Medical Science

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The prevalence of migraine headache among the general population and its impact on quality of life in Tabuk city, Saudi Arabia

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ABSTRACT

Background: Migraine represents the second most disabling condition worldwide. The prevalence of migraine varies from one region and one population to another. *Aim:* This study was conducted to estimate the prevalence of migraine in Tabuk and assess the associated factors. *Methods:* This cross-sectional study included a sample from the general population in Tabuk City, Saudi Arabia. A structured questionnaire was utilized to collect the participants' data. It comprised questions about the socio-demographic characteristics of the participants and the experienced headaches, the ID Migraine questionnaire and the Migraine specific quality of life questionnaire (MSQ 2.1). *Results:* The prevalence of migraine was 64.2%. Migraine was significantly associated with female gender (p<0.001), anxiety (p=0.046) and family history (p<0.001). Migraine had a significantly higher frequency (p<0.001), longer duration (p<0.001), more severity (p<0.001) and lower MSQ scores than non-migraine headaches. The most prevalent and significant triggers for migraine were noise (p<0.001), stress (p=0.001), screen usage (p=0.003) and fasting/skipping meals (p<0.001). The significantly associated relieving factors were dark and quiet environment (p<0.001), reducing noise (p<0.001) and local massage (p=0.036). *Conclusions:* The prevalence of Migraine headache toward our population in Tabuk city was high and consistent with current literature. Since quality of life is affected in these patients, efforts should be made to promote and support public awareness and health education of migraine headache.

Keywords: Headache, general population, migraine, quality of life, prevalence

1. INTRODUCTION

Migraine is a common chronic neurological disorder characterized by a moderate to severe headache that is usually unilateral and throbbing. Migraine is often accompanied by other symptoms such as nausea and photophobia. The untreated migraine attack can last for 4 hours and sometimes may continue for 2 or 3 days (Lipton et al., 2014). Migraine impairs the patient's quality of life by limiting the daily activities. The Global Burden of Diseases Study 2019 reported that migraine ranked as the second most disabling disease worldwide (Ashina et al., 2021).

The proposed pathophysiology of migraine entails the stimulation of the trigeminal nerve fibers that surround the basal meningeal and cerebral vessels. This results in the release of several inflammatory mediators that cause local inflammation, vasodilatation of the blood vessels and stimulation of other nerve fibers (Noseda and Burstein, 2013). In addition, the neurons and glial cells undergo a wave of depolarization and suppression along with the changes in cerebral blood flow and metabolism; this wave is known as cortical spreading depolarization (Shah et al., 2018). Several triggers were reported for migraine, including long fasting, sleep disorders, stress and hormonal changes in females (Al-Qarni et al., 2020; Rafique et al., 2020; Bamalan et al., 2021).

Migraine is accompanied by aura in 15% to one-third of patients, which is a temporary neurological symptom occurring before or with the onset of migraine headaches. However, some patients do not experience aura. The aura may be visual, sensory, motor, autonomic and behavioral or dizziness (Loder et al., 2013; Shah et al., 2018; Lucas, 2021).

According to El-Metwally et al., (2020) Saudi Arabia is among the Arab countries with the highest prevalence rates of migraine. Several studies were conducted to assess the prevalence of migraine in different regions of Saudi Arabia (Almalki et al., 2018; Alotaibi et al., 2018; Rafique et al., 2020; Kanjo et al., 2021), but no such studies were performed in the region of Tabuk. In addition, most previous studies assessed the prevalence of migraine among university students, with few studies only conducted among the public.

Understanding the prevalence of migraine and its characteristics in a population is essential to help identify undiagnosed cases and improve their outcomes by addressing any modifiable factors. Therefore, this study was carried out to measure the prevalence of migraine in Tabuk. The study intended to identify the epidemiological characteristics of migraine patients and assess the triggers, relieving factors and impact of migraine on their quality of life.

2. METHODS

Study design and settings

This cross-sectional study used a self-administered, online questionnaire to collect data from the general population in Tabuk City, Saudi Arabia during the period from October to November 2022.

Ethical considerations

The study obtained ethical clearance from the Ethical Committee of the Directorate of Health Affairs in Tabuk, Saudi Arabia and the IRB Protocol No: TU-07710221161. Participants were informed about the study objectives and methodology at the beginning of the online survey and in the invitation messages sent through social media platforms. The consent to participate in the study was obtained by a question at the beginning of the survey that asked the participants whether they agree or do not agree to participate. The study conserved participants' privacy. The investigators kept the data secure and the participants' data would not be used for any other purpose outside this study. Personal data (e.g., name, contact info) were not entered in our data entry software to conserve the participants' privacy. Each subject got a unique identifier code.

Target population

The general population of Tabuk city

Eligibility criteria

The study included all citizens above the age of 18 years who were living in Tabuk city and willing to participate. Excluded participants were those refusing to participate and those under the age of 18 years.

Sampling and sample size

A convenient sample was obtained. The sample size was estimated using the Raosoft online sample size calculator (http://www.raosoft.com/samplesize.html) assuming a margin of error of 5%, a confidence interval of 95% and an average response

for most of the questions of 50%. Considering that the estimated population size of adults in Tabuk city was 667,837, the required sample size was 384.

Data collection

Data were obtained through an online, structured, self-administered questionnaire created using Google Forms. The survey was disseminated to the community using social media platforms such as Twitter, Instagram and WhatsApp. The questionnaire was prepared in Arabic and consisted of 34 questions asking about the participants' demographic data (e.g., age, sex and income), characteristics of migraine (3 ID migraine test) and the disease effect on the participants' quality of life (the Migraine specific quality of life questionnaire).

The severity of the headache was graded by the respondent and explained in the questionnaire form as follows: Mild (no effect on usual activity or efficiency), moderate (interferes with routine activities but does not require rest) and severe (activity and efficiency impaired; need rest and go home).

The ID-Migraine TM questionnaire was used to diagnose migraine among the respondents. The ID-Migraine TM questionnaire is a three-item, self-administered, screening tool for migraine in patients complaining of headaches in a primary care setting. The tool asked about nausea, sensitivity to light and disability. The sensitivity of the tool was 81% (95%CI, 77% to 85%), the specificity was 75% (95%CI, 64% to 84%) and the positive predictive value was 93% (95%CI, 89% to 95%). A diagnosis of migraine is established if two or all items were answered positively (Lipton et al., 2003).

The Migraine specific quality of life questionnaire (version 2.1) comprises 14 items that assess three main domains of the patient's daily functioning: Role function-restrictive (7 items about limiting the daily social and work activities), role function-preventive (4 items about how migraines prevent these activities) and emotional function (3 items about the associated emotions). The responses are rated on a 6-point scale. Scores of each item are summed up and then the total is rescaled from a 0 to 100 scale. Lower scores mean poor quality of life (Jhingran et al., 1998; Martin et al., 2000). The participants were divided into the migraine and other headache groups to assess the characteristics of migraine and significant triggering and relieving factors.

Statistical analysis

The responses were downloaded in a spreadsheet and managed with the Statistical Package for Social Sciences (IBM SPSS Statistics), version 26 for Windows (IBM Corp., Armonk, N.Y., USA). Categorical variables were summarized as counts and percentages and Pearson's Chi-Square test for independence of observations or Fisher's exact test were used to assess the association between the type of headache and relevant variables. The Chi-square test for trend was used when one variable was ordinal (e.g., rating of the MSQ 2.1 questions) and the other was categorical (e.g., the type of headache). The score of the MSQ 2.1 was summarized as the median and interquartile range (expressed as the 25th–75th percentiles). A p-value<0.05 was adopted to interpret the results of the tests of significance.

3. RESULTS

The present study included 374 participants who completed the online questionnaire. The responses to the ID Migraine questionnaire showed that half the respondents experienced nausea or sickness in the stomach in relation to headaches, while 65% were bothered more by light than usual and had limited ability to work or perform tasks during headaches (Figure 1). The respondents who answered positively to two at least of the questions were 240 (64.2%), while 134 respondents answered yes to one question only (35.8%).

The age of most respondents ranged from 18 to 29 years, while the least age group was above 50 years (5.6%). The distribution of female and male respondents was nearly equal with a slightly higher percentage of females (54.5% vs. 45.5%). The majority were Saudi citizens (90.9%). Most respondents had a bachelor's degree (60.2%). One-third had one or more chronic diseases, the most frequent being irritable bowel syndrome (IBS, 15.8%) and anxiety (12.8%). Only 20.9% of the respondents smoked cigarettes or shisha. More than half the respondents had a monthly income of less than 5,000 Saudi Riyal and one-quarter had an income of 5,000-10,000 Saudi Riyal. One-third had a family history of migraine headaches. Compared to the other headache group, the migraine group was significantly associated with a higher prevalence of females (61.7% vs. 41.8%, p<0.001), presence of chronic diseases (37.9% vs. 22.4%, p = 0.002) particularly IBS (19.6% vs. 9%, p = 0.007) and anxiety (15.4% vs. 8.2%, p = 0.046) and a positive family history of migraines (39.6% vs. 19.4%, p<0.001) (Table 1).
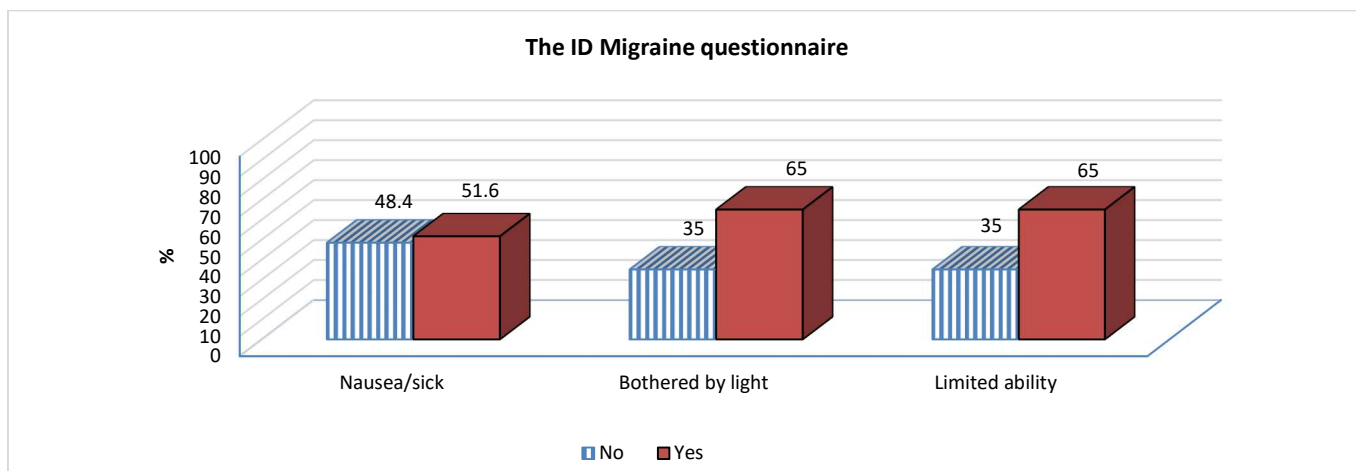
Figure 1 Responses to the ID Migraine questionnaire (total n = 374)

Table 1 Characteristics of the respondents (total n = 374)

Personal characteristics		Total (n = 374)	Other headaches (n = 134)	Migraine (n = 240)	Test statistic	p-value
Age (years)	18-29	266 (71.1%)	101 (75.4%)	165 (68.8%)	1.035 a	0.319
	30-39	58 (15.5%)	17 (12.7%)	41 (17.1%)		
	40-49	29 (7.8%)	9 (6.7%)	20 (8.3%)		
	>50	21 (5.6%)	7 (5.2%)	14 (5.8%)		
Sex	Female	204 (54.5%)	56 (41.8%)	148 (61.7%)	13.701 b	<0.001*
	Male	170 (45.5%)	78 (58.2%)	92 (38.3%)		
Nationality	Saudi	340 (90.9%)	121 (90.3%)	219 (91.3%)	0.094 b	0.759
	Non-Saudi	34 (9.1%)	13 (9.7%)	21 (8.8%)		
Educational level	Literate	6 (1.6%)	0 (0.0%)	6 (2.5%)	1.152 a	0.297
	High school	104 (27.8%)	36 (26.9%)	68 (28.3%)		
	Bachelor	225 (60.2%)	84 (62.7%)	141 (58.8%)		
	Higher education	24 (6.4%)	7 (5.2%)	17 (7.1%)		
	Other	15 (4.0%)	7 (5.2%)	8 (3.3%)		
DO you have any of these chronic diseases	No	253 (67.6%)	104 (77.6%)	149 (62.1%)	9.474 b	0.002*
	Yes	121 (32.4%)	30 (22.4%)	91 (37.9%)		
	Irritable bowel syndrome	59 (15.8%)	12 (9.0%)	47 (19.6%)	7.310 b	0.007*
	Anxiety	48 (12.8%)	11 (8.2%)	37 (15.4%)	3.993 b	0.046*
	Diabetes mellitus	16 (4.3%)	4 (3.0%)	12 (5.0%)	0.853 b	0.356
	Thyroid gland disturbances	13 (3.5%)	4 (3.0%)	9 (3.8%)	FE	0.778
	Morbid obesity	12 (3.2%)	4 (3.0%)	8 (3.3%)	FE	1.000
	Sleep apnea syndrome	8 (2.1%)	2 (1.5%)	6 (2.5%)	FE	0.717
Smoking and shisha usage	No	296 (79.1%)	105 (78.4%)	191 (79.6%)	0.078 b	0.780
	Yes	78 (20.9%)	29 (21.6%)	49 (20.4%)		
Monthly income (Saudi Riyal)	< 5,000	215 (57.5%)	83 (61.9%)	132 (55.0%)	0.617 a	0.432
	5,000 - 10,000	93 (24.9%)	27 (20.1%)	66 (27.5%)		
	> 10,000	66 (17.6%)	24 (17.9%)	42 (17.5%)		
Family history of migraine headaches	No	253 (67.6%)	108 (80.6%)	145 (60.4%)	16.001 b	<0.001*
	Yes	121 (32.4%)	26 (19.4%)	95 (39.6%)		

a: Chi-square test for trend; b: Pearson's Chi-square test for independence of observations; FE: Fisher's exact test; * significant at p<0.05

The frequency of headaches per month was less than four times in most respondents (76.9%). The headache lasted for less than four hours in 44.8% of respondents, while the duration extended from 4 to 72 hours in 25.7%. Most participants experienced a headache in one head side (69.3%) and felt like a pulse (80.5%). The headache was moderate in severity (46.3%), severe in 27.2%, and aggravated by or caused avoidance of physical activity in 62.3%. Nearly two-thirds of respondents had some form of associated symptoms with headache, the commonest being photophobia 59.4%, followed by nausea/vomiting (40.6%) and smelling an odour (13.4%). There was a significant trend of the migraine group to have more frequent headache episodes per month (p<0.001), with longer duration (p<0.001), and with higher severity (p<0.001). In addition, the migraine group had a significantly higher percentage of respondents experiencing unilateral headache (76.7% vs. 56.0%, p<0.001), with pulse-like feeling (87.5% vs. 67.9%, p<0.001) and the headache aggravated or caused avoidance of physical activity (72.5% vs. 44.0%, p<0.001), as well as association with photophobia (p<0.001), nausea/vomiting (p<0.001) or smelling odours (p = 0.002) (Table 2).

Table 2 Characteristics of headache (total n = 374)

Characteristics of headache		Total (n = 374)	Other headaches (n = 134)	Migraine (n = 240)	Test statistic	p-value
Frequency of headache per month	< 4 times	279 (76.9%)	113 (91.9%)	166 (69.2%) $-	18.981 b	<0.001*
	4-10 times	69 (19.0%)	8 (6.5%)	61 (25.4%) $+		
	10-15 times	6 (1.7%)	2 (1.6%)	4 (1.7%)		
	> 15 times	9 (2.5%)	0 (0.0%)	9 (3.8%) $+		
Duration of headache	Seconds	44 (11.8%)	37 (27.6%)	7 (2.9%) $-	66.133 b	<0.001*
	Minutes	55 (14.7%)	29 (21.6%)	26 (10.9%)		
	< 4 h	167 (44.8%)	51 (38.1%)	116 (48.5%)		
	4 h - 72 h	96 (25.7%)	14 (10.4%)	82 (34.3%) $+		
	> 72 h	11 (2.9%)	3 (2.2%)	8 (3.3%)		
Unilateral location	No	115 (30.7%)	59 (44.0%)	56 (23.3%)	17.298 a	<0.001*
	Yes	259 (69.3%)	75 (56.0%)	184 (76.7%)		
The pain feel pulse like	No	73 (19.5%)	43 (32.1%)	30 (12.5%)	21.006 a	<0.001*
	Yes	301 (80.5%)	91 (67.9%)	210 (87.5%)		
Severity	Mild	97 (26.4%)	65 (50.4%)	32 (13.4%) $-	62.519 b	<0.001*
	Moderate	170 (46.3%)	51 (39.5%)	119 (50.0%)		
	Severe	100 (27.2%)	13 (10.1%)	87 (36.6%) $+		
Aggravation by or causing avoidance of routine physical activity	No	141 (37.7%)	75 (56.0%)	66 (27.5%)	29.675 a	<0.001*
	Yes	233 (62.3%)	59 (44.0%)	174 (72.5%)		
Associated symptoms with headache	None	113 (30.2%)	82 (61.2%)	31 (12.9%)	95.051 a	<0.001*
	Photophobia	222 (59.4%)	41 (30.6%)	181 (75.4%)	71.602 a	<0.001*
	Nausea &/or vomiting	152 (40.6%)	27 (20.1%)	125 (52.1%)	36.350 a	<0.001*
	Smelling odor before/after headache	50 (13.4%)	8 (6.0%)	42 (17.5%)	9.870 a	0.002*

a: Pearson's Chi-square test for independence of observations; b: Chi-square test for trend; * significant at p<0.05; $+: significantly higher frequency than the other headache group; $-: significantly lower frequency than the other headache group.

The most frequent triggers of headache included noise (55.9%), stress (43.9%), screen usage (36.6%), change in sleep pattern (34.8%), fasting/skipping meals (23.8%), caffeine deprivation (22.2%) and menses in females (21.9%). The significantly associated triggers with migraine were noise (63.3% vs. 42.5%, p<0.001), stress (50.0% vs. 32.8%, p = 0.001), screen usage (42.1% vs. 26.9%, p = 0.003) and fasting/skipping meals (29.6% vs. 13.4%, p<0.001). The most common relieving factor for headache was sleep (73.3%), followed by paracetamol, fevadol, tylenol and caffeine (46.5%), dark and quiet environment (43.3%), reducing noise (41.2%), painkillers as ibuprofen and aspirin (38.5%) and local massage (22.5%). The relieving factors that were significantly associated with migraine were dark and quiet environment (50.8% vs. 29.9%, p<0.001), reducing noise (47.9% vs. 29.1%, p<0.001) and local massage (25.8% vs. 16.4%, p = 0.036) (Table 3).

Table 3 Aggravating and relieving factors of headache (total n = 374)

Triggers and relieving factors	Total (n = 374)	Other headaches (n = 134)	Migraine (n = 240)	Test statistic	p-value
Triggers for headache					
Noise	209 (55.9%)	57 (42.5%)	152 (63.3%)	15.084 a	<0.001*
Stress	164 (43.9%)	44 (32.8%)	120 (50.0%)	10.289 a	0.001*
Screens	137 (36.6%)	36 (26.9%)	101 (42.1%)	8.579 a	0.003*
Change in sleep pattern	130 (34.8%)	39 (29.1%)	91 (37.9%)	2.945 a	0.086
Fasting or skipping meals	89 (23.8%)	18 (13.4%)	71 (29.6%)	12.369 a	<0.001*
Caffeine	83 (22.2%)	33 (24.6%)	50 (20.8%)	0.717 a	0.397
Menses	82 (21.9%)	27 (20.1%)	55 (22.9%)	0.385 a	0.535
Physical activities	48 (12.8%)	18 (13.4%)	30 (12.5%)	0.067 a	0.796
No specific reason	5 (1.3%)	3 (2.2%)	2 (0.8%)	FE	0.354
Others	48 (12.8%)	20 (14.9%)	28 (11.7%)	0.816 a	0.366
Relieving factors					
Sleep	274 (73.3%)	101 (75.4%)	173 (72.1%)	0.475 a	0.491
Paracetamol, fevadol, Tylenol and caffeine	174 (46.5%)	55 (41.0%)	119 (49.6%)	2.520 a	0.112
Dark and quiet environment	162 (43.3%)	40 (29.9%)	122 (50.8%)	15.419 a	<0.001*
Reducing the noise	154 (41.2%)	39 (29.1%)	115 (47.9%)	12.564 a	<0.001*
Painkiller (ibuprofen, asprin, rofenac)	144 (38.5%)	43 (32.1%)	101 (42.1%)	3.627 a	0.057
Local massage	84 (22.5%)	22 (16.4%)	62 (25.8%)	4.377 a	0.036*
Triptans	18 (4.8%)	7 (5.2%)	11 (4.6%)	0.077 a	0.781
Anti-emetic medication	14 (3.7%)	4 (3.0%)	10 (4.2%)	0.333 a	0.564
Others	38 (10.2%)	21 (15.7%)	17 (7.1%)	6.948 a	0.008*

a: Pearson's Chi-square test for independence of observations; b: Chi-square test for trend; FE: Fisher's exact test; * significant at p<0.05

The responses of the participants to the MSQ 2.1 questionnaire showed a significant impact on all aspects and a trend towards a lower ability to perform duties/tasks, hindered social activities and feeling like a burden on others in the migraine group (p<0.001) (Table 4). The comparison of the rescaled total MSQ 2.1 score showed a significantly lower score in the migraine group compared to the other headache group (Median: 59 vs. 77, p<0.001) (Figure 2). The IQR of the score in the migraine group was 49-67, as opposed to 64-94 in the other headache group.
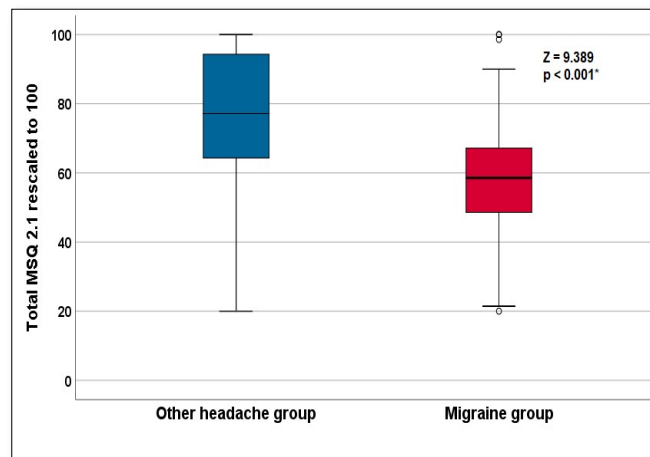

Figure 2 Comparison of the rescaled total score of MSQ 2.1 between migraine and other headache groups (total n = 374)

Z: standardized test statistic of Mann-Whitney test; * significant at p<0.05

Table 4 Effect of headache on the quality of life of the respondents (The MSQ 2.1 questionnaire, total n = 374)

Questions	Groups	Always	Almost	Sometimes	Rarely	Never	Test statistic	p-value
Q 1	Total	42 (11.2%)	57 (15.2%)	132 (35.3%)	87 (23.3%)	56 (15.0%)	45.340 a	<0.001*
	Other headaches	11 (8.2%)	10 (7.5%)	31 (23.1%)	37 (27.6%)	45 (33.6%)		
	Migraine	31 (12.9%)	47 (19.6%) $+	101 (42.1%) $+	50 (20.8%)	11 (4.6%) $-		
Q 2	Total	27 (7.2%)	37 (9.9%)	152 (40.6%)	82 (21.9%)	76 (20.3%)	52.275 a	<0.001*
	Other headaches	6 (4.5%)	4 (3.0%)	34 (25.4%)	37 (27.6%)	53 (39.6%)		
	Migraine	21 (8.8%)	33 (13.8%) $+	118 (49.2%) $+	45 (18.8%)	23 (9.6%) $-		
Q 3	Total	29 (7.8%)	60 (16.0%)	146 (39.0%)	87 (23.3%)	52 (13.9%)	66.763 a	<0.001*
	Other headaches	6 (4.5%)	6 (4.5%)	39 (29.1%)	38 (28.4%)	45 (33.6%)		
	Migraine	23 (9.6%)	54 (22.5%) $+	107 (44.6%) $+	49 (20.4%)	7 (2.9%) $-		
Q 4	Total	35 (9.4%)	65 (17.4%)	141 (37.7%)	77 (20.6%)	56 (15.0%)	78.005 a	<0.001*
	Other headaches	4 (3.0%)	8 (6.0%)	40 (29.9%)	34 (25.4%)	48 (35.8%)		
	Migraine	31 (12.9%) $+	57 (23.8%) $+	101 (42.1%)	43 (17.9%)	8 (3.3%) $-		
Q 5	Total	34 (9.1%)	66 (17.6%)	136 (36.4%)	81 (21.7%)	57 (15.2%)	65.745 a	<0.001*
	Other headaches	7 (5.2%)	8 (6.0%)	35 (26.1%)	37 (27.6%)	47 (35.1%)		
	Migraine	27 (11.3%)	58 (24.2%) $+	101 (42.1%) $+	44 (18.3%)	10 (4.2%) $-		
Q 6	Total	34 (9.1%)	67 (17.9%)	127 (34.0%)	75 (20.1%)	71 (19.0%)	61.215 a	<0.001*
	Other headaches	5 (3.7%)	7 (5.2%)	40 (29.9%)	30 (22.4%)	52 (38.8%)		
	Migraine	29 (12.1%) $+	60 (25.0%) $+	87 (36.3%)	45 (18.8%)	19 (7.9%) $-		
Q 7	Total	63 (16.8%)	77 (20.6%)	124 (33.2%)	63 (16.8%)	47 (12.6%)	77.780 a	<0.001*
	Other headaches	10 (7.5%)	12 (9.0%)	36 (26.9%)	35 (26.1%)	41 (30.6%)		
	Migraine	53 (22.1%) $+	65 (27.1%) $+	88 (36.7%)	28 (11.7%)	6 (2.5%) $-		
Q 8	Total	44 (11.8%)	63 (16.8%)	131 (35.0%)	86 (23.0%)	50 (13.4%)	74.185 a	<0.001*
	Other headaches	7 (5.2%)	4 (3.0%)	40 (29.9%)	41 (30.6%)	42 (31.3%)		
	Migraine	37 (15.4%) $+	59 (24.6%) $+	91 (37.9%)	45 (18.8%) $-	8 (3.3%) $-		
Q 9	Total	34 (9.1%)	45 (12.0%)	109 (29.1%)	88 (23.5%)	98 (26.2%)	35.161 a	<0.001*
	Other headaches	5 (3.7%)	9 (6.7%)	31 (23.1%)	29 (21.6%)	60 (44.8%)		
	Migraine	29 (12.1%) $+	36 (15.0%) $+	78 (32.5%)	59 (24.6%)	38 (15.8%) $-		
Q 10	Total	40 (10.7%)	48 (12.8%)	116 (31.0%)	84 (22.5%)	86 (23.0%)	45.876 a	<0.001*
	Other headaches	5 (3.7%)	4 (3.0%)	39 (29.1%)	33 (24.6%)	53 (39.6%)		
	Migraine	35 (14.6%) $+	44 (18.3%) $+	77 (32.1%)	51 (21.3%)	33 (13.8%) $-		
Q 11	Total	48 (12.8%)	51 (13.6%)	115 (30.7%)	76 (20.3%)	84 (22.5%)	62.478 a	<0.001*
	Other headaches	5 (3.7%)	6 (4.5%)	34 (25.4%)	32 (23.9%)	57 (42.5%)		
	Migraine	43 (17.9%) $+	45 (18.8%) $+	81 (33.8%)	44 (18.3%)	27 (11.3%) $-		
Q 12	Total	58 (15.5%)	64 (17.1%)	121 (32.4%)	65 (17.4%)	66 (17.6%)	52.487 a	<0.001*
	Other headaches	9 (6.7%)	13 (9.7%)	36 (26.9%)	28 (20.9%)	48 (35.8%)		
	Migraine	49 (20.4%) $+	51 (21.3%) $+	85 (35.4%)	37 (15.4%)	18 (7.5%) $-		
Q 13	Total	38 (10.2%)	39 (10.4%)	79 (21.1%)	72 (19.3%)	146 (39.0%)	19.112 a	<0.001*
	Other headaches	5 (3.7%)	9 (6.7%)	27 (20.1%)	23 (17.2%)	70 (52.2%)		
	Migraine	33 (13.8%) $+	30 (12.5%)	52 (21.7%)	49 (20.4%)	76 (31.7%) $-		
Q 14	Total	60 (16.0%)	48 (12.8%)	90 (24.1%)	65 (17.4%)	111 (29.7%)	20.137 a	<0.001*
	Other headaches	13 (9.7%)	14 (10.4%)	25 (18.7%)	22 (16.4%)	60 (44.8%)		
	Migraine	47 (19.6%) $+	34 (14.2%)	65 (27.1%)	43 (17.9%)	51 (21.3%) $-		

Q1: interfering with dealing with family, friends and others who are close to you; Q2: interrupting leisure time activities; Q3: Having difficulty in performing work or other daily activities; Q4: Being kept from getting as much accomplished as you normally do; Q5: Limiting your ability to work or do other activities as carefully as you usually do them; Q6: cancelling or delaying work or social activities because you were exhausted; Q7: limiting energy levels; Q8: Having to stop work or other activities; Q9: Needing the help of other people in handling routine tasks; Q10: Avoiding social or family activities to treat your migraine attacks; Q11: Difficulty to go to social events such as parties; Q12: Feeling fed up or frustrated; Q13: Feeling like a burden on others; Q14: Fear of letting others down; a: Chi-square test for trend; * significant at p<0.05 ; $+: significantly higher frequency than the other headache group; $-: significantly lower frequency than the other headache group.

4. DISCUSSION

Globally, migraine is among the leading disabling diseases (Ashina et al., 2021). Saudi Arabia has reportedly one of the highest rates of migraine in the Arab world (El-Metwally et al., 2020). The present study aimed to estimate the prevalence of migraine headaches in Tabuk and assess the associated factors. The prevalence of migraine among the respondents was 64.2%. Similar rates were reported by Almalki et al., (2018) on the general public in Taif, with a rate of 78.5%. Moreover, the prevalence among students of Fakeeh College for Medical Sciences in Jeddah, Saudi Arabia was 71.6% (Kanjo et al., 2021). However, much lower rates were reported by previous studies where the rates ranged from 12.3% in Aseer, Saudi Arabia (Al-Qarni et al., 2020) to 37.2% in Jeddah (Alotaibi et al., 2018; Bamalan et al., 2021).

The wide variations in the reported rates of migraine can be attributed to several factors. First, the rates can differ from one region to another according to the altitude above sea level. High altitude has been linked to a higher rate of headaches, particularly migraine, in altitudes above 500 meters (Linde et al., 2017) as in Tabuk. Second, some regions may have higher rates of migraine due to the weather conditions and the extent of air pollution (Li et al., 2019). Third, the methods used for recruiting the participants may affect the prevalence rate. Studies that depend on a convenient sample particularly when the invitation and distribution are through social media platforms will attract mainly the individuals who are interested in the investigated topic, presumably because they suffer from this condition. Meanwhile, those not suffering from the condition may be not interested to participate. Fourth, personal factors of the participants may increase or decrease the rates of migraine as studies that include participants from one gender only or university students during the stress of exams.

According to the respondents' answers, migraine was significantly associated with the female gender (p<0.001). This finding is supported by Ibrahim et al., (2017), Almalki et al., (2018) and Al-Qarni et al., (2020) that found more than two-thirds of migraine patients to be female in Saudi Arabia as well as worldwide (Al-Hassany et al., 2020). The higher predisposition of females to suffering migraine may be attributed partially to the fluctuations in the levels of sex hormones, particularly the ovarian estrogen and progesterone by modulating the action of several hormones and vasoactive neuromediators that are involved in the pathophysiology of migraine. However, the precise mechanisms have not yet been elucidated. In addition, other factors contribute to the higher risk of migraine in females, including gender disparities in pain perception as well as work, economy, social life, expectations and stresses (Al-Hassany et al., 2020; Allais et al., 2020).

The migraine group in this study showed a higher frequency of persons suffering from chronic diseases than the other headaches group (p = 0.002), particularly IBS (p = 0.007) and anxiety (p = 0.046). Anxiety has been significantly linked to IBS and so the association between migraine and IBS may be explained by the common contributing factor (i.e., anxiety) that caused both conditions. Anxiety correlates significantly with migraine and this relationship may even be bidirectional, with one condition causing or precipitating the other (Kumar et al., 2022).

We found also that migraine was significantly associated with a positive family history of migraines (p<0.001), with 39.6% of migraines having a positive family history. This finding agrees with the results of previous studies in Saudi Arabia that reported similar frequencies (Gouhar et al., 2018; Kanjo et al., 2021). Merikangas, (2013) and Dzoljic et al., (2014) stated higher rates of positive family history among migraine patients while a lower prevalence of positive family history was reported by Gu and Xie, (2018) from China. Hsu et al., (2020) from China reported a higher rate in males compared to females. Meanwhile, genetic studies identified multiple susceptibility variants in the genome and this may explain the running of migraine in some families (Ducros, 2021). The higher rate of migraines with positive family history in Saudi studies may be explained by the genetic similarities within the Saudi population and the higher rate of consanguineous marriages in Saudi society.

The characteristics of unilateral head affection and pulse-like feeling were described by most participants with migraine, which is consistent with the reported classical migraine manifestations (Loder et al., 2013; Almalki et al., 2018; Al-Qarni et al., 2020; Kanjo et al., 2021; Mansour et al., 2021). Meanwhile, these characteristics were significantly less reported in the other headaches group (p<0.001) in our study (Al-Qarni et al., 2020).

Migraine headaches are known to be accompanied by other manifestations, which are nevertheless not commonly experienced in some migraines. The significantly associated symptoms among our respondents with migraine included photophobia (p<0.001), nausea/vomiting (p<0.001) and smelling odours (p = 0.002). These symptoms were also reported by a large body of literature, though their prevalence varied across the studies. For instance, some studies (Menon and Kinnera, 2013; Bamalan et al., 2021) similar to our results found photophobia to be the most frequently recorded symptom. Meanwhile, Almalki et al., (2018) reported that nausea was the most frequent symptom. Migraine-associated symptoms can serve as a warning sign for the patients so that they can undertake measures that can alleviate the headache early and reduce the duration of the attack. Moreover, these symptoms can help differentiate migraines from other types of headaches.

Regarding the frequency of headache episodes, migraine headaches significantly tended to occur more frequently during the month than did the other "non-migraine" headaches (p<0.001) and they had longer durations (p<0.001) and severity (p<0.001). Likewise, Khan et al., (2012) showed that migraine headaches usually last for 4-72 hours. The higher frequency of attacks per month, longer duration and increased severity were also remarkable for migraine compared to other types of headache as illustrated by Al-Qarni et al., (2020) on the general public in the Aseer region, Saudi Arabia.

These characteristics can explain the negative effect of migraine that we detected on the patient's quality of life and how it interferes with their usual activities more than other headaches do. We found that more than two-thirds of migraine patients felt that physical activity aggravated the migraine or caused them to avoid performing physical activities (p<0.001), which is supported by previous reports (Al-Qarni et al., 2020).

The literature defines several triggering factors for migraine headaches that initiate the episode of migraine or aggravate it. The most prevalent and significant triggers for migraine among our respondents included noise (p<0.001), stress (p = 0.001), screen usage (p = 0.003) and fasting/skipping meals (p<0.001).

These triggering factors were also reported by previous research work, though the order of their frequency differed from one study to another. Ibrahim et al., (2017) reported that stress, followed by sleep disturbances, were the commonest triggers for migraine at King Abdulaziz University, Jeddah, Saudi Arabia. On the other hand, Al-Qarni et al., (2020) in Aseer and Bamalan et al., (2021) in Jeddah, Saudi Arabia, found that the most common factors were sleep deprivation followed by stress/anxiety. Kanjo et al., (2021) stated that the commonest trigger in Fakeeh College, Jeddah, Saudi Arabia, was sleep, followed by noise and then emotional stress/anxiety. Stress was the most recorded trigger factor in a Chinese study (Gu and Xie, 2018).

The relationship between stress and migraine seems to be bidirectional as that between anxiety and migraine. Stress is a risk factor for migraine (Stubberud et al., 2021). Stress stimulates the hypothalamic pituitary adrenocortical axis, with the subsequent activation of the corticotrophin-releasing hormone. This in turn induces alterations in the serotonin receptors, leading to degranulation of the cells near the trigeminal nerve endings, with the release of the vasoactive and inflammatory substances that are involved in migraine pathophysiology (Theoharides et al., 1995; Olness et al., 1999).

Sleep disturbances were reported as triggers of headaches both in migraine and the non-migraine groups in our study. Rafique et al., (2020) reported a lack of significant association between sleep disturbances and migraine headaches. However, Zhu et al., (2013), Parashar et al., (2014) and Kim et al., (2017) showed a significant association between poor sleep quality and migraine.

The relieving factors that were significantly associated with migraine were dark and quiet environment (p<0.001), reducing noise (p<0.001) and local massage (p = 0.036). Avoidance of bright lights and noise can help to avoid migraine or alleviate the severity of headache. The use of local massage was also reported by Haque et al., (2012) to relieve migraine more than tension headaches.

According to the results of the MSQ 2.1 questionnaire, respondents with migraine had a significantly poorer quality of life compared to those with other types of headaches. All aspects were markedly affected in migraine patients, including the interference with usual routine activities, physical performance and social life with family and friends and the feeling of patients that they constitute a burden on others. In addition, migraine headaches made them feel vulnerable and dependent on others. These results highlight the gravity of the negative impact of migraine and that it exceeds the effect of other types of headaches.

The affection of the migraines' quality of life was also reported by previous studies using the World Health Organization QOL Brief (Shaik et al., 2015), the MSQ 2.1 (Al-Harbi and Al-Ateeq, 2020; Pradeep et al., 2020) and the 36-item short-form survey (SF-36) (Bamalan et al., 2021) tools, displaying negative affection of all aspects of the quality of life and the scores were significantly lower than the healthy controls (Shaik et al., 2015; Bamalan et al., 2021).

The present study has several points of strength as it is the first study to address the prevalence and characteristics of migraine among the citizens of Tabuk City, Saudi Arabia. Moreover, the study compared the migraine's characteristics and its impact on quality of life to other types of headaches, which helps identify the distinguishing points between the two conditions. Meanwhile, the study has some limitations. First, the sample was convenient and this may have resulted in the inclusion of a higher number of migraine patients as they may be more interested to participate in the study. In addition, we did not include specific questionnaires for the quality of sleep or anxiety to assess the role of these conditions as triggering factors or comorbid conditions with migraine.

5. CONCLUSIONS

The prevalence of migraine seems to be high among the citizens of Tabuk City, Saudi Arabia. The characteristics of migraine and the differences from other types of headaches are mostly consistent with the literature. Health education should elevate the

awareness of the public about the characteristics, relieving factors and treatment of migraines. Efforts should be exerted to improve the patients' quality of life.

Ethical approval
The study obtained ethical clearance from the Ethical Committee of the Directorate of Health Affairs in Tabuk, Saudi Arabia and The Ethical approval code: TU-07710221161.

Informed consent
Participants were informed about the study objectives and methodology at the beginning of the online survey and in the invitation, messages sent through social media platforms. The consent to participate in the study was obtained by a question at the beginning of the survey that asked the participants whether they agree or do not agree to participate. The study conserved participants' privacy. The investigators kept the data secure and the participants' data would not be used for any other purpose outside this study. Personal data (e.g., name, contact info) were not entered in our data entry software to conserve the participants' privacy. Each subject got a unique identifier code.

Conflict of interest
The authors declare that there is no conflict of interests.

Data and materials availability
All data sets collected during this study are available upon reasonable request from the corresponding author.

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