European, and American populations.<sup>21</sup> This could

**Table 1** - Characteristics of the study population.

Variables	Migraine headache	Non-migraine headache	No headache	P-value
Age, mean±SD	29.6±10.9	29.3±11.3	31.3±11.9	0.001
BMI, mean±SD	24.8±5.5	24.9±5.6	24.5±5.1	0.494
<b>Gender</b>				
Female	621 (45.2)	285 (20.7)	469 (34.1)	<0.001
Male	145 (21.2)	104 (15.2)	434 (63.5)	
<b>Nationality</b>				
Saudi	684 (36.9)	354 (19.1)	817 (44)	0.59
Non-Saudi	82 (40.4)	35 (17.2)	86 (42.4)	
<b>Education</b>				
Secondary school or less	207 (38.9)	113 (21.2)	212 (39.8)	0.018
Diploma	28 (31.1)	16 (17.8)	46 (51.1)	
Bachelor	476 (38.3)	228 (18.3)	539 (43.4)	
Master or above	55 (28.5)	32 (16.6)	106 (54.9)	
<b>Occupation</b>				
Student	332 (37.2)	182 (20.4)	378 (42.4)	<0.001
Non-employee	170 (46.1)	71 (19.2)	128 (34.7)	
Employee	234 (33.3)	126 (17.9)	343 (48.8)	
Retired	30 (31.9)	10 (10.6)	54 (57.4)	
<b>Smoking</b>				
Yes	92 (40.9)	31 (13.8)	102 (45.3)	0.403
No	674 (36.8)	358 (19.5)	801 (43.7)	
<b>Family history of migraine</b>				
Yes	376 (60.6)	90 (14.5)	154 (24.8)	<0.001
No	390 (27.1)	299 (20.8)	749 (52.1)	

Values are presented as number and percentages (%). BMI: body mass index, SD: standard deviation

**Table 2** - Quality of life of participants with migraine and those with no headaches.

Variables	Migraine		No headache		P-value
	Mean±SD	Median	Mean±SD	Median	
Physical function	69.9±25.7	75	72.4±31.3	85	0.000
Role limitation due to physical health	42.1±40.9	25	80±33.2	100	0.000
Role imitation due to emotional problems	38.7±43.4	33.3	71.8±39.6	100	0.000
Energy and fatigue	45.3±17.1	50	55.9±18.6	55	0.000
Emotional well being	52±18.9	52	62.5±18.3	60	0.000
Social function	60.1±19.2	62.5	75.8±23	75	0.000
Pain	59.8±24.1	57.5	84.1±21.6	100	0.000
General health	57.7±16.6	60	66.9±14.8	65	0.000

SD: standard deviation.

be explained by the differences in the methodologies of different studies or by the female predominance in our sample since women are more liable to experience migraine headaches. Another explanation is that the prevalence of migraine is increasing in KSA.

The most prominent manifestation associated with headache attacks in this study was photophobia. This is consistent with the findings of another study conducted in India, in which photophobia and phonophobia were the most prevalent manifestations.<sup>22</sup> In contrast, the results of a study carried out in Taif, KSA, showed that nausea was the most common manifestation experienced before, during, and after migraine attacks.<sup>23</sup> The most common triggering factors for migraine headaches were sleep deprivation, stress and anxiety, which were supported by a previous study conducted in Aseer, KSA, in which lack of sleep triggered migraine in 84.1% of the patients and anxiety in 73.2%.<sup>11</sup>

This study has noted that migraine headaches were more prevalent among students (43.3%), and the prevalence was exceptionally high among people with bachelor's degrees (62.1%), which demonstrated an association between high levels of education and increased prevalence of migraine headaches. These findings matched the results of other studies and this association could be explained by the stress and anxiety that students face, which is known to stimulate the mechanisms that cause headaches.<sup>1-5,11</sup>

In our study, no significant difference was observed between migraine headache patients and normal individuals in relation to smoking. Similarly, Nazari et al<sup>24</sup> also found no significant difference between the 2 groups. In contrast, Aamodt et al<sup>25</sup> found a significant difference between both groups in a study carried out in Norway. The question of a possible causal relationship between smoking and headache cannot be addressed in a cross-sectional study. However, cigarette smoking has several effects that may induce headaches, such as alterations in nitric oxide levels in the brain, decreased monoamine oxidase activity, vascular changes caused by carbon monoxide-induced anoxia, and increased metabolism of common headache medications resulting in decreased clinical efficacy.<sup>3-5,11</sup> Moreover, the possibility of reversed causality, wherein headache may be responsible for smoking, should be considered.

In the QoL assessments, the participants with migraine headaches showed significant differences from the normal participants in all 8 aspects of QoL in this study. Limitations due to physical health, limitations due to emotional problems, and bodily pain were the most affected domains. These results are consistent

with the results of a study conducted in Riyadh, which used the migraine-specific QoL questionnaire and found that migraine negatively affects QoL in several aspects, including leisure time activities, dealing with their family and friends, socialization, feeling energetic, feelings of frustration, performing and concentrating on daily activities at work or at home, feeling of being a burden to others, and feeling of letting others down.<sup>4</sup> Another Malaysian study that used another tool to assess QoL showed lower overall scores in migraine patients than in healthy controls, and found that the physical health score and psychological health score were the lowest.<sup>2</sup> Other studies have supported these results.<sup>26</sup> In addition, a systematic review using SF-36 found that people with migraine headaches scored the lowest among those with chronic daily headaches.<sup>8</sup>

Due to the chronicity of migraine, patients also suffer between attacks, when they experience fear and anxiety about upcoming attacks.<sup>5</sup> As a result, they tend to limit their routine activities to prevent the next headache, which negatively affects their QoL.<sup>4</sup> Moreover, people with migraine may remain undiagnosed for a long time, preventing them from taking prophylactic medication or knowing which triggering factors cause an increase in the number of attacks, leading to poor QoL.<sup>2</sup>

**Study limitations.** Although the cross-sectional nature of this study could reveal the association relationships between variables, it could not reveal causal relationships. This was one of the major limitations of our study. The convenience type of sampling was another limitation.

In conclusion, the prevalence of migraine headaches in Jeddah, was 37.2%, with females (81.1%) showing a greater prevalence and students (43.3%) showing the highest prevalence. Photophobia was the most prevalent migraine headache symptom, appearing in 94.6% of the patients. Sleep deprivation, stress, and anxiety were the most frequently reported triggers, and migraine patients scored poorer than the control group in all 8 QoL dimensions. The domain that was the most impacted was role limitation due to physical health. This study found that migraine significantly affects all aspects of QoL in comparison with the normal population.

This study empathized the importance to examine QoL and related disability of patients with migraine on a regular basis to see if they are receiving successful treatment and if any further treatment techniques are needed to enhance QoL. In addition, there is a need for future national studies that include larger representative sample of Saudi population for better assessment of the magnitude of this problem.

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