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Obesity and Migraine

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Abstract

The aim of this study is to determine a possible relationship between prevalence, frequency and severity of migraine, and obesity.

All pertinent datafrom the literature have been critically examined and reviewed in order to assess the possible relationship between obesity and migraine, in particular migraine frequency and disability in children, as well as in adult population studies.

Prevalence, frequency and severity of migraine seem to be related with the Body Mass Index, although this evidence is not supported by all the studies examined.

Data from literature suggest that obesity can be linked with headache prevalence, frequency and disability both in adult subjects and, less frequently, in pediatric subjects. These data could have important clinical implications and suggest that clinicians should have a special interest for weight reduction of obese children suffering from migraine.

Keywords: Migraine; Headache; Obesity; Overweight; Body mass index

Introduction

Migraine is a neurological disorder involving episodes of head pain that are frequently throbbing, unilateral and severe. According to the International Headache Society attacks typically last 4-72 h and are often accompanied by nausea, vomiting, or sensitivity to light, sound, or movement. Approximately one-third of migraineurs have attacks that are preceded or accompanied by an aura, characterized by transient focal neurological symptoms that are most often visual but may also involve disturbances in sensory, speech and motor functioning.

Migraine is best understood as a chronic disorder with episodic manifestations, progressive in some individuals. Consistently, identifying risk factors for progression has emerged asa very important public health priority. Recent studies suggested a potential role of obesity on headache outcomes.

Obesity is another chronic disorder that is very frequent both in adult and in pediatric population. Although it has been recently demonstrated a clear comorbidity between these conditions, the real link between them is still matter of debate.

Obesity occurs with several chronic pain syndromes. Obesity and migraine are both highly prevalent disorders in the general population, and reports in the literature underscore this association. An increasing number of reports suggest that obesity is a risk factor for migraine progression and headache frequency in adults [1-4] as in children [5-7].

In this article, we review the most recent clinical and population-based studies, evaluating the associations between obesity headache/migraine.

Epidemiological relationship between migraine and obesity

Headache and obesity are prevalent and disabling disorders that are influenced by a variety of physiological, psychological and behavioral mechanisms, many of which are affected by weight loss [8]. It is not unusual for migrainous patients to be obese. Recently, attention has focused on the potential relation between overweight and frequency and severity of headache attacks [9,10] and some evidence for this relationship has been demonstrated [11,12].

Considering epidemiological data, one of the largest population study emphasizes the association between obesity and chronic daily headache (CDH) although underlines that this association was relatively specific only for chronic migraine (CM) [13].

The question of the link between obesity and migraine frequency is still matter of debate while the majority of studies have suggested a certain influence of the overweight of the subjects on migraine severity; the data concerning this possible influence are shown in Table 1.

The first study to identify an association between frequent headache and obesity was a study involving 1932 patients, aged 18-65 years, by Scher et al. [14]. The population studied included 1134 patients were CDH sufferers, and 798 had episodic headache. The most important result was that the prevalence of CDH was associated with total body obesity (OR 1.34; CI: 1.0-1.8) or overweight (OR 1.26; 1.0-1.7). Moreover, individuals with episodic headache who also had total body obesity at baseline were at increased odds of having CDH at follow-up (OR 5.28; CI: 1.3-21.1). More in detail, an important percentage (30%) of newly identified cases of CDH showed clearly obesity, while only 13% of patients with episodic headache were obese. The result of this study is that individuals with episodic headache and obesity develop chronic daily headache (CDH) more than 5 times the rate of normal-weight individuals.

Similarly, Ohayon [15] found that overweight/obese (BMI>27) respondents were more likely to report morning headache than were adults with BMIs 20-25 and among a sample of ~15,000 Australian women, Brown et al. [16] found that obese persons were more likely to report headache (OR=1.47), confirming again the association between headache and obesity.

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Ref.	Clinical study design	N.	F (%)	Age (average age or range)	Characteristics of migraine or headache Prevalence Frequency and Severity	
Scher [14]	longitudinal study	1932	NA	18-65	Prevalence of CDH was higher in those with TBO>grade II	Obesity and headache frequency were significantly associated with new onset CDH.
Bigal [9]	Observational cohort study	30.215	65	38.7	No correlation between the prevalence of migraine and obesity	Positive correlation between migraine frequency and obesity Severity: NA
Bigal [10]	Observational cohort study	162.576	NA	≥12	NA	Positive correlation between migraine frequency and obesity Severity: NA
Ford [11]	Cross-sectional analysis	7.601	48	≥20	Positive correlation between the prevalence of headache and obesity	Increased attacks of severe headache in overweight or obese when compared with normal weight.
Keith [22]	Cross-sectional analysis	220,370	100	16-94	No correlation between the prevalence of migraine and obesity	NA
Mattsson [21]	Cross-sectional analysis	684	100	40-74	No correlation between the prevalence of migraine and obesity	No correlation between frequency / severity of migraine and obesity.
Peterlin [12]	Cross-sectional analysis	21.783	51	≥20	Increased prevalence of migraine in subjects aged < 55 with total or abdominal obesity	NA
Winter [25]	Cross-sectional study	63.467	100	50	No correlation between the prevalence of migraine and obesity	Positive correlation between frequency / severity of migraine and obesity
Bigal [24]	Longitudinal study	176	79.5	44.4	No correlation between the prevalence of migraine and obesity	No correlation between frequency / severity of migraine and obesity.
Kinik [6]	Cross-sectional analysis	124	62	12.9	Increased attacks of severe headache in overweight or obese compared with normal weight	Positive correlation between frequency / severity of migraine and obesity.
Hershey [5]	Large, multi-center, retrospective case	913	59	11.9 (3-18)	Increased attacks of severe headache in overweight or obese compared with normal weight	Positive correlation between frequency / severity of migraine and obesity Severity: NA
Peres [4]	Case-control study	74	89	38,4 (14-69)	Increased attacks of severe headache in obese compared with normal weight. Increased prevalence of migraine in obese women than obese men	No correlation between frequency of migraine and obesity. Severity: NA
Pinhas-Hamiel [7]	Prospective cohort study	273	61	13	Increased headaches in overweight girls compared with normal weight	Positive correlation between frequency of migraine and obesity. Severity: NA
Horev [17]	Cross-sectional analysis	5041	50%	43,6	Increased prevalence of migraine in patients with morbid obesity	No correlation between frequency / severity of migraine and obesity.
Vo M [18]	Cross-sectional analysis	3733	100%	18-40	Increased prevalence of migraine in patients with morbid obesity	Positive correlation between migraine severityand obesity
Winter AC [25]	Prospective cohort study	19162	100%	50	No correlation between the prevalence of migraine and obesity	No correlation between frequency / severity of migraine and obesity

Table 1: Link between obesity and migraine frequency

In 2005, two small clinic-based studies reported an increased frequency of migraine attacks in those with TBO. In the first study the relationship between migraine and obesity was evaluated and it showed that obese patients were three times as likely as age-matched normal-weight controls to have migraine, in fact Peres et al. [4] compared 74 patient with TBO (mean age 39 years) who presented obesity surgery clinic to 70 age-matched controls. A total of 75% of those with TBO had life-time headache diagnosis as compared with 42% of the controls, p<0,001. Furthermore, ICHD migraine was compared with 18, 5% of the non-obese controls, p<0, 0001.

Similarly, in the second clinic based study by Horev et al. [17], 63% of 27 patients with TBO reported episodic headache and 48% fulfilled migraine criteria. The results of those studies showed that migraine was the most common diagnosis and were as prevalent in obesity grade III as in overweight and obesity grades I and II.

Bigal et al. [9] showed that obesity was not associated with increased prevalence of migraine, but was related to headache attack frequency. In this population-based telephone interview study, the subjects were subdivided into five groups, considering their BMI: 1, underweight (<18.5), 2, normal weight (18.5 to 24.9), 3, overweight (25 to 29.9), 4, obese (30 to 24.9), and 5, severe obese (≥ 35): the odds ratio for headache frequency increased significantly from group 1 to group 5. There was a robust evidence that groups 3, 4 and 5 migraineurs showed an high risk for having great and frequent headache; in contrast, groups 1 and 2 subjects did not show this risk.

On the other side, another large cross-sectional population research added more evidence about the association between obesity and CDH and demonstrated that obesity is an important determinant for Chronic Migraine (CM) but not for chronic tension type headache [13]. The same authors showed that CDH and total body obesity were more significantly associated in transformed migraine than in Chronic Tension-Type Headache (CTTH).

The objective of Ford's et al. work [11] was to study the cross-sectional association between body mass index and the prevalence of severe headaches or migraines in a national sample of US adults. They evaluated 7601 participants in the national Health and Nutrition Examination survey (NHEANES), ranging from 20 to 85 years of age. Migraine and severe headache were self-reported, showing that that those who were underweight (BMI\18.5) or obese (BMI C 30) were

at higher risk for having severe headaches or migraine compared with those of normal weight.

A total of 21,783 participants were included in the Peterlin's analysis [12] in order to evaluate the prevalence of migraine/severe headaches in those with and without general obesity and abdominal obesity (Abd-O) and the effect of gender and age on this relationship. They found in man and women aged 20-55 years that higher migraine prevalence was associated with both total and abdominal obesity. And, this was the first study which suggested and clearly demonstrated that older individuals or those of post-reproductive age who have migraine do not have an association with obesity while those of reproductive age do, which also suggested that both obesity and migraine are modulated by reproductive status. The finding that migraine and obesity is associated in those of reproductive age by Peterlin et al. [12]; this association was also later supported by data from Vo et al. [18] and Robberstad et al. [19]. Vo et al. [18] found a significant association between migraine and obesity and that the odds of migraine increased with increasing obesity status. Robberstad et al. [19] found that recurrent headache was associated with overweight (odds ratio [OR]= 1.4,95 % CI 1.2-1.6, p\0.0001).

The relationship between obesity and headache has not been adequately studied with pediatric populations. The first study to examine the prevalence of obesity within a pediatric headache population was the Hershey's et al. work [5] in which were examined 913 patients at 7 pediatric headache centers and the results clearly showed that obesity was significantly correlated with headache frequency and disability in children, and reduction in BMI as associated with greater reduction in headache frequency. Interestingly, the degree of overweight (measured by BMI percentile) correlated with both headache frequency and disability of headache. Of certain relevance is the fact that the magnitude of weight reduction was related with decreased headache frequency at 3- and 6-month follow-up visits.

In another pediatric study, Kinik et al. [6] investigated the influence of obesity on the severity of migraine in children. In agreement with previous adult study the authors concluded that obesity seems to occur at greater frequency in children and adolescents with migraine compared with persons in the general population, and obese patients had more frequent migraine attacks than did non-obese patients.

Recently a retrospective study [20] of 925 children in the Pediatric Headache Clinic, evaluating headache frequency, medication overuse, and BMI compared to population-based healthy subjects, children with headache had a greater percentage of overweight in comparison with the general population. It should be noted that also the patients with chronic tension-type headache showed similar results. On the other hand, there was no increased incidence of overweight in children with medication overuse or chronic migraine. It is important to remember that in adult series [13], a link between chronic migraine and obesity was found but with chronic tension-type headache.

Nevertheless, not all studies found the positive correlation between migraine and obesity. Infact Mattsson et al. [21] failed to detect a significant correlation between obesity and migraine in684 women aged 40-74 years. Similarly, in the study of Keith et al. [22] migraine prevalence was not related to obesity but obese women (BMI of 30) had increased risk for headache (but not specifically migraine) as compared with those with BMI, Te´llez-Zenteno et al. [23] found that there was no association between the disability and severity of migraine and BMI, as well as no correlation between BMI and the frequency and prevalence of migraine was found in the study of Bigal et al. [24] in which 176 subject (79.5% women, mean of 44.4 years) with normal weight (≤ 24.9), overweight (25-29.9), or obesity (≥ 30) was observed before and after headache preventive treatment. After treatment, frequency declined in the entire population, but no significant differences were found by BMI group.

Regarding the number of days with severe pain per month, there were also no significant differences at baseline (normal=6.1, overweight=6.5, obese=6.7), and improvement overall (P=0.01). Recently, also Winter et al. [25] in their large prospective study of middle-aged women does not indicate a consistent association between migraine and incident overweight, obesity or relevant weight gain.

In contrast in the study of Peterlin et al. [12] and Vo et al. [18], were predominantly Caucasian population, and in Shengyuan's et al. work [26] had shown that there is an association between morbid obesity and migraine in a Asian population. In this study it was found that migraine prevalence was significantly raised in the morbidly obese group (but not lesser degrees of obesity), and this was a substantial and statistically significant increase, but they also observed that there was a weak link between being underweight and migraine severity and disability.

On the other side, the relationship between migraine and obesity seems to vary by age, gender, and adipose tissue distribution. Adipose tissue distribution patterns are different in women and men, with younger women having more adipose tissue depots in a gluteo-femoral distribution than abdominally, while men of all ages and older women have more abdominal adipose tissue depots then young women. Peterlin et al. [12] found that migraine prevalence varies based on the distribution of adipose tissue (as either total body obesity or Abd-O) as well as by age and gender. While migraine prevalence was increased in younger men and women with Abd-O, migraine was less prevalent in older women with abdominal obesity. In men and women ≤ 55 years old, migraine prevalence is increased in those with total body obesity, independent of abdominal obesity. This is probably due to the fact that men begin depositing adipose tissue is in the abdominal region, during puberty, which continues throughout the adult male life [27]. In contrast, during puberty women preferentially deposit more adipose tissue in the gluteo-femoral region; however, postmenopausally it changes to an abdominal pattern similar to men. Finally, some studies were conducted exclusively in women of perimenopausal and postmenopausal age who have lower migraine rates than women in their reproductive years [28].

Conclusion

Migraine is a chronic neurological disorder characterized by recurrent attacks of pain that generally impair the quality of life. The real etiology and pathogenetic mechanism (s) of migraine are still unknown but the association with obesity seems to be important. Although this co-morbidity is now recognized, the basic nature of this association is still unclear; it is possible that migraine and obesity can have some common pathophysiologic mechanisms and share one or more final pathways (e.g. inflammatory mediators). Obesity (and often body mass index of the patients) seems to be related not only to high frequency and to the degree of migraine attacks (especially some forms of migraine) but also to the prevalence of the latter. These relations seem to be present in both adult and pediatric subjects. Take in review studies previously made regarding the association between headache and migraine is important for clinical practice and future research. Given the association between obesity and headache, clinicians should actively consider a child's weight status in the context of treatment for headache. Routine assessment of

child weight using BMI percentiles should be undertaken at the initial visit andused in the conceptualization of the presenting problem. For children who are overweight or at risk for overweight at the beginning of treatment, educational intervention may be necessary to improve weight control and subsequent headache treatment outcomes. For some children, referrals for behavioral weight management services may be necessary to facilitate appropriate lifestyle changes (increasing exercise, improving adherence to dietary guidelines) for effective weight control and optimal headache management.

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