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COMPARISON OF INDIVIDUALS WITH MIGRAINE AND TENSION-TYPE HEADACHE IN TERMS OF PAIN, PHYSICAL ACTIVITY LEVEL AND TEMPOROMANDIBULAR DISORDER SEVERITY

MİGREN VE GERİLİM TİPİ BAŞ AĞRISINA SAHİP BİREYLERİN AĞRI, FİZİKSEL AKTİVİTE DÜZEYİ VE TEMPOROMANDİBULAR BOZUKLUK ŞİDDETİ AÇISINDAN KARŞILAŞTIRILMASI

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ABSTRACT

Objective: The aim of this study was to compare individuals with migraine and tension-type headache (TTH) in terms of pain, physical activity level and severity of temporomandibular disorder.

Method: Individuals (n=48) between the ages of 18 and 45 who participated in the study were divided into two groups by being diagnosed with migraine or TTH by a neurologist. Pain severity was evaluated with the Visual Analogue Scale (VAS), headache impact level with the Headache Impact Test (HIT-6), Pressure-Pain Threshold (PPT) with the J-Tech Digital Algometer device, physical activity level with the International Physical Activity Questionnaire-Short Form (IPAQ-SF), and temporomandibular disorder severity with the Fonseca Anamnestic Index (FAI).

Results: There was no statistically significant difference in headache severity between individuals diagnosed with migraine and TTH (p>0.05). PPT measurement values of the trapezius and suboccipital muscles evaluated bilaterally did not show a statistically significant difference between the two groups (p>0.05). The average HIT-6 score of individuals diagnosed with migraine was found to be higher than individuals with TTH (p=0.003). The temporomandibular disorder severity level of individuals diagnosed with migraine was found to be higher than individuals diagnosed with TTH (p=0.002). There was no statistically significant difference between the groups in terms of physical activity level (p>0.05).

Conclusion: These findings highlight the importance of a holistic approach to headache management, addressing both primary symptoms and comorbid conditions, to improve patient outcomes. Determination of headache impact level and temporomandibular disorder severity in individuals with migraine and TTH may help physiotherapists to achieve optimal results, and may contribute to the development of proactive approaches to headache.

Key Words: Migraine, Tension-type headache, Physical activity, Pain, Temporomandibular joint

ÖZ

Amaç: Bu çalışmanın amacı migren ve gerilim tipi baş ağrısı (GTBA) olan bireyleri ağrı, fiziksel aktivite düzeyi ve temporomandibular bozukluk şiddeti açısından karşılaştırmaktır.

Yöntem: Çalışmaya katılan 18-45 yaş arasındaki bireyler (n=48) nörolog tarafından migren veya GTBA tanısı konularak iki gruba ayrıldı. Ağrı şiddeti Vizüel Analog Skalası (VAS) ile, baş ağrısı etki düzeyi Baş Ağrısı Etki Testi (HIT-6) ile, basınç-ağrı eşiği J-Tech Dijital Algometre cihazı ile, fiziksel aktivite düzeyi Uluslararası Fiziksel Aktivite Anketi-Kısa Form (UFAA-KF) ile ve temporomandibular bozukluk şiddeti Fonseca Anamnestik İndeksi (FAİ) ile değerlendirildi.

Bulgular: Migren ve GTBA tanısı konulan bireyler arasında baş ağrısı şiddetinde istatistiksel olarak anlamlı bir fark bulunmadı (p>0.05). Trapezius ve suboksipital kasların bilateral olarak değerlendirilen basınç-ağrı eşiği ölçüm değerleri iki grup arasında istatistiksel olarak anlamlı bir fark göstermedi (p>0.05). Migren tanısı konulan bireylerin ortalama HIT-6 skorunun GTBA tanısı konulan bireylerden daha yüksek olduğu bulundu (p=0.003). Migren tanısı konulan bireylerin temporomandibular bozukluk şiddeti düzeyinin GTBA tanısı konulan bireylerden daha yüksek olduğu bulundu (p=0,002). Fiziksel aktivite düzeyi açısından gruplar arasında istatistiksel olarak anlamlı bir fark yoktu (p>0.05).

Sonuç: Bu bulgular, hasta sonuçlarını iyileştirmek için hem birincil semptomları hem de komorbid durumları ele alan bütünsel bir baş ağrısı yönetimi yaklaşımının önemini vurgulamaktadır. Migren ve GTBA'lı bireylerde baş ağrısı etki düzeyinin ve temporomandibular bozukluk şiddetinin belirlenmesi, fizyoterapistlerin optimum sonuçlara ulaşmalarına yardımcı olabilir ve baş ağrısına yönelik proaktif yaklaşımların geliştirilmesine katkı sağlayabilir.

Anahtar Kelimeler: Migren, Gerilim tipi baş ağrısı, Fiziksel aktivite, Ağrı, Temporomandibular eklem

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INTRODUCTION

Headache, which is among the most prevelant nervous system disorders and causes significant disability, is defined by the World Headache Association as a disease that can be seen at any age, causes high health care expenditures but can be cured with appropriate treatment [1]. According to the International Headache Classification, headaches consists of two types as primary and secondary [2]. Primary headache refers to headache that is not due to a disease or head trauma, while secondary headache develops secondary to different health problems such as tumors, infections, vascular diseases and sinusitis. Migraine and tension-type headache (TTHs) are included in the primary headache group [3]. The causes of migraine and TTHs, which are among the most common headache types globally, include personal, social and economic factors [4]. Headaches are ranked 6th among the leading causes of years lived with disability worldwide, and in comprehensive headache epidemiology studies conducted in our country, the prevalence of headache is reported to be 68% in women and 62% in men [5].

In individuals under 50 years of age, migraine is a recurrent primary headache characterized by neurological, gastrointestinal and autonomic changes and is among the top 10 causes of disability [6,7]. Disorders such as neck pain, depression, and anxiety that accompany migraine place migraine in a central position among the problems that cause disability. Cervical dysfunction frequently accompanies migraines, with pain signals traveling through upper cervical nerves even when no structural abnormalities are present in the neck. Sensory input from these nerves converges with the trigeminal nerve within the brainstem and interacts with secondary neurons in the upper cervical area. Additionally, some branches of the trigeminal nerve extend to neck muscles via the skull, suggesting that trigeminal pathways may contribute to neck pain associated with migraines [7].

TTH is a common neurological disorder characterised by mild to moderate recurrent bilateral headaches that are described as a 'hatband' pattern [8]. According to this pattern, pain may radiate to the forehead, posterior part of the head and neck. TTH has 3 different pathophysiological mechanisms: genetic, myofascial and central sensitisation and chronification involving altered pain modulation [9]. Pericranial muscle tenderness is a common symptom in individuals with TTH, suggesting the potential of myofascial tissues in the pathophysiology of TTH [10]. Studies show that people with chronic TTH experience greater tenderness in both pericranial muscles and tendon attachment sites compared to healthy controls [11,12]. Additionally, myofascial trigger points and hyperirritable spots, often linked to taut bands in muscles, may contribute to the condition. Therefore, it is emphasized that it may mimic the TTH pattern of muscular origin in the head, neck and shoulder regions [12].

The trigger point theory reports that the presence of trigger points is associated with headache in the neck and chewing muscles (upper trapezius, sternocleidomastoideus, suboccipitalis, masseter and temporalis) [13]. On the other hand, considering the close physiological, anatomical and biomechanical relationship between the temporomandibular joint (TMJ) and the cervical region, the weakness of the deep flexor muscle group suggests that it will lead to negative effects on the TMJ [14].

Regular physical activity is associated with lower prevalence of migraine and severity of non-migraine headaches [15,16]. A review of the literature found few studies examining the relationship between physical activity and headaches. Varkey et al. [15] identified sedantary behavior as a increase the risk for non-migraine headaches in people without pre-existing headaches and noted that those with headaches tend to be less active than headache-free individuals. Köseoglu et al. [17] emphasized the positive impact of exercise on migraines, particularly in patients with low baseline beta-endorphin levels. Beier et al. [18] revealed that physical inactivity is associated with poor quality of life (QoL) in individuals suffering from headaches. In addition, physical inactivity and non-compliance with World Health Organisation recommendations for physical activity (150-300 minutes of moderate-intensity aerobic physical activity or at least 75-150 minutes of high-intensity aerobic physical activity per week, or an equivalent combination of both) are reported to be associated with primary headaches [16].

As a result of the literature review considering myofascial mechanisms such as muscle tenderness and physiological stress, trigger point theory, physical activity, cervical-TMJ relationship, no study comparing individuals with migraine and TTH in terms of pain severity, physical activity level and temporomandibular disorder severity was found. The aim of this study was to investigate pain, physical activity level and temporomandibular disorder severity levels in individuals with migraine and TTH and compare the results. Our hypotheses are as follows:

- H_1: There is a difference in pain between individuals with migraine and TTH.
- H_2: There is a difference in physical activity levels between individuals with migraine and TTH.
- H_3: There is a difference in temporomandibular disorder levels between individuals with migraine and TTH.

METHOD

Study Design and Participants

This study, which has an observational and cross-sectional study design, was carried out in KTO Karatay University Physiotherapy and Rehabilitation Application Laboratory between January-October 2023. With a mean headache severity of 7.4 out of 10 and a standard deviation of 1.6 in individuals with migraine and a mean headache severity of 5.5 and a standard deviation of 2.2 in individuals with tension-type headache, the minimum sample size required to find a clinically significant difference with an effect size of 1.05, 90% power and 0.05 bias level was determined as at least 40 participants in total, with at least 20 participants per group [19].

Our study is a triple blind study. Participants were diagnosed with migraine or TTH by a neurologist (BH) who is an expert in the field. The evaluations were made by physiotherapists (BKÖ, MM) who are expert in the field. Identification and analysis of the data into the system was done by another researcher (ÜY). A triple blind trial means that participants, physiotherapists and data analyst do not have access to details of group assignment. This ensures that bias for or against the tested evaluations is very unlikely to occur.

Inclusion Criteria: Participants were divided into two groups by being diagnosed with migraine or TTH by a neurologist (BH). The age range of the participants was determined as 18-45 years, which is a period when the prevalence of both migraine and tension-type headache is high [20]. Individuals with headache were classified by a specialist neurologist (BH) as chronic migraine (headache more than 15 days a month, at least 8 days of which were migraine for the last 3 months) and chronic TTH (headache occurring daily or very frequently, lasting for hours to days or continuous, bilaterally located) according to the diagnostic criteria in the 3rd edition of the International Headache Classification (ICHD-3) established by the International Headache Society (IHS) [8].

Exclusion Criteria: Individuals with general joint damage affecting the head, neck and shoulder area and individuals who received radiotherapy to these body parts, individuals diagnosed with cervical disc herniation, radiculopathy and myelopathy, individuals with a history of congenital diseases, women during menstruation and pregnant women were excluded from the study.

Data Collection

Sociodemographic characteristics of the participants such as age, body weight, height, body mass index, gender and occupational status were recorded with the Assessment Form. Participants were evaluated by an expert neurologist within the study team and then diagnosed with

migraine or TTH. The intensity of pain was evaluated using the Visual Analogue Scale (VAS), while the Headache Impact Test (HIT-6) assessed how headaches affected participants. Physical activity levels were evaluated using International Physical Activity Questionnaire-Short Form (IPAQ-SF), and the Fonseca Anamnestic Index (FAI) was used to determine the severity of temporomandibular disorder. Lastly, the participants' Pressure-Pain Threshold (PPT) was measured using the J-Tech Algometer Device (J-Tech Medical, Salt Lake City, UT, USA), an objective assessment tool. The total evaluation time was 15 minutes and all evaluations were completed in one session.

Outcome Measures

Assessment of Pain Severity: VAS, a self-reported measure of pain, was used to measure pain intensity. VAS consists of a 10-centimeter line. At the left end of the scale is written "No pain (0 cm)" and at the right end is written "Worst pain (10 cm)". Participants were asked to mark their pain level on the line. The measurement from the left side, which is the starting point of the scale, to the participant's marks, was recorded in centimeters [21].

Evaluation of Headache Impact Level: HIT-6 evaluates different parameters such as pain, vitality, psychological distress, role, sociability, and cognitive functioning. 3 of the 6 questions in the test specifically evaluate the previous 4 weeks, and the other 3 questions do not specify any time interval. The scoring of the scale, which is a 5-point Likert type (Never:6 point, Rarely=8 point, Sometimes=10 point, Very often=11 point, Always=13 point), is obtained by summing the answers from six questions. The total score of the questionnaire, the Turkish validity and reliability study of which was performed by Dikmen et al. in migraine patients, varies between 36-78 and higher scores show increased negative effect level [22].

Evaluation of Pressure-Pain Threshold: The PPT was measured using the J-Tech Digital Algometer. This threshold refers to the minimum pressure needed for the sensation of pressure to be perceived as pain. It assesses the increase in increased mechanical sensitivity, especially in headache studies. After the upper part of the trapezius muscle (the midpoint between the C7 vertebra and the acromion) and the suboccipital regions of the participants were evaluated by palpation, tender points were detected and then these regions were marked. Vertical and direct pressure was applied to the painful point with the 1 cm^2 diameter head of the algometer. Participants were required to indicate the point at which the sensation of pressure changed from a pressure sensation to a painful sensation, and this value was then recorded as kilograms per square centimeter (kg/cm^2). Each area was measured three times, with a 30-second interval between measurements. The mean value of three measurements was recorded [23].

Evaluation of Physical Activity Level: The physical activity levels of the participants were evaluated with the Turkish version of the IPAQ-SF with 7 questions [24]. The short form was used in our study. IPAQ-SF inquires about the duration and frequency of activities performed over the past seven days. While the sitting question in the questionnaire is not included in the total score, scores for light, moderate and vigorous activities are calculated and the sum of 3 different physical activity levels gives the overall score. The total score of IPAQ-SF is obtained by multiplying the days, minutes, and Metabolic Equivalent of Task (MET) value. For its calculation, the formula Physical Activity Total Score (MET-min/week) = [(walking time×day×3.3 METs) +(moderate activity time×day×4 METs) +(vigorous activity time×day×8 METs)] was used (24). To calculate Physical Activity Total Score (MET-min/week) = [(Walking time×day×3.3 MET) + (Moderate activity time×day×4 MET) + (Vigorous activity time×day×8 MET)] formula was used [24].

Evaluation of Temporomandibular Joint Dysfunction Severity: The presence and degree of temporomandibular disorder were evaluated using the FAI. Turkish validity and reliability study was performed by Kaynak et al. The FAI consists of a total of 10 questions [25]. Each question in the index has 3 answer options as Yes: “10 points”, Sometimes: “5 points” and No: “0 points”. The increase in the total index score indicates an increase in the severity of temporomandibular disorder.

Ethical Approval

In this study, which had an observational and cross-sectional study design, the ethical criteria of the Declaration of Helsinki were followed and the participants were informed about the study in detail. Participants who have both verbal and written informed consent and signed the Informed Consent Form participated in the study. Ethical approval for the research was given by KTO Karatay University Pharmaceutical and Non-Medical Device Research Ethics Committee with decision number 2022/015.

Statistical Analysis

SPSS statistical software version 26 was used for statistical analysis of the data (Statistical Package for Social Science for Windows, Version 26.0, Inc, an IBM Company, Chicago, IL, USA). Demographic data were given as mean±standard deviation and percentage (%). The independent sample t-test was employed for data that exhibited a normal distribution, whereas the Mann-Whitney U test was utilised for data displaying a non-normal distribution.

RESULTS

The groups were similar in terms of age (p=0.900), height (p=0.462), body weight (p=0.845) and body mass index (p=0.863) (Table 1). The gender and occupational status of the individuals are shown in Table 1.

Table 1. Demographic characteristics of groups

Parameters	Migraineurs(n=24)	TTH (n=24)	t	p
Age (years)	24.29±6.89	24.04±6.85	0.126	0.900
Height (m)	1.66± 6.86	1.64±6.36	0.742	0.462
Body mass (kg)	64.70±13.76	63.95±12.72	0.196	0.845
BMI (kg/m^2)	23.35±4.29	23.57±4.64	-0.174	0.863
Sex (n/%)				
Male	2/8.3%	-		
Female	22/91.7%	24/100%		
Occupational Status				
Student	19/79.2%	18/75%		
Worker	3/12.4%	1/4.2%		
Academician	1/4.2%	3/12.4%		
Administrator	1/4.2%	2/8.4%		

BMI:Body mass index

The analyses revealed similar headache severity values between individuals with migraine and those with TTH (p>0.05). Similarly, the PPT values for the trapezius and suboccipital muscles, measured on both sides, showed no significant difference between the two groups (p>0.05) (Table 2).

The mean HIT-6 score of individuals diagnosed with migraine was found to be higher than individuals with TTH (p=0.003). In addition, the temporomandibular disorder severity level of individuals diagnosed with migraine was found to be higher than individuals diagnosed with tension-type headache (p=0.002). In terms of physical activity level no statistically significant difference was found between the groups (p>0.05) (Table 3).

Table 2. Comparison of headache severity and PPT values between groups

Parameters	Migraineurs (n=24)	TTH (n=24)	t	p
Headache pain intensity (VAS-cm)	5.63±2.35	5.56±1.52	0.125	0.901
PPT-M. Trapezius (right) (kg/cm^2)	55.19±18.03	52.03±15.84	0.646	0.521
PPT-M. Trapezius (left) (kg/cm^2)	50.92±15.61	45.90±13.83	1.178	0.245
PPT-M. Suboccipitalis (right) (kg/cm^2)	43.65±12.74	44.38±14.50	-0.186	0.853
PPT-M. Suboccipitalis (left) (kg/cm^2)	44.55±13.47	46.10±16.84	-0.353	0.726

*VAS-cm:Visual Analog Scale-centimeter; kg/cm^2:kilograms per square centimeter; M:Musculus; TTH:Tension-Type Headache; PPT:Pressure Pain Threshold; *p<0.05*

Table 3. Comparison of HIT-6, FAI and IPAQ-SF values between groups

Parameters	Migraineurs (n=24)	TTH (n=24)	t	p
HIT-6	67.45±5.11	62.41±5.99	3.135	0.003[a]*
FAI	50 (36.25-70)	35 (25-45)	3.269	0.002[b]*
IPAQ-SF	1219.75 (717.75-2725.50)	1328.25 (750.75-2178.50)	0.382	0.992[b]

*a:Independent samples t test; b:Mann Whitney U Test; TTH:Tension-Type Headache; HIT-6:Headache Impact Test-6; FAI:Fonseca Anamnestic Index; IPAQ-SF:International Physical Activity Questionnaire-Short Form; *p<0.05*

DISCUSSION

The purpose of the present study was to compare individuals with migraine and TTH in terms of physical activity level, pain and severity of temporomandibular disorder. In this context, no difference was found in terms of pain and physical activity in individuals with migraine and TTH; however, the severity of temporomandibular dysfunction was statistically significantly higher in individuals with migraine compared to individuals with TTH. According to these results, H1 and H2 were not supported but H3 was supported. The findings revealed some important insights into the differences and similarities between these two common types of headaches.

Our results, consistent with previous studies [26,27], showed similar values in headache severity between individuals diagnosed with migraine and individuals diagnosed with TTH. This suggests that although the nature and triggers of the pain may be different, the perceived severity of headaches may be comparable between the two groups. However, individuals with migraine reported a higher impact of their headaches on their daily lives, according to HIT-6 results. Similarly, Kim et al. [28] reported that more individuals with migraine (31.5%) were affected by headache than individuals with TTH (7%) (Headache Impact Level score ≥56). This suggests that migraine has a more profound impact on individuals' QoL than TTH due to associated symptoms such as nausea, photophobia, phonophobia.

In studies, PPT values measured on both the trapezius muscle and suboccipital muscles were found to be lower in individuals with migraine and chronic TTH compared to controls [29,30]. However, comparisons have also been made between different headache types. An interesting study reported that individuals with chronic TTH generally showed lower PPT values than both unilateral migraine patients and controls [31]. Similarly, Malo-Urries et al. [32] also stated that TTH exhibited lower PPT values compared to migraine, cluster headache and controls. On the other hand, Filatova et al. [33] reported that the mean PPT values in the neck region including the forehead, temple and the area between the trapezius muscle and C2 were similar between chronic temporomandibular disorder and chronic migraine. Additionally, no significant difference in PPT values in the neck region was identified in geriatric population with episodic TTH, migraine, cervicogenic headache, or unclassifiable headaches [34]. There may be various reasons why study results differ. The results may be affected by many factors such as the number of participants in the studies, differences between the methods and protocols used and measurement sites, the type, frequency, severity and duration of migraine, and whether the TTH is chronic or episodic. Present study shows that PPT values of the trapezius and suboccipital muscles were similar between groups. This result indicates that local muscle tenderness may not differ between migraine and TTH patients. This may mean that although the pain mechanisms and pathways involved in headaches are different, their peripheral reflections in terms of muscle sensitivity are comparable.

Previous studies have revealed that both migraine [35] and TTH [36] negatively affect physical activity level. Krøll et al. [37] reported that physical activity levels were lower especially in migraine patients, followed by individuals with temporomandibular disorder and neck pain. The results of a recent study conducted in Brazil with 14,088 participants showed that individuals with TTH (137.8±189.9 min/week) and migraine (109.9±165.9 min/week) had similar physical activity levels. In the present study, similar to the results of de Oliveira et al. [38] no significant difference was found between the groups in terms of physical activity levels. This may be because participants in both groups had similar lifestyle habits or because their physical activity levels could not be assessed with a more objective method and sensitive differences could not be detected. However, the lack of difference indicates that the complexity of headache problems has a multidimensional nature, including triggers and exacerbating factors.

Temporomandibular disorders are a common condition in individuals with headaches [39]. Temporomandibular disorder may aggravate headache symptoms or cause a primary headache disorder, the perception of pain in the masticatory muscles or TMJ [40]. In our study, the severity of temporomandibular disorder was found to be greater in individuals with migraine in comparison to participants with TTH. This finding is particularly interesting considering the anatomical and functional relationship between the TMJ and the cervical region. The recurrent and intense nature of migraine pain suggests that it may exacerbate or contribute to temporomandibular disorder, possibly through mechanisms involving muscle tension or trigeminal nerve involvement [7]. This supports the idea that comorbid conditions such as temporomandibular disorders are more frequently seen in individuals with migraine [39] and may contribute to their overall experience of disability and pain.

As a result of a comprehensive literature review, no study was found that evaluated and compared the PPT in the muscles around the neck of individuals with migraine and TTHs with objective measurement methods such as digital inclinometer. Moreover, our study is the first to investigate and compare the severity of temporomandibular disorder in migraine and TTH, which are among the primary headaches.

Limitations

There are certain limitations to this study, such as its cross-sectional design, which restricts the ability to draw causal conclusions, and its reliance on self-reported measures of physical activity level. Another limitation is that the PPT measurements focus only on neck muscles and that the masticatory muscles are not included in the assessments. Future research should aim to use longitudinal designs to investigate causal relationships between physical activity, headache intensity, and temporomandibular disorder. Additionally, objective measurements of physical activity level and more detailed assessments of headache-related disability may provide more comprehensive information.

CONCLUSION

In conclusion, this study enhances the insight of the complex interaction between headache types, physical activity, and temporomandibular disorder. While migraine and TTH share some similarities in terms of headache severity and muscle tenderness, they differ significantly in their effects on daily life and associated temporomandibular disorder. These findings emphasize the significance of a multidirectional to headache management, addressing both primary symptoms and comorbid conditions, to improve patient outcomes. It also suggests that encouraging exercise may be beneficial for all headache sufferers, not just those with migraine.

Ethical Approval: *2022/015 Pharmaceutical and Non-Medical Device Research Ethics Committee of KTO Karatay University*

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