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RESEARCH ARTICLE

The relationship between anthropometric measurements and the frequency and severity of attacks in migraine patients in western Türkiye

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ABSTRACT

Objective: Migraine affects approximately 20% of the general population. This study evaluated the effects of anthropometric measurements on migraine. We aimed to investigate the relationship between migraine and various anthropometric indices as superior indicators of regional body fat distribution.

Methods: This study included 190 participants. Height, weight, waist circumference (WC), hip circumference (HC), and neck circumference (NC) were measured. These measurements were used to calculate body mass index (BMI), waist-to-hip ratio (WHR), waist-to-height ratio (WHtR), and a body shape index (ABSI). The relationships between these anthropometric parameters and the Migraine Disability Assessment (MIDAS) scale were evaluated.

Results: BMI, WHR, and HC were significantly associated with migraine status ($p < 0.001$, $p < 0.001$, and $p = 0.040$, respectively). Among migraine patients, attack frequency correlated significantly with BMI, WHtR, WC, NC, and HC, whereas ABSI showed no significant association with attack frequency or severity ($p = 0.746$).

Conclusion: BMI, WHR, and HC are significantly associated with migraine. No correlation was observed between ABSI and migraine attack frequency or severity. Furthermore, a significant relationship was identified between MIDAS scores, HC, and WHtR.

Keywords: migraine, a body shape index, Migraine Disability Assessment, waist-to-hip ratio, body mass index

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INTRODUCTION

Migraine is a neurovascular disorder characterized by recurrent headache attacks and associated symptoms, including photophobia, phonophobia, osmophobia, nausea, vomiting, myalgia, and cutaneous allodynia (1). It affects up to 20% of the general population (2). Although its pathophysiology is complex, it involves interactions within the trigeminovascular system and various peptides, including sex hormones, oxytocin, and calcitonin gene-related peptide (CGRP). While its etiology remains not fully elucidated, it is influenced by genetic, hormonal, and environmental factors. Its prevalence is higher in women than in men, peaking during middle age. Migraine susceptibility and attacks are influenced by environmental factors such as alcohol and tobacco use, caffeine consumption, a sedentary lifestyle, dietary habits, and psychological distress (3,4). Additionally, obesity has been demonstrated to impact migraine frequency and severity (5). Large-scale studies have shown that the prevalence of migraine in women with severe obesity is twice as high as in those with a normal weight (6).

Several studies have shown that obesity affects other pain disorders, including various types of headache (7). Furthermore, migraine and obesity share overlapping pathophysiological pathways, such as endothelial dysfunction, chronic systemic inflammation, and elevated levels of inflammatory mediators (8). A Body Shape Index (ABSI) is calculated using waist circumference, height, and weight to assess an individual's body structure and health risk. Higher ABSI values are associated with greater central obesity, a higher risk of cardiovascular disease, and increased all-cause mortality (9,10). Although body mass index (BMI) is widely used in clinical practice to define obesity, its utility is limited as it does not reflect regional body fat distribution. Therefore, other parameters, including waist circumference (WC), hip circumference (HC), neck circumference (NC), waist-to-hip ratio (WHR), waist-to-height ratio (WHtR), and ABSI, may provide a more comprehensive representation of body fat distribution.

In previous studies, the effect of obesity on migraine was evaluated using BMI only (11,12). In this study, the effect of other anthropometric measurements (WC, HC, NC, WHR, WHtR, and ABSI) as a better indicator of body fat distribution on migraine was evaluated.

METHODS

Study design

Prior to initiating the study, necessary ethical approvals and permissions were obtained (Approval No: 2019/324). The sample size was calculated using the G*Power 3.1.9.2 software. For an independent samples t-test with a medium effect size (Cohen's d = 0.50), a significance level of $\alpha = 0.05$, and 90% power, the calculation indicated that a minimum of 172 participants was required.

The study prospectively enrolled 95 migraine patients and 95 healthy controls aged 18–50 years who presented to the Neurology outpatient clinic and agreed to participate. Migraine was diagnosed according to the criteria of the International Classification of Headache Disorders, 3rd edition (ICHD-3) (13). Participants with other major neurological or psychiatric disorders (e.g., bipolar disorder, schizophrenia) were excluded from the study.

Data collection tools

Anthropometric Measurements: Written informed consent was obtained from all participants prior to enrollment and physical assessment. Height, weight, WC, NC, and HC were measured using standardized protocols. These measurements were used to calculate BMI, WHR, and WHtR. Additionally, A Body Shape Index (ABSI), a novel anthropometric index, was calculated using the standard formula:

BMI = Weight / Height2 (kg/m2)

WHR = Waist Circumference / Hip Circumference

WHtR = Waist Circumference / Height

ABSI = WC ÷ (BMI2/3 × Height1/2)

Migraine Disability Assessment Scale (MIDAS): This scale, which evaluates migraine-associated work productivity and daily activity loss, was developed by Stewart et al., who reported a Cronbach's alpha of 0.87

(14). The Turkish validity and reliability of this scale was established, with a reported Cronbach's alpha of >0.8 (15). The MIDAS score is calculated by summing the total days of activity or work loss due to migraine headaches over the preceding three months. Scores are categorized into four grades of disability: Grade I (little or no disability, scores 0–5), Grade II (mild disability, scores 6–10), Grade III (moderate disability, scores 11–20), and Grade IV (severe disability, scores 21 or more).

Statistical analysis

Statistical analyses were performed using the IBM SPSS Statistics software package. Continuous variables are expressed as mean ± standard deviation, while categorical variables are presented as frequencies and percentages (%). The normality of the distribution of continuous variables was evaluated using standard normality tests and graphical methods. For comparisons between two independent groups, the independent samples t-test was used when normal distribution assumptions were satisfied. The relationships between continuous variables were examined using Pearson correlation analysis. For all analyses, a p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 190 participants (n = 95 patients; n = 95 healthy controls) were included in this study. The mean age of the migraine patient group was 33.18 ± 8.8 years, while that of the control group was 32.3 ± 1.5 years. Females constituted 75.8% (n = 72) of the migraine patient group. The sociodemographic characteristics of the cohorts are summarized in Table 1.

Significant differences in HC, BMI, and WHR were observed between the migraine group and the controls ($p < 0.001$, $p < 0.001$, and $p = 0.040$, respectively). Specifically, HC and BMI were significantly higher in the migraine group, whereas WHR was significantly lower compared to the control group. A detailed comparison of the anthropometric measurements between the groups is presented in Table 2.

There was no significant association between MIDAS scores and ABSI in the patient group ($p = 0.746$). In terms of sociodemographic factors, a statistically significant relationship was found between migraine attack frequency and marital status, with married patients experiencing a higher frequency of attacks

Table 1. Distribution of participants' sociodemographic characteristics

	Diseased Group	**n (%)**	**Control Group**	**n (%)**
Gender	Male	23 (24.2%)	Male	46 (48.4%)
	Female	72 (75.8%)	Female	49 (51.6%)
Marital Status	Single	37 (38.9%)	Single	79 (83.2%)
	Married	58 (61.1%)	Married	16 (16.8%)
Education Status	None	1 (1.1%)	None	0 (0%)
	Primary	16 (16.8%)	Primary	12 (12.5%)
	High School	49 (51.6%)	High School	47 (49.5%)
	University	29 (30.5%)	University	36 (38%)
Family History	No	43 (45.3%)	No	68 (71.6%)
	Yes	52 (54.7%)	Yes	27 (28.4%)
MIDAS	Between 1-5 days	2 (2.1%)		
	Between 6-10 days	13 (13.7%)		
	Between 11-20 days	27 (28.4%)		
	21 days and more	53 (55.8%)		

* MIDAS: Migraine Disability Assessment

Table 2. Evaluation of anthropometric measurements of the diseased and control group					
		n	**Mean±SD**	**p**	**95% CI [Lower, Upper]**
Gender	Diseased	95	1.76±0.43	**<0.001**	[0.10, 0.37]
	Control	95	1.52±0.50		
Height	Diseased	95	163.59±8.95	**<0.001**	[-9.85, -4.86]
	Control	95	170.95±8.45		
Weight	Diseased	95	72.41±11.35	**0.018**	[0.80, 8.54]
	Control	95	67.74±15.38		
WC	Diseased	95	84.36±14.04	0.128	[-0.86, 6.82]
	Control	95	81.38±12.80		
NC	Diseased	95	35.64±2.47	0.101	[-0.14, 1.58]
	Control	95	34.92±3.47		
HC	Diseased	95	103.96±9.70	**<0.001**	[2.89, 7.56]
	Control	95	98.73±6.24		
BMI	Diseased	95	27.32±4.89	**<0.001**	[3.22, 5.61]
	Control	95	22.90±3.29		
ABSI	Diseased	95	0.08±0.09	0.297	[-0.00, 0.02]
	Control	95	0.07±0.01		
WHR	Diseased	95	0.78±0.13	0.040	[-0.07, -0.00]
	Control	95	0.82±0.10		
WHtR	Diseased	95	0.49±0.11	**0.066**	[-0.00, 0.05]
	Control	95	0.47±0.05		

* WC: Waist circumference, NC: Neck Circumference, HC: Hip Circumference, BMI: Body Mass Index, ABSI: A Body Shape Index, WHR: waist/hip ratio, WHtR: waist/height ratio

compared to single patients (p = 0.010). Conversely, there was no statistically significant relationship between family history of migraine and the frequency or severity of attacks (p = 0.053). The correlations between individual anthropometric measurements and migraine attack frequency and severity within the patient group are detailed in Table 3.

DISCUSSION

This study demonstrated that BMI, WHR, and HC are significantly associated with migraine status. Furthermore, BMI was found to correlate with both the frequency and severity of migraine attacks. In addition, positive correlations were observed between the frequency of migraine attacks and WHtR, NC, WC, and HC. Conversely, no correlation was found between ABSI, a relatively novel anthropometric index, and either the frequency or severity of migraine attacks.

Existing literature suggests that obesity increases the risk of migraine (5). Consistently, higher BMI has been associated with increased migraine frequency (11). A large-scale study involving over 3,800 participants reported that the risk of migraine was 81% higher in obese individuals than in their normal-weight peers (16). These findings align with our results. Nonetheless, conflicting findings exist in the literature (17). For instance, in a study of 15,105 individuals, no direct association was found between BMI and the presence of migraine; however, a strong correlation was identified between elevated BMI and migraine attack frequency (18).

Table 3. Evaluation of attack frequency and severity and anthropometric measurements

Variable	Attack frequency		Attack severity		MIDAS	
	r	p	r	p	r	p
BMI	0.273	**0.007**	-0.245	**0.017**	0.057	0.584
ABSI	-0.005	0.965	0.100	0.333	-0.027	0.796
WHR	0.032	0.758	-0.024	0.819	0.264	**0.010**
WHtR	0.209	**0.042**	-0.101	0.328	0.321	**0.002**
WC	0.275	**0.007**	-0.119	0.252	0.218	0.034
NC	0.232	**0.024**	0.109	0.293	0.053	0.611
HC	0.259	**0.011**	-0.067	0.516	0.102	0.327

* WC: Waist circumference, NC: Neck Circumference, HC: Hip Circumference, BMI: Body Mass Index, ABSI: A Body Shape Index, WHR: waist to hip ratio, WHtR: waist to height ratio, MIDAS: Migraine Disability Assessment

While some studies have reported no relationship between headache duration or frequency and overweight/obesity status, other research has shown that headache frequency, duration, severity, and MIDAS scores are significantly elevated in obese patients compared to those with a normal BMI (19). In agreement with the latter findings, we observed a significant positive correlation between migraine attack frequency and BMI.

Intriguingly, our study revealed an inverse relationship between attack severity and BMI. In contrast, some previous studies have demonstrated that overweight or obese status is positively associated with pain intensity (20), while others indicated that BMI had no influence on the severity or duration of migraine attacks (21). Thus, our findings regarding attack severity diverge from these previous reports.

Our findings also showed that WC, NC, HC, and WHtR have significant correlations with migraine attack frequency. Prior literature has reported that the frequency of migraine attacks is higher in patients with an increased WC compared to those with a normal WC, though no significant relationship was found with attack severity or duration (22). In a study conducted in Türkiye, Özcan et al. identified associations of both BMI and WC with migraine (23). Consistent with our findings, a study from Iran demonstrated significant correlations between WC, WHR, WHtR, and both migraine attack frequency and severity (24).

A significant relationship was also found between MIDAS scores, HC, and WHtR in the present study; specifically, HC and WHtR were significantly higher in patients with severe disability (MIDAS Grade IV, indicating 21 or more lost days). In contrast, no significant correlations were found between BMI or other anthropometric parameters and MIDAS scores. Consistent with our findings, previous studies have reported no significant association between BMI and MIDAS scores (25). Similarly, Yu et al. demonstrated no association between obesity and MIDAS scores (26).

We did not observe a significant relationship between ABSI and migraine. Although ABSI has been widely studied, its potential association with migraine has not been previously investigated. To our knowledge, the present study is among the first to evaluate the relationship between ABSI and migraine-related clinical features. In the existing literature, ABSI has been linked to various adverse health outcomes, including cerebrovascular events, cardiovascular diseases, and malignancies (9,10).

This study has several limitations. First, manual anthropometric measurements were selected for their ease of use and rapid implementation in a clinical setting. While body composition was estimated using standard formulas based on these physical measurements, advanced imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) provide more precise evaluations of body fat distribution. Future studies utilizing these imaging modalities are needed to clarify the relationship between precise body fat distribution and migraine. Second, this study was conducted at a single center, which may limit the generalizability of the findings to wider populations.

CONCLUSION

In conclusion, this study demonstrates that BMI, WHR, and HC are significantly associated with migraine. While no correlation was found between ABSI and migraine attack frequency or severity, a significant relationship was established between MIDAS scores, HC, and WHtR. These findings contribute to the growing body of evidence linking regional body fat distribution to migraine clinical features. As one of the first studies to evaluate the relationships of NC and ABSI with migraine, this work may serve as a valuable reference for future large-scale, multicenter trials.

Ethical approval

This study has been approved by the Bolu Abant Izzet Baysal University Clinical Researches Ethics Committee (approval date: 19.12.2019, number: 2019/324). Written informed consent was obtained from the participants.

Author contribution

Concept: NAG, CA; Design: CA, NAG; Analysis or interpretation: NAG, CO; Literature search: NAG, CO; Manuscript writing: NAG, CA, CO. All authors reviewed the results and approved the final version of the article.

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Conflict of interest

The authors declare that there is no conflict of interest.

REFERENCES

1. Steiner TJ, Paemeleire K, Jensen R, et al. European principles of management of common headache disorders in primary care. J Headache Pain. 2007; 8 Suppl 1: S3-47.
2. Natoli JL, Manack A, Dean B, et al. Global prevalence of chronic migraine: a systematic review. Cephalalgia. 2010; 30(5): 599-609. **[Crossref]**
3. Yuan S, Daghlas I, Larsson SC. Alcohol, coffee consumption, and smoking in relation to migraine: a bidirectional mendelian randomization study. Pain. 2022; 163(2): e342-8. **[Crossref]**
4. Calabrò RS. Gender effect on migraine: nature or culture? J Integr Neurosci. 2022; 21(1): 18. **[Crossref]**
5. Ornello R, Ripa P, Pistoia F, et al. Migraine and body mass index categories: a systematic review and meta-analysis of observational studies. J Headache Pain. 2015; 16: 27. **[Crossref]**
6. Vo M, Ainalem A, Qiu C, Peterlin BL, Aurora SK, Williams MA. Body mass index and adult weight gain among reproductive age women with migraine. Headache. 2011; 51(4): 559-69. **[Crossref]**
7. Scher AI, Stewart WF, Ricci JA, Lipton RB. Factors associated with the onset and remission of chronic daily headache in a population-based study. Pain. 2003; 106(1-2): 81-9. **[Crossref]**
8. Peterlin BL, Bigal ME, Tepper SJ, Urakaze M, Sheftell FD, Rapoport AM. Migraine and adiponectin: is there a connection? Cephalalgia. 2007; 27(5): 435-46. **[Crossref]**
9. Allais G, Chiarle G, Sinigaglia S, Benedetto C. Menstrual migraine: a review of current and developing pharmacotherapies for women. Expert Opin Pharmacother. 2018; 19(2): 123-36. **[Crossref]**
10. Delaruelle Z, Ivanova TA, Khan S, et al. Male and female sex hormones in primary headaches. J Headache Pain. 2018; 19(1): 117. **[Crossref]**
11. Sadeghi O, Askari G, Maghsoudi Z, Ghiasvand R, Khorvash F. The association between abdominal obesity and characteristics of migraine attacks in Iranian adults. Iran J Nurs Midwifery Res. 2016; 21(3): 271-7. **[Crossref]**
12. Miri A, Nasiri M, Zonoori S, et al. The association between obesity and migraine in a population of Iranian adults: a case-control study. Diabetes Metab Syndr. 2018; 12(5): 733-6. **[Crossref]**
13. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. Cephalalgia. 2018;38(1):1-211. **[Crossref]**
14. Stewart WF, Lipton RB, Kolodner K, Liberman J, Sawyer J. Reliability of the migraine disability assessment score in a population-based sample of headache sufferers. Cephalalgia. 1999; 19(2): 107-14; discussion 74. **[Crossref]**
15. Ertaş M, Siva A, Dalkara T, et al. Validity and reliability of the Turkish Migraine Disability Assessment (MIDAS) questionnaire. Headache. 2004; 44(8): 786-93. **[Crossref]**
16. Recober A, Peterlin BL. Migraine and obesity: moving beyond BMI. Future Neurol. 2014; 9(1): 37-40. **[Crossref]**

17. Mattsson P. Migraine headache and obesity in women aged 40-74 years: a population-based study. Cephalalgia. 2007; 27(8): 877-80. [Crossref]
18. Santos IS, Goulart AC, Passos VM, Molina MDC, Lotufo PA, Bensenor IM. Obesity, abdominal obesity and migraine: a cross-sectional analysis of ELSA-Brasil baseline data. Cephalalgia. 2015; 35(5): 426-36. [Crossref]
19. Togha M, Haghdoost F, Khorsha F, Razeghi Jahromi S, Ghorbani Z. Body mass index and its association with migraine characteristics in female patients. Arch Iran Med. 2019; 22(10): 554-9.
20. Galioto R, O'Leary KC, Gunstad J, et al. The role of migraine headache severity, associated features and interactions with overweight/obesity in inhibitory control. Int J Neurosci. 2018; 128(1): 63-70. [Crossref]
21. Khan, M. M., Huda, M. N., Bhattacharjee, M., et al. Relationship of Migraine and Body Mass Index (BMI). Journal of Enam Medical College, 2016;6(2), 80-87. [Crossref]
22. Rossoni de Oliveira V, Camboim Rockett F, Castro K, da Silveira Perla A, Chaves MLF, Schweigert Perry ID. Body mass index, abdominal obesity, body fat and migraine features in women. Nutr Hosp. 2013; 28(4): 1115-20. [Crossref]
23. Özcan RK, Özmen SG. The Association between migraine, metabolic syndrome, insulin resistance, and obesity in women: a case-control study. Sisli Etfal Hastan Tip Bul. 2019; 53(4): 395-402. [Crossref]
24. Afshinmajd S, Davati A, Akbari F. The effects of body mass index on the treatment of the patients with migraine headaches. Iran J Neurol. 2011; 10(3-4): 35-8.
25. Téllez-Zenteno JF, Pahwa DR, Hernandez-Ronquillo L, García-Ramos G, Velázquez A. Association between body mass index and migraine. Eur Neurol. 2010; 64(3): 134-9. [Crossref]
26. Yu S, Liu R, Yang X, et al. Body mass index and migraine: a survey of the Chinese adult population. J Headache Pain. 2012; 13(7): 531-6. [Crossref]