

Prevalence of primary headache among King Khalid University students in 2019

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Received: August 2020; Accepted: September 2020; Published: October 1, 2020.

Citation: Shehata Farag Shehata et al. Prevalence of primary headache among King Khalid University students in 2019. World Family Medicine. 2020; 18(10): 57-65 DOI: 10.5742/MEWFM.2020.93875

Abstract

Background: Headache is one of the most common complaints among medical students more than the general population, as a result of multiple physical and psychosocial stressors. Also the degree of headache severity has a great impact on quality of life, psychological behavior, academic performance and work. The pathophysiology of the primary headache is not clear, but several hypotheses suggest that neurovascular disorders can result in migraine and cluster headache; overactivity of pericrania or cervical muscles result in tension type headache.

Aim: to assess prevalence of primary headache among King Khalid University students in 2019.

Methodology: A descriptive cross-sectional approach was used targeting all accessible student population in Aseer region, southern Saudi Arabia. Data were collected from participants using electronic pre-structured questionnaire. The questionnaire data included student's socio-demographic data such as age, gender, faculty nature (medical, non-medical), and family history as well as , causes and risk factors of different types of headache among students, and co-morbidities. Headache data including duration, complaint, type of headache, medical intervention and outcome.

Results: The study included 421 students whose ages ranged from 18 to 30 years with mean age of 21.7 ± 1.9 years old. Males were 71.5% of the sample and 56.3% were from medical colleges. Generalized headache pain was the most recorded (45%) followed by migraine (31.2%) while frontal headache was recorded among 21% of the students. Headache started suddenly in 29.6% of the attacks and it was more in the evening and night times (63.8%). The most recorded Prodroma signs were blurred vision (37.8%) followed by drowsiness (24.6%) while no Prodroma was recorded among 44.2% of the students.

Conclusions: In conclusion, more than three quarters of the students complained of moderate to severe headache attacks which were mainly related to sleeping disturbance, studying hours, and stressful lifestyle. Students should be taught strategies for stress management training for headache.

Key words: headache, primary, students, university, prevalence, risk factors

Background

Headache is a pain of the head that can be confined to a specific site of head or is diffuse across the head from one point or affecting one or both sides [1]. It could start gradually or be of abrupt onset, with duration ranging from several minutes up to many days, and has different manifestations that are revealed as throbbing, sharp or dull pain [2]. Also, headache can be episodic or chronic (headache that occurs for 15 days or more than a month) [3]. The total socioeconomic cost of headache to society is about \$14 billion per year [4]. Lifelong prevalence of headache is 96% [5]. According to the 3rd edition of the International Classification of Headache disorders published by the International Headache Society, headache can be classified as primary headache that includes migraine, tension-type headaches, trigeminal autonomic cephalgia and other primary headache disorder (headache not of the other 3 groups and that does not have a secondary cause). Secondary headache results from a clinical condition or underlying disease [3]. Headache is one of the most common complaints among medical students, more so than the general population, as a result of multiple physical and psychosocial stressors [6]. The degree of headache severity has a great impact on quality of life, psychological behavior, academic performance and work [7].

The pathophysiology of primary headache is not clear, but several hypotheses suggest that neurovascular disorders can result in migraine and cluster headache; overactivity of pericrania or cervical muscles result in tension type headache [8, 9]. Several hypotheses have emerged to explain the specific causes of Migraine, such as a mutation in a calcium gene channel that makes the individual more sensitive to environmental factors, and accordingly, migraine is considered a complex familial disorder [10]. Also, a clear association between headache and releases of calcitonin gene-related peptide have been demonstrated, as well as additional release of vasoactive intestinal peptide in cluster and chronic paroxysmal headache [11].

Globally, according to the American Journal of Medicine, the prevalence of tension-type headache is approximately 40%; migraine is 10% and 3 times more common in females; cluster headache which is a type of trigeminal autonomic cephalgia is 0.1% and chronic daily headache at 3%-5% and mostly in the form of chronic migraine [5]. A study done in Sweden on an elementary school, reports that about 22% of pupils had a headache at least once a week, and this study shows a great association between smoking and headache in both sexes [12]. A study was done in 2015 among nursing staff in North China (n= 1102), noted that the prevalence of primary headache was 45.3%, in which tension type headache was 26.2%, migraine was 14.8% (3.4% with aura and 11.4% without aura) and chronic daily headache in 2.7%. Only 10 nurses were diagnosed with two primary headache types, and two nurses with both chronic daily headache and medication

over use headache [13]. The current study aimed to assess the prevalence of primary headache and its subtypes among students in King Khalid University.

Methodology

A descriptive cross-sectional approach was used targeting all students in King Khalid University, Abha, Saudi Arabia, during academic year 2019-2020. The study was conducted during the period from March 2019 to June 2020. Students with chronic psychological disorders, chronic deviated nasal septum, and visual disturbance were excluded. Data were collected using structured questionnaire which was developed by the researchers after intensive literature review and experts' consultation. The questionnaire data included student's socio-demographic data such as age, gender, faculty nature (medical, non-medical), and family history. Also, causes and risk factors of different types of headache among students, as well as comorbidities. Headache data including duration, complaint, type of headache, medical intervention outcome was recorded. A panel of 3 experts reviewed the questionnaire independently for content validity and all suggested modifications were applied till the final tool was achieved. The questionnaire was uploaded online using social media platforms by the researchers and their relatives and friends to be filled out by all the student population in Aseer region. A consecutive convenience sampling method was used due to the current lockdown and lack of physical contact due to COVID-19 pandemic. All those who received the electronic questionnaire during the study period and fulfilling the inclusion criteria were invited to participate through filling out the questionnaire.

Data analysis

After data were extracted, it was revised, coded and fed into Statistical Software IBM SPSS version 22 (SPSS, Inc. Chicago, IL). All statistical analysis was done using two tailed tests. P value less than 0.05 was considered to be statistically significant. Descriptive analysis based on frequency and percent distribution was done for all variables including demographic data, headache related data and its risk factors. Cross tabulation was used to assess univariate analysis for different risk factors of headache among students. Relations were tested using Pearson chi-square test. Multiple logistic regression model was used to assess the most significant adjusted determinants of students' headache complaints. Factors extracted were based on backwards LR model.

Results

The study included 421 students whose ages ranged from 18 to 30 years with mean age of 21.7 ± 1.9 years old. Males were 71.5% of the sample and 56.3% were from medical colleges. Insufficient family income was recorded among 28.7% of the students and 15% were smokers. Headache during the last 3 months was recorded among 362 students (86%). Headache was recorded among 90% of the students aged less than 20 years and among 87.8% of those aged 25 years or more with no statistical significance ($P=.600$). As for gender, 82.7% of the male students complained of headache in the last 3 months compared to 94.2% of the females with a statistically significant difference ($P=.002$). Considering faculty nature, headache was recorded among 84.4% of the medical college students compared to 88% of non-medical college students ($P=.284$). All married students complained of headache during the last 3 months compared to 85.5% of single students. Smoking and family income were not significantly related with headache complaint (Table 1).

Table 2 demonstrates the characteristics of the headache episodes among the students. Generalized headache pain was the most recorded (45%) followed by migraine (31.2%) while frontal headache was recorded among 21% of the students. Headache started suddenly in 29.6% of the attacks and it was more in the evening and night times (63.8%). The most recorded Prodroma signs were blurred vision (37.8%) followed by drowsiness (24.6%) while no Prodroma was recorded among 44.2% of the students. Regarding aggravating factors, stress was the most reported (83.7%) followed by sleep disturbance (76%), and tiredness (30.4%). Sleeping was the most identified relieving factors (75.4%) followed by having analgesics (55.8%), sitting in a quiet dark room (45.6%), and having coffee (1.7%). With regard to pain severity, it was moderate among 55.8% of the students and severe among 29.8% of them. Daily activities performance was affected among 76% of the students who had headache and 47% of them used drugs to overcome pain.

With regard to predictors of headache among the students (Table 3), headache was reported by all students who studied for more than 12 hours daily compared to 82.6% of those who studied for 1 to 5 hours daily with recorded statistical significance ($P=.001$). As for skipping meals daily, headache was reported by 90.4% of the students who skipped one of their daily meals, especially breakfast, compared to 77% of those who didn't ($P=.001$). Also headache was reported by 91.1% of the students who have stimulants (coffee or tea) regularly compared to 71% of those who didn't ($P=.001$). Sleep duration was also significantly associated with headache as it was reported by 95.5% of the students who sleep for less than 5 hours daily compared to 68.3% of those who sleep for more than 8 hours ($P=.001$). All students who usually experienced unexpected events during the last period of their life had headache attacks compared to 37% of those who were rarely exposed ($P=.001$). Also 99.5% of the students who had a permanent feeling of stress had headache

compared to 20.6% of those who rarely feel stressed. Ability to control trouble source was associated with less frequent headache than others (70.6% vs. 91%).

Finally, logistic regression model revealed that among all included headache predictors (Table 4), study hours, having stimulants, exposure to stressful conditions, and ability to control trouble sources were the most important determinants of headache attacks. Studying for more hours daily was associated with 3 times more likelihood for headache (OR: 3.25; 95% CI: 1.0-10.6). Having stimulants was associated with increased likelihood for headache attacks by about 2.5 times more (OR: 2.5; 95% CI: 1-7.1). Also experience stressful unexpected events was associated with increased likelihood for headache by about 5 times (OR: 4.75; 95% CI: 1.5-15.4). Ability to control trouble source was associated with decreased likelihood for headache by about 57% (OR: 0.37; 95% CI: 0.18-0.76).

Table 1. Distribution of age according to students' socio-demographic data, KKU, Saudi Arabia

Socio-demographic data		Total (%)	Headache during last 3 months				p-value
			Yes (n=362)		No (n=59)		
			No	%	No	%	
Age in years	<20 years	42 (10.0%)	38	90.5%	4	9.5%	.600
	20-24	330 (78.4%)	281	85.2%	49	14.8%	
	25-30	49 (11.6%)	43	87.8%	6	12.2%	
Gender	Male	301 (71.5%)	249	82.7%	52	17.3%	.002*
	Female	120 (28.5%)	113	94.2%	7	5.8%	
Faculty	Medical	237 (56.3%)	200	84.4%	37	15.6%	.284
	Non-medical	184 (43.7%)	162	88.0%	22	12.0%	
Marital status	Single	406 (96.4%)	347	85.5%	59	14.5%	.111
	Married	15 (3.6%)	15	100.0%	0	0.0%	
Family income	Insufficient	121 (28.7%)	107	88.4%	14	11.6%	.589
	Just sufficient	189 (44.95)	162	85.7%	27	14.3%	
	More than sufficient	111 (26.4%)	93	83.8%	18	16.2%	
Smoking	Smoker	63 (15.0%)	52	82.5%	11	17.5%	.694
	Ex-smoker	30 (7.1%)	26	86.7%	4	13.3%	
	Non-smoker	328 (77.9%)	284	86.6%	44	13.4%	

P: Pearson X² test

* P < 0.05 (significant)

Table 2: Characteristics of headache among KKU students, Saudi Arabia

Headache data		No (n=362)	%
Headache site	<i>Migraine</i>	113	31.2%
	<i>Frontal</i>	76	21.0%
	<i>Occipital</i>	10	2.8%
	<i>Generalized</i>	163	45.0%
Onset of headache	<i>Sudden</i>	107	29.6%
	<i>Gradual</i>	255	70.4%
Time of peak	<i>Morning</i>	131	36.2%
	<i>Evening</i>	231	63.8%
Prodroma	<i>Others</i>	4	1.1%
	<i>Extremities numbness</i>	36	9.9%
	<i>Drawsiness</i>	89	24.6%
	<i>Nausea</i>	84	23.2%
	<i>Blurred vision</i>	137	37.8%
	<i>Nothing</i>	160	44.2%
Aggravating factors	<i>None</i>	1	.3%
	<i>Stress</i>	303	83.7%
	<i>Sleep disturbance</i>	275	76.0%
	<i>Tiredness</i>	110	30.4%
	<i>Cough</i>	39	10.8%
	<i>Others</i>	90	24.9%
Relieving factors	<i>Sleeping</i>	273	75.4%
	<i>Quiet dark room</i>	165	45.6%
	<i>Analgesics</i>	202	55.8%
	<i>Others</i>	65	18.0%
	<i>Coffee</i>	6	1.7%
Pain severity	<i>Mild</i>	44	12.2%
	<i>Moderate</i>	202	55.8%
	<i>Severe</i>	108	29.8%
	<i>Intractable</i>	8	2.2%
Pain affects daily activity	<i>Yes</i>	275	76.0%
	<i>No</i>	87	24.0%
Use drugs for the pain	<i>Yes</i>	170	47.0%
	<i>No</i>	192	53.0%

Table 3: Determinants of headache among KKU students, Saudi Arabia

Risk factors		Headache during last 3 months				p-value
		Yes		No		
		No	%	No	%	
Daily study hours	1-5	266	82.6%	56	17.4%	.001*
	6-9	66	95.7%	3	4.3%	
	> 12 hrs	30	100.0%	0	0.0%	
Work besides study	Yes	18	90.0%	2	10.0%	.596
	No	344	85.8%	57	14.2%	
Pregnant	Yes	1	100.0%	0	0.0%	.803
	No	112	94.1%	7	5.9%	
OCP at last 3 months	Yes	5	100.0%	0	0.0%	.570
	No	108	93.9%	7	6.1%	
Skip meals during day	Yes	255	90.4%	27	9.6%	.001*
	No	107	77.0%	32	23.0%	
Have coffee/ tea	Yes	286	91.1%	28	8.9%	.001*
	No	76	71.0%	31	29.0%	
Sleep duration	< 5 hours	212	95.5%	10	4.5%	.001*
	5-8 hours	122	77.2%	36	22.8%	
	> 8 hours	28	68.3%	13	31.7%	
Stress due to unexpected event at last month	Rarely	30	37.0%	51	63.0%	.001*
	Sometimes	189	95.9%	8	4.1%	
	Usually	143	100.0%	0	0.0%	
Feeling stressed during last month	Rarely	13	20.6%	50	79.4%	.001*
	Sometimes	168	95.5%	8	4.5%	
	Usually	181	99.5%	1	.5%	
Feeling trust to deal with troubles	Rarely	45	86.5%	7	13.5%	.001*
	Sometimes	150	92.6%	12	7.4%	
	Usually	167	80.7%	40	19.3%	
Can control troubles source	Rarely	71	91.0%	7	9.0%	.001*
	Sometimes	195	94.2%	12	5.8%	
	Usually	96	70.6%	40	29.4%	
Accumulated troubles feeling	Rarely	48	49.0%	50	51.0%	.001*
	Sometimes	185	95.9%	8	4.1%	
	Usually	129	99.2%	1	.8%	

P: Pearson X² test, * P < 0.05 (significant)

Table 4. Multiple stepwise logistic regression results for predictors of headache among KKU students, Saudi Arabia

Factor	B	S.E.	P-value	OR	95% C.I for OR	
					Lower	Upper
Study hours	1.18	0.60	0.05	3.25	1.00	10.62
Having stimulants	0.90	0.54	0.05	2.47	1.00	7.12
Unexpected events	1.56	0.60	0.01	4.75	1.47	15.35
Stress during day	3.49	0.68	0.00	32.81	8.69	123.87
Can control trouble source	-0.99	0.36	0.01	0.37	0.18	0.76
Constant	-6.53	1.41	0.00	0.00		
Model Pseudo R ² ; significance				.76; .001		
AUC				.97		

B: regression coefficient; SE: standard error; OR: adjusted odds ratio; CI: confidence interval; AUC: area under curve

Discussion

Headache is the symptom of pain in the face, head, or neck. It can occur as a migraine, tension-type headache, or cluster headache [14]. Frequent headaches can affect relationships and employment [15]. There is also an increased risk of depression in those with severe headaches [16]. Headaches can occur because of many conditions. Causes of headaches may include dehydration, fatigue, sleep deprivation, stress, and the effects of medications, the effects of recreational drugs, viral infections, loud noises, common colds, head injury, rapid ingestion of a very cold food or beverage, and dental or sinus issues [17, 18].

The current study aimed to assess the headache as a disabling factor among the university students and also to assess its determinants and effects. The study revealed that about 4 out of each 5 included students complained of chronic headache during the last months before the study onset. This assessed prevalence is nearly close to that recorded by many researchers who assessed the prevalence ranging from 41.2% to 98% [19-21]. Nearly half of the students had generalized headache all over the head and couldn't detect its main site. Migraine was the second most reported type which is not the situation in the literature as classical migraine is the most recorded. The generalized headache recorded for the study students is mostly tension headache which is more common among university students as reported by Ferri-de-Barros et al, 2011 and by Ghorbani A et al in Iran, 2013 [6, 21]. Among more than half of the student migraine started gradually and with no Prodroma. The most recorded aggravating factor for the headache was sleep disturbance which is consistent with this age group who are hyperactive with more outdoor time. This in turn confirms that sleeping was the most important relieving factor followed by having analgesics as the pain was moderate to severe among more than three quarters of the students.

Headache attacks were more recorded among female students which is the trend in most of the literature due to physiological and psychological factors including menstruation with higher incidence of anaemia and also females are more susceptible to stress conditions including university academic affairs [22, 23]. Also, headache was more reported by married students who had extra life responsibilities outside the university environment due to family requirements. The most surprising finding was that headache was reported more by non-medical college students which is against what is known as medical students had more affairs and more stressful study requirements. This may be explained by that non-medical students spend more time outdoors with friends due to their lower study commitment requirement making them more liable for less sleeping and inadequate dietary habits. Medical college students spend more time at home studying and fulfilling academic requirements which may help to have more organized daily life activities and dietary habits. Skipping meals was also recorded as a main predictor especially skipping breakfast which in some literature is

named as fasting headache. This headache is usually diffuse or located in the frontal region, and the pain is non-pulsating and of mild or moderate intensity matching what is reported by the current study participants [24]. Also having coffee or other stimulants was significantly associated with headache which was confirmed by Milde-Busch A et al, 2010 [25], and by Moschiano F et, 2011 [26]. Stress exposure with the ability to deal with stress sources were also among the most important determinants of headache attack and its type. Much of the literature confirmed the association between stress and having headache episodes or even transforming headache from episodic to a chronic condition [27-29].

A study was done in King Saud University which showed that, among 4,943 who responded to questions about headache, 4,158 had recurring headache, and among them 1,333 had migraine headache, and 2,691 with non-migraine headache [30]. Also there was a cross-sectional study of headache prevalence among medical students in Umm al-Qura university on a total 758 participants with 82.2% responses (623 responses). The one year headache prevalence was 89.6% (558) with predominance of Tension type headache (n=173, 31%) then probable infrequent Tension type headache (n=114, 20.4%) then probable frequent Tension type headache (n=63, 11.3%) while migraine was (n=2, 40.0%; n=14, 34.4%; n=11, 33.3%) [31].

Another study was done among Arab countries (Saudi Arabia, Qatar and Oman) with two papers in Saudi Arabia and one paper in Qatar and one paper in Oman. The prevalence of headache in Saudi Arabia in the first paper was 12.1, 5% migraine, 9.5% Tension type headache while 2.4% mixed migraine and Tension type headache. In the second paper with 8% headache prevalence, 2.6% migraine, 3.1% tension type headache and 2.3% with mixed migraine and tension headache, while the prevalence of headache in Oman was 83.6% and 10.1%, 11.2% and 16% for migraine, Tension type headache, and Mixed migraine tension headache respectively, and in Qatar the prevalence was 72.5% while for migraine was 7.9% [32].

Headache is an annoying health condition which may be exaggerated from just episodic attacks to a low grade life lasting health condition affecting students' quality of life including daily activities, scholastic achievement, and absenteeism up to depression with its consequences.

Conclusions and Recommendations

In conclusion, more than three quarters of the students complained of moderate to severe headache attacks which was mainly related to sleeping disturbance, studying hours, and stressful lifestyle. Students should be taught strategies for stress management training for headache that teaches them more adaptive ways of interpreting and managing stress through the application of coping skills. These strategies are significantly helpful for improving stress management and are likely to be similarly effective in the prevention/treatment of headache progression.

Conflict of interest:

There is not any conflict of interest associated with this manuscript to be declared.

Funding disclosure:

No funding received for this manuscript.

Contributions:

All authors approve that the manuscript has been read and approved. All authors participated equally in the preparation of this manuscript by completing the questionnaires of the patients, preparing, and writing the final manuscript preparing it for publishing.

Acknowledgment:

We kindly appreciate the role of all participants in the study.

References

- Ziegler DK. Headache syndromes: problems of definition. *Psychosomatics*. 1979 Jul 1;20(7):443-7.
- Foroughipour M, Sharifian SM, Shoeibi A, Barabad NE, Bakhshae M. Causes of headache in patients with a primary diagnosis of sinus headache. *European archives of otorhinolaryngology*. 2011 Nov 1;268(11):1593.
- The International Classification of Headache Disorders, 3rd edition Copyright. [cited 2019 Apr 2]; Available from: www.uk.sagepub.com
- Hu XH, Markson LE, Lipton RB, Stewart WF, Berger ML. Burden of Migraine in the United States. *Arch Intern Med*. 2003;159(8):813.
- Lebedeva ER, Kobzeva NR, Gilev D, Olesen J. Prevalence of primary headache disorders diagnosed according to ICHD-3 beta in three different social groups. *Cephalalgia*. 2016 May;36(6):579-88.
- Ghorbani A, Abtahi SM, Fereidan-Esfahani M, Abtahi SH, Shemshaki H, Akbari M, Mehrabi-Koushki A. Prevalence and clinical characteristics of headache among medical students, Isfahan, Iran. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences*. 2013 Mar;18(Suppl 1):S24.
- Smitherman TA, McDermott MJ, Buchanan EM. Negative impact of episodic migraine on a university population: Quality of life, functional impairment, and comorbid psychiatric symptoms. *Headache*. 2011;51(4):581-9.
- Robbins MS, Lipton RB. The epidemiology of primary headache disorders. *Semin Neurol*. 2010;30(2):107-19.
- Almesned IS, Alqahtani NG, Alarifi JA, Alsaawy TN, Agha S, Alhumaid MA. Prevalence of primary headache among medical students at king Saud bin Abdulaziz University for health sciences, Riyadh, Saudi Arabia. *Journal of family medicine and primary care*. 2018 Nov;7(6):1193.
- Edvinsson L, Uddman R. Neurobiology in primary headaches. *Brain research reviews*. 2005 Jun 1;48(3):438-56.
- Edvinsson L. Pathophysiology of primary headaches. *Curr Pain Headache Rep*. 2001;5(1):71-8.
- Leonardsson-Hellgren M, Gustavsson U-M, Lindblad U. Scandinavian Journal of Primary Health Care Headache, and associations with lifestyle among pupils in senior level elementary school. *Scand J Prim Health Care*. 2001;19(2):107-11.
- Wang Y, Xie J, Yang F, Wu S, Wang H, Zhang X, Liu H, Deng X, Yu S. The prevalence of primary headache disorders and their associated factors among nursing staff in North China. *The journal of headache and pain*. 2015 Dec;16(1):4.
- Sjaastad O, Fredriksen TA, Pfaffenrath V. Cervicogenic headache: diagnostic criteria. *Headache: The Journal of Head and Face Pain*. 1998 Jun; 38(6):442-5.
- Choi YJ, Kim BK, Chung PW, Lee MJ, Park JW, Chu MK, Ahn JY, Kim BS, Song TJ, Sohn JH, Oh K. Impact of cluster headache on employment status and job burden: a prospective cross-sectional multicenter study. *The journal of headache and pain*. 2018 Dec 1;19(1):78.
- Zwart JA, Dyb G, Hagen K, Ødegård KJ, Dahl AA, Bovim G, Stovner LJ. Depression and anxiety disorders associated with headache frequency. The Nord-Trøndelag Health Study. *European Journal of Neurology*. 2003 Mar;10(2):147-52.
- Landtblom AM, Fridriksson S, Boivie J, Hillman J, Johansson G, Johansson I. Sudden onset headache: a prospective study of features, incidence and causes. *Cephalalgia*. 2002 Jun;22(5):354-60.
- Steiner TJ, Birbeck GL, Jensen RH, Katsarava Z, Stovner LJ, Martelletti P. Headache disorders are third cause of disability worldwide.
- Ogunyemi AO. Prevalence of headache among Nigerian university students. *Headache: The Journal of Head and Face Pain*. 1984 May; 24(3):127-30.
- Split W, Neuman W. Epidemiology of migraine among students from randomly selected secondary schools in Lodz. *Headache: The Journal of Head and Face Pain*. 1999 Jul;39(7):494-501.
- Ferri-de-Barros JE, Alencar MJ, Berchielli LF, Castelhana Junior LC. Headache among medical and psychology students. *Arquivos de neuro-psiquiatria*. 2011 Jun;69(3):502-8.
- MacGregor EA. *Migraine in women*. CRC Press; 2004 Jun 1.
- Mongini F, Keller R, Deregibus A, Raviola F, Mongini T, Sancarlo M. Personality traits, depression and migraine in women: a longitudinal study. *Cephalalgia*. 2003 Apr;23(3):186-92.
- Torelli P, Manzoni GC. Fasting headache. *Current pain and headache reports*. 2010 Aug 1;14(4):284-91.
- Milde-Busch A, Blaschek A, Borggräfe I, Heinen F, Straube A, Von Kries R. Associations of diet and lifestyle with headache in high-school students: Results from a cross-sectional study. *Headache: The Journal of Head and Face Pain*. 2010 Jul; 50(7):1104-14.
- Moschiano F, Messina P, D'Amico D, Grazi L, Frediani F, Casucci G, d'Onofrio F, Demurtas A, Beghi E, Bussone G. Headache, eating and sleeping behaviors and lifestyle factors in preadolescents and adolescents: preliminary results from an Italian population study. *Neurological Sciences*. 2012 May 1; 33(1):87-90.
- Penzien DB, Rains JC, Lipton RB. Introduction to the special series on the chronification of headache: Mechanisms, risk factors, and behavioral strategies aimed at primary and secondary prevention of chronic headache. *Headache*. 2008; 48:5.

28. Bigal ME, Lipton RB. Concepts and mechanisms of migraine chronification. *Headache* 2008; 48:6-15.
29. Scher A, Midgette L, Lipton R. Risk factors for headache chronification. *Headache*. 2008; 48:16-25.
30. Muayqil T, Al-Jafen BN, Al-Saaran Z, Al-Shammari M, Alkthiry A, Muhammad WS, et al. Migraine and Headache Prevalence and Associated Comorbidities in a Large Saudi Sample. *Eur Neurol*. 2018; 79(3-4):126-34.
31. Khairoalsindi OA, Saber WK, Althubaiti NA, Alshareef EF, Almekhlafi MA. Primary headache characters and coping strategies among medical students of Umm Al-Qura University in the Western Region of Saudi Arabia. *Neurosciences (Riyadh)*. 2018;23(4):308-13.
32. Benamer HTS, Deleu D, Grosset D. Epidemiology of headache in Arab countries. *J Headache Pain*. 2010;11(1): 1-3.