ORIGINAL ARTICLE

Body Mass Index and Migraine: A Hospital-Based Study in Lahore

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ABSTRACT

Background: Obesity and migraine are the most common disorders among general population that are linked with disability and impaired life quality. Though, several studies have investigated the relationship between obesity and migraine but yet there is no complete knowledge regarding association between BMI and migraine, particularly chronic migraine.
Objective: The objective of the study was to find the association between body mass index and migraine.
Material and Methods: It was a prospective study carried out at Neurology Outpatient Department of Lahore General Hospital, Lahore. Total of 545 patients with major complaint of headache were included after fulfilling "episodic migraine" (n=370) and "chronic migraine" (n=175) criteria according to International Headache Society (IHS) criteria.
Results: Among 370 patients with episodic migraine (EM), 78.4% were females while among 175 patients with chronic migraine (CM), 81.1% were females. In EM group, the mean age of the patients was 41.72+21.35 years and in CM group, it was 45.80+15.79 years. In EM group, mean pain intensity was 4.6+2.41 and in CM group, mean pain intensity was 4.3+2.51. Among EM group patients, mean duration of headache was 4.85+5.17 days and among CM group patients, mean duration was 20.88+8.86 days. Mean BMI (Body Mass Index) of patients in EM groups was 22.91+3.89 while in CM groups was 24.43+3.43 (P=0.002). In EM group, 9.7% patients and in CM group, 6.3% patients were underweight (P=0.189). In EM group, 11.4% patients and in CM group, 30.3% patients were overweight (P=0.002). However, in EM group, only 1.3% patients and in CM group, 3.4% patients were obese (P=0.087). Multiple logistic regression analysis of chronic migraine group showed significant results (P <0.05) regarding headache days/month, BMI, overweight and obese.
Conclusion: Study concluded that overweight and obesity were associated factors for migraine. Chronic migraine patients were more likely to have elevated BMI than the episodic migraine patients.
Keywords: Body mass index, migraine, obesity, chronic, headache

INTRODUCTION

Headache is a prevalent complaint across the globe while migraine is one of the most frequent primary headaches.[1] The prevalence of migraine is almost 11% among general populace and it is 7th most disabling disease in the world.[2] As per nationwide survey, migraine one year incidence is 22.7% in Pakistan that mostly affects the people aged between 40 to 49 years. Migraine is most common disease and 3rd most significant cause of disability among people aged less than 50 years.[3]

The migraine's main symptoms comprise: headache, mostly unilateral but it can be bilateral, painful and acute, accompanied by phonophobia, photophobia, nausea and vomiting.[4] As per number of headache days/month, migraine is categorized by IHS into: episodic migraine and chronic migraine. The EM remains for less than 15 headache days/month; and CM for 15 or more headache days/month during >3 months with experiencing migraine features at least eight days per month.[5] Migraine is related to several co-morbidities such as psychiatric disorders (e.g. depression & anxiety), cardiovascular risk factors (e.g. hypertension, diabetes, obesity & high cholesterol level), sleep disorders, fatigue, cardiovascular and cerebrovascular diseases.[6]

A significant rise in the prevalence of overweight and obesity has been observed worldwide,[7] being labeled a world pandemic during current years, with Pakistan ranked 9th among 188 world countries. As per WHO (World Health Organization), since 1975 the prevalence of obesity has been increased threefold worldwide, with number of overweight people in 2016 reaching 1.9 billion.[8] Worldwide, numerous noninfectious diseases (such as cardiovascular diseases, type-II diabetes mellitus, hypertension, dyslipidemia and carcinoma) are related to increased BMI.[9]

Particularly, general or overall body obesity, according to BMI, has been demonstrated to be associated with headache disorders in various epidemiologic and clinical studies. There is significant uncertainty regarding type of headache/obesity association and either it is specific to the migraine, or daily chronic headache, or headache generally.[10]

Both obesity and migraine are the most common disorders among general population that are linked with disability and impaired life quality. Though, several studies have investigated the relationship between obesity and migraine but yet there is no complete knowledge regarding association between BMI and migraine, particularly chronic migraine.[11] So, the objective of this study is to find the association between body mass index and migraine in Pakistani population reporting at a Lahore General Hospital, Lahore.

MATERIAL AND METHODS

It was a prospective study, carried out at the Neurology Outpatient Department of Lahore General Hospital, Lahore.

The target population was 18 to 65 years old patients. Pregnant females, elderly and younger people were excluded from study due to their changing weight. All patients with headache underwent fundoscopy as well as physical neurological examination. Where necessary, radiography, electroencephalography, brain CT or MRI were also carried out and patients with abnormal results were not included in the study.

During study 545 patients with major complaint of headache were included after fulfilling "Episodic Migraine (n=370)" and "Chronic Migraine (n=175)" criteria as per HIS criteria. Written informed consent was taken from all patients.

Pain intensity was evaluated on 11-point pain scale (no pain=0, mild=1–3, moderate=4–6, severe=7–10). Both weight and height of patients were measured with light clothing and with no shoes. The body mass index was calculated according to following formula: BMI=weight (kg)/height(m)^2. Using WHO guidelines, five categories were described based upon BMI: underweight(<18.5), normal weight(18.5-24.9), overweight(25-29.9), obese(30-34.9), and morbidly obese (35). The data of obese and morbidly obese patients was combined as one group.

Analysis was performed using SPSS version 24.0 program. Data were summarized using frequency counts and descriptive statistics. Measurement variables were expressed as means± SD. Multiple logistic regression analysis of chronic migraine group was also performed. A value of p<0.05 was considered statistically significant.

RESULTS

Table-1 exhibits that among 370 patients with episodic migraine (EM), 290 (78.4%) were females while among 175 patients with chronic migraine (CM), 142 (81.1%) were females. In both groups females were in majority with insignificant results (P=0.177).

In EM group patients, mean age was 41.72±21.35 years and in CM group, it was 45.80±15.79 years. The results were found statistically significant (P=0.002).

The education level of EM group patients was found better than EM group patients (P=0.003).

In EM group 71 (19.1%) patients while in CM group 49 (28.0%) patients had raised blood pressure (P=0.006).

Result shows that among 370 patients with episodic migraine, 41 (11.1%) were smokers and among 175 patients with chronic migraine, 26 (14.9%) were smokers (P=0.212).

In EM group, mean pain intensity was 4.6±2.41 and in CM group, mean pain intensity was 4.3±2.51 (P=0.713).

Similarly in EM group, mean duration of headache was 4.85±5.17 days and in CM group, mean duration was 20.88±8.86 days with significant results (P=0.002).

In EM groups, 184 (49.7%) patients and in CM group, 82 (30.6%) patients had family history of headache. The results were found statistically significant (P=0.002).

Among EM group patients, mean duration of headache history was 11.94±11.71 years and in CM group patients, mean duration was 13.63±10.87 years indicating statistically significant results (P=0.001).

Table describes that mean BMI of patients in EM groups was 22.91±3.89 while in CM groups mean BMI was 24.43±3.43 (P=0.002).

Table-2 depicts that in EM group, 36 (9.7%) patients and in CM group, 11 (6.3%) patients were underweight (P=0.189).

Table-1: Demographic & clinical characteristics of episodic & chronic migraine groups

|	Episodic migraine (n=370)	Chronic migraine (n=175)	p-value
Female(n, %)	290 (78.4%)	142 (81.1%)	0.177
Age (years, mean±SD)	41.72±21.35	45.80±15.79	0.002
Education (n, %)			0.003
Upto primary	196 (53.0%)	131 (74.8%)	
Matric or inter	83 (22.4%)	32 (18.3%)	
University	91 (24.6%)	12 (6.9%)	
Elevated BP (n,%)	71 (19.1%)	49 (28.0%)	0.006
Smoking (n, %)	41 (11.1%)	26 (14.9%)	0.212
Pain intensity (mean±SD)	4.6±2.41	4.3±2.51	0.713
Headache days/ month (mean±SD)	4.85±5.17	20.88±8.86	0.002
Family history of headache (n, %)	184 (49.7%)	82 (30.6%)	0.285
Duration of headache history (years, mean±SD)	11.94±11.71	13.63±10.87	0.001
BMI (mean±SD)	22.91±3.89	24.43±3.43	0.002
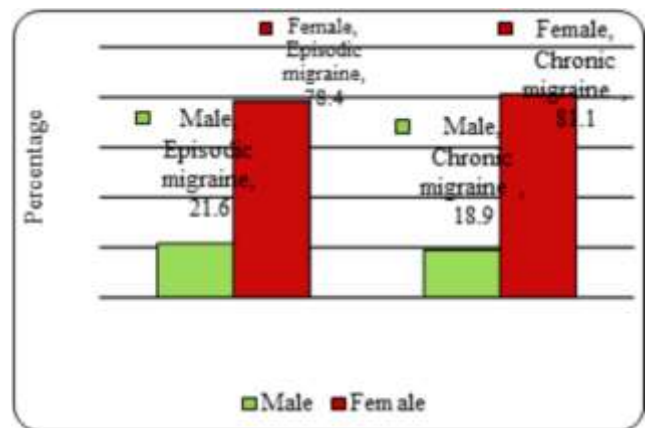
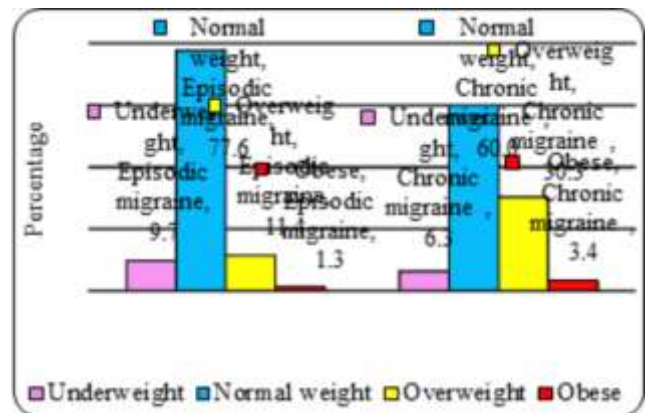Figure-1: Frequency distribution migraine patients according to gender

Figure-2: Frequency distribution migraine patients according to BMI

In EM group, 42 (11.4%) patients and in CM group, 53 (30.3%) patients were overweight (P=0.002).

However, in EM group, only 5 (1.3%) patients and in CM group, 6 (3.4%) patients were obese (P=0.087).

Table-3 demonstrates that when multiple logistic regression analysis of chronic migraine group was carried out, significant results (P <0.05) were found regarding headache days/month, BMI, overweight and obese while age, education, elevated BP, duration of headache history and underweight showed insignificant results (P >0.05).

Table-2: Distribution of patients with abnormal and normal BMI in episodic and chronic migraine groups

	Episodic migraine (n=370)	Chronic migraine (n=175)	p-value
Compared with normal BMI			
Underweight	36 (9.7%)	11 (6.3%)	0.189
Overweight	42 (11.4%)	53 (30.3%)	0.002
Obese	5 (1.3%)	6 (3.4%)	0.087

Table-3: Multiple logistic regression analysis of chronic migraine group

	p-value	OR	95% CI for OR
Age	0.47	1.03	0.99-1.06
Education	0.81	0.98	0.6-1.62
Elevated BP	0.77	0.88	0.32-2.36
Headache days/ month	0.002	1.26	1.22-1.34
Duration of headache history	0.56	0.98	0.96-1.02
BMI	0.004		
Compared with normal weight			
Underweight	0.689	0.72	0.13-4.15
Overweight	0.031	3.25	1.18-8.80
Obese	0.003	27.64	2.69-277.7

DISCUSSION

Migraine and obesity are the most common disorders among general population. Migraine is generally linked with abnormal body mass index, especially obesity. The migraine associated co-morbidities are psychiatric disorders (depression & anxiety), fatigue, sleep disorder, cardiovascular risk factor (diabetes, obesity, elevated cholesterol & hypertension) and cerebrovascular and cardiovascular diseases. Keeping in mind such issues, current study was carried out to find the association between BMI and migraine at the Neurology Outpatient Department of Lahore General Hospital, Lahore. To acquire appropriate outcomes, total 545 patients with major complaint of headache were included and divided into two groups namely Episodic Migraine (370 patients) and Chronic Migraine (175 patients).

Study revealed that most of the patients in both groups were females (78.4% in EM group and 81.1% in CM group) and the result was found statistically insignificant (P=0.177). The findings of our study are comparable with a study undertaken by Huang and coworkers (2018) who reported that in both groups females were in majority (77.1% in EM group and 77.6% in CM group).[11] Another study carried out by Huang and teammates (2019) also showed similar scenario that most of the patients in both groups were females (77.5% in EM group and 82.7% in CM group) indicating insignificant results (P=0.176).[12]

Age is a leading factor because with increasing age people suffer from different diseases. It was found during study that mean age of the patients in EM group was 41.72±21.35 years while in CM group was 45.80±15.79 years (P=0.002). A study carried out by Huang and coworkers (2018) showed almost similar results that mean age of the patients in EM group was 40.42±2.38 years while in CM group was 43.36±2.93 years. Huang and teammates (2019) also reported in their study that mean age of the patients in EM group was 40.71±20.34 years while in CM group was 46.9±16.89 years (P=0.001).[12] In our study educational level was found better among EM group patients but Huang and coworkers (2018) asserted in their study that patients in CM group had better educational level than EM group.[11]

High blood pressure could be a major cause of migraine. It is important to mention that in EM group only 19.1% patients while in CM group 28.0% patients had raised blood pressure (P=0.006). A study done by Huang and teammates (2019) also showed comparable results who confirmed that in EM group 18.9% patients and in CM group 29.8% patients were hypertensive (P=0.005).[12] Study further disclosed that patients in both groups had severe pain. The mean pain intensity in EM group was 4.6±2.41 and in CM group was 4.3±2.51 (P=0.713. Same results were reported by Huang and teammates (2019) who also elucidated that patients in both groups had severe pain (EM 4.5±2.40 vs CM 4.4±2.62) (P=0.714).[12] Similarly in EM group, mean duration of headache was 4.85±5.17 days and in CM group was 20.88±8.86 days with significant results (P=0.002). However, almost same findings were demonstrated by Huang and teammates (2019) that in EM group, mean duration of headache was 3.94±5.18 days and in CM group was 21.79±8.95 days (P=0.002).[12] Study showed very discouraging results that among EM group patients, mean duration of headache was 11.94±11.71 years and similarly in CM group patients, mean duration was 13.63±10.87 years (P=0.001). Anyhow study conducted by Huang and teammates (2019) remained unable to show better scenario and reported that mean duration of headache in EM group was 10.83±10.60 years and in CM group was 14.74±11.98 years (P=0.001).[12]

The people who are underweight have less chance to have migraine. The risk of migraine is increased with increasing BMI. It is significant to mention here that according to mean BMI, patients in both groups were found normal as among EM group patients mean BMI was 22.91±3.89 while among CM group patients was 24.43±3.43 (P=0.002). The finding of a study carried out by Huang and teammates (2019) exhibited similar scenario who confirmed that mean BMI of patients in EM groups was 21.90±2.88 while in CM groups mean BMI was 23.34±2.32 (P=0.001).[12]

During study patients with abnormal and normal BMI were also evaluated and found that in EM group, most of the patients (11.4%) were overweight, followed by, underweight (9.7%) and obese (1.3%). Likewise in CM group, majority of the patients (30.3%) were also overweight, followed by, underweight (6.3%) and obese (3.4%). The remaining proportion in both groups was of patients with normal BMI. Virtually the results of our study are comparable with a study conducted by Huang and

coworkers (2018) who reported that majority of the patients in both groups were overweight (EM:15.1% vs CM:17.2%), followed by, underweight (EM:9.6% vs CM:9.7%) and obese (EM:3.0% vs CM:3.7%). The remaining proportion in both groups was of patients with normal BMI.[11] Another study performed by Huang and teammates (2019) also indicated that in both groups most of the patients were overweight, followed by, underweight and obese.[12] But the findings of a recent study undertaken by Hashmat and fellows (2019) showed that majority of the patients (33.4%) were obese/morbidly obese, followed by overweight (14.1%) and underweight (11.5%) while remaining proportion was of normal patients.[4]

It is pertinent to mention here that when multiple logistic regression analysis of chronic migraine group was carried out, study found an elevated risk of having migraine among patients with headache, BMI, overweight and obesity (P <0.05). The findings of studies carried out by Thierry et al. (2018) [13] and Quach (2013) [14] also confirmed that overweight and obesity were associated with migraine. Bigal et al. (2007)[15], Saeed & Shukr (2020) [16] and Adoukonou et al. (2014)[17] reported in their studies that obesity was the leading factor for migraine. But the study carried out by Keith and associates (2008) demonstrated that obesity was associated with enhanced risk for headache, but not migraine.[18] Similarly Özcan and Özmen (2019) [19] and Yu et al. (2012)[20] reported no association between obesity and migraine. The findings of a study undertaken by Bigal and colleagues (2006) indicated that obesity was associated with chronic migraine.[21] Queiroz et al. (2009)[22] and Tellez-Zenteno et al. (2010)[23] confirmed in their study that there was insignificant association between BMI and migraine. The findings a similar study carried out by Huang and teammates (2019) demonstrated comparable results who reported that headache, BMI, overweight and obesity were associated with migraine (P <0.05).[12]

CONCLUSION
Study concluded that overweight and obesity were associated factors for migraine. Chronic migraine patients were more likely to have elevated BMI than the episodic migraine patients. Further studies are needed on large scale to find out the association between body mass index and migraine.

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