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RESEARCH ARTICLE

Factors Contributing to Changes in Chronic Migraine Patients with Bruxism: A Comparative Analysis

Nevra Öksüz, Aynur Özge

Department of Neurology, Mersin University Faculty of Medicine, Mersin, Türkiye

ABSTRACT

Objective: Migraine and temporomandibular disorders (TMDs) are both common diseases and TMDs are reported as a risk factor in migraine progression. In our clinical practice, we see that especially bruxism and migraine often coexist, but there is a lack of research investigating the possible relationship between migraine and bruxism. In this study, we aimed to investigate the presence of bruxism in chronic migraine (CM) patients and to evaluate migraine characteristics in patients with and without bruxism.

Materials and Methods: A retrospective analysis was conducted utilizing the Mersin University headache database, which encompassed a total of 270 patients meeting the diagnostic criteria for CM. Among the CM patients, 54 individuals were additionally diagnosed with bruxism. The patients (with/without bruxism) were compared in terms of migrainous features and comorbidities.

Results: Out of the 270 patients, 54 individuals reported the coexistence of bruxism alongside CM. CM patients without bruxism exhibited a higher likelihood of experiencing migraine-associated symptoms, including nausea, photophobia, and phonophobia ($p<0.001$, $p=0.020$, and $p<0.001$, respectively). The characteristics of the headache, such as the throbbing pattern, were similar in both groups, showing no significant difference ($p>0.05$).

Conclusion: The presence of bruxism did not demonstrate a significant association with a higher prevalence of common symptoms related to migraines. Although bruxism is thought to be a potential risk factor for worsening migraine, we did not find any significant results indicating this in our study. However, we think it is important to accept bruxism as a contributing factor to the holistic management of CM.

Keywords: Bruxism, chronification, depression, migraine, prevalence

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INTRODUCTION

Chronic migraine (CM) is a common chronic daily headache characterized by frequent headaches with at least 15 headache days per month, which has a great disease burden with a prevalence of 1.3–2.4% of the general population.[1–3] CM is one of the most disabling forms of migraine and is particularly difficult to treat. There are several risk factors associated with the progression of migraine and are still under investigation.[4] Bruxism is one of the risk factors thought to have a potential contribution to this process.

Bruxism is a parafunctional activity characterized by clenching or grinding of teeth without a functional purpose such as chewing and grinding.[5] The incidence of bruxism decreases with age. Although it varies in studies, the prevalence of bruxism has been reported to be 9% in adults, 14–20% in children, 13% in young adults between the ages of 18–29, and around 3% in the group over 60 years of age.[6,7] Due to subjective diagnostic criteria, there is no globally accepted method for diagnosing bruxism. However, the most commonly used method is clinical observation. Bruxism can cause problems such as wear and fractures in teeth, and pain in the orofacial region especially in the temporomandibular joint.[8]

Bruxism usually causes pain that spreads to the temple area when waking up in the morning, and its association with another pain source, migraine, is frequently observed. Al-

Address for Correspondence: Nevra Öksüz, Department of Neurology, Mersin University Faculty of Medicine, Mersin, Türkiye
E-mail: nvrksz@gmail.com **ORCID ID:** 0000-0003-4825-7457

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though the prevalence of bruxism is high in patients with headaches in our daily practice, it remains unclear whether bruxism is a stand-alone risk factor for primary headaches in studies. Therefore, in our study, we first planned to investigate the frequency of bruxism and the effect of the presence of bruxism on the migraine clinic in CM patients.

MATERIALS and METHODS

Study Population and Data Collection

The data set was composed using the Turkish headache database, Mersin Branch. A retrospective analysis was conducted utilizing this comprehensive database. All information of our patients was in detail in this database.[9] The study was conducted in accordance with the Helsinki Declaration and approved by the local Ethics Committee of Mersin University. Informed consent was obtained from all participants. A total of 270 patients with CM were enrolled in the study, including 54 CM patients with bruxism and 216 CM patients without bruxism. The classification of migraine was based on The International Classification of Headache Disorders, 3rd edition (Headache Classification Committee, 2018).[10] These patients were closely monitored between the years 2017 and 2023. Patients with a "headache-plus" diagnosis (e.g., migraine plus tension-type headache) were excluded from the study. The presence of migrainous features, triggers, and comorbidities were noted during face-to-face interviews. Nausea, vomiting, photophobia, phonophobia, aggravation by physical activity, allodynia, motion sickness, headache frequency, presence of aura, localization, and intensity of pain according to the visual analog scale (VAS) were questioned. In addition to demographic data, we recorded the presence of migraine patients in their family, the presence of stress, allergy, and sleep disorders etc.

The diagnosis of bruxism was made as a result of clinical evaluations. In clinical evaluations, patients were asked questions such as whether they were grinding their teeth, clenching their teeth during sleep or awake, waking up tired in the morning, having pain in the orofacial region, and whether there was wear in the teeth. In addition to the presence of these symptoms, patients with temporal and/or mandibular muscle hypertrophy on examination were diagnosed with bruxism.

Statistical Analysis

To compare the clinical features between CM patients with and without bruxism, thorough statistical analyses were performed. Statistica version 13.5.0.17 (TIBCO Software Inc., Palo Alto, CA 94304 USA) program was employed for data evaluation, with a statistical significance level set at $p<0.05$. The normality of continuous variables was assessed using the Shapiro–Wilk test. The Mann–Whitney U-test and t-test were utilized for comparing continuous variables in the two independent groups, i.e., CM patients with and without bruxism. As for categorical data analysis, the Chi-Square test and Fisher's exact test were applied.

RESULTS

Our study evaluated a total of 270 participants, including 45 men (16.7%) and 225 women (83.3%). There were no statistically significant differences between the patient groups regarding age and gender distribution ($p=0.945$ and $p=0.414$, respectively). Features such as motion sickness, smoking, and alcohol use, medication overuse, and the presence of headache in their family are shown in the table below. Family history of headache, seasonal relationship, and menstrual exacerbation was more common in the group without bruxism. There was no statistical difference between the groups in terms of features supporting migraine such as atopy, allergy, and motion sickness (Table 1).

When examining the characteristics of headache, we found that participants without bruxism had significantly higher levels of throbbing pattern, photophobia, phonophobia, and nausea ($p=0.020$, $p<0.001$, and $p<0.001$, respectively), as shown in Table 2. However, there was no significant difference between the two groups in terms of headache severity and frequency ($p=0.211$ and 0.942, respectively). The presence of unilaterality was significantly higher ($p=0.028$) in the CM without bruxism group, but it was remarkable that there was no difference in terms of being bilateral between the groups ($p>0.05$) (Table 2).

There was no significant difference between the groups in terms of common triggers such as stress and sleep disturbance and comorbid conditions such as vascular and metabolic diseases except for depression. Depression was more common in the group with bruxism ($p=0.013$) (Table 3). When we look at the type of treatment, there was no difference between the groups about the patients who received acute treatment, used prophylaxis, or had intermittent great occipital nerve blockade ($p=0.197$, $p=0.115$, and $p=0.428$, respectively). There was also no difference between the groups in terms of sleep disorder rates, which are known to frequently accompany bruxism ($p=0.807$).

Our results indicated that there was no significant difference in the distribution of most symptoms between the

Table 1. Clinical characteristics of the study patients

	CM without bruxism (n=216)		CM with bruxism (n=54)		p
	Mean±SD (min-max)	Median (IQR)	Mean±SD (min-max)	Median (IQR)	
Age	39.48±12.48 (13-73)	39 (31–48)	39.61±11.18 (12-66)	38 (33-48)	0.945[a]
	n	%	n	%	p
Family history of headache	127	58.8*	21	38.9	0.009[b]
Medication overuse	56	25.9	9	16.7	0.155[b]
Menstrual exacerbation	108	50.0*	18	33.3	0.028[b]
Seasonal relationship	51	23.6*	6	11.1	0.044[b]
Motion sickness	63	29.2	12	22.2	0.308[b]
Allergy	16	7.4	4	7.4	1.00[c]
Atopy	47	21.8	13	24.1	0.714[b]
Current smoker	47	21.8	10	18.5	0.602[b]
Alcohol use	3	1.4	2	3.7	0.262[c]

*: Represents a significantly higher rate (p<0.05); [a]: Independent Sample t test; [b]: Chi-Squared test; [c]: Fisher exact test. CM: Chronic migraine; SD: Standard deviation; IQR: Interquartile range

two groups, including headache quality, VAS, allodynia, autonomic symptoms, as well as allergy, and atopy. Stress and physical activity, which are among the most common triggers, did not differ significantly between the two groups (p=0.099 and p=0.785, respectively).

Our study findings suggest that there is no significant worsening in terms of headache characteristics in CM patients with bruxism.

DISCUSSION

Migraine is a common disorder, and 7.7% of these patients are CM. CM is a severely disabling disease, and bruxism is thought to contribute to this disability. However, when we look at the literature, we see that this issue has not been studied enough. For this purpose, we investigated migrainous features and whether the presence of bruxism contributes to the severity of the disease. In our study group, which included 270 CM patients, we detected bruxism in 54 patients (20%), which is a substantial rate. Considering that this rate is 9% in adults and 13% in the 18–30 age group, which is the age range where migraine is common, this is a very high rate.[6]

In our patient group, as in the studies, bruxism was higher in female (n=47, 87%) patients in general, but it was not statistically significant (p>0.05).[11,12] It has been suggested that TMDs are seen more frequently in migraine patients, and it was found to be higher in female patients with migraine compared to those without migraine.[13] However, there was no control group in our study, and all patients were CM. This is actually one of the missing aspects of our study. Another study found the rate of bruxism to be around 27% in the group with headache, similar to our study, but all primary headaches were included in this study. However, it is known that TMDs mostly accompany migraine, one of the primary headaches.[14,15]

Bruxism is one of the factors thought to contribute to chronicity, but we did not find an increase in headache frequency or severity in CM patients with bruxism in our study (p=0.942 and p=0.211, respectively). CM patients with bruxism also did not exhibit a higher likelihood of experiencing migraine-associated symptoms, including nausea, photophobia, and phonophobia (p>0.05). We know that migraine is usually a unilateral and throbbing pain. On the contrary, in bruxism, pain in the bilateral temporomandibular region is expected and is usually of a pressing nature.[16] In our study, consistent with the literature, unilateral pain was more common in the group without bruxism (p=0.028), but there was no statistically significant difference in terms of bilaterality (p>0.05) and pressing pattern (p=0.854).

Table 2. Phenotypic features of CM in the study group

	CM without bruxism (n=216)		CM with bruxism (n=54)		p
	Mean±SD (min-max)	Median (IQR)	Mean±SD (min-max)	Median (IQR)	
Headache frequency (day/month)	19.95±8.65 (1.5–30)	20 (10–30)	19.19±9.25 (1-30)	20 (14.25–28.75)	0.942[a]
VAS	8.11±1.64 (0–10)	8 (7–9)	8.33±1.92 (0–10)	9 (8–9.25)	0.211[a]
	n	%	n	%	
Headache quality					
Pressing	19	23.5	3	9.4	0.854[b]
Throbbing	124	153.1	22	68.8	
Localization					
Unilateral	106	70.2*	12	44.4	0.028[b]
Bilateral	15	9.9	6	22.2	
Nausea	174	80.6*	31	57.4	<0.001[b]
Vomiting	101	46.8	18	33.3	0.076[b]
Photophobia	169	78.2*	34	63.0	0.020[b]
Phonophobia	181	83.8*	29	53.7	<0.001[b]
Osmophobia	144	66.7	30	55.6	0.127[b]
Allodynia	65	30.1	12	22.2	0.252[b]
Autonomic symptoms	21	9.7	5	9.3	1.00[c]

*: Represents a significantly higher rate (p<0.05); [a]: Mann Whitney U-test; [b]:Chi-Squared test; [c]: Fisher exact test. CM: Chronic migraine; SD: Standard deviation; IQR: Interquartile range; VAS: Visual analog scale

Although psychosocial theory suggests that stress and personality structure have a significant effect on bruxism, the presence of stress and anxiety did not show any significant difference in our study (p=0.099 and p=0.221, respectively).[17] However, it was noteworthy that the rates of depression were higher in our patients (p=0.013). Certain factors such as family history of migraine, menstrual association, and seasonal relationship were more common in CM patients without bruxism (p=0.009, p=0.028, and p=0.044, respectively).

In terms of treatment, TMDs are usually under-recognized in patients with CM. Considering that botulinum toxin application is one of the effective treatment options in CM, we can think that the recognition of bruxism becomes more important.[18] Although the differences in the etiology of bruxism require different approaches in their treatment, bruxism treatment approaches mainly include; cognitive-behavioral therapy, pharmacological approaches, and dental approaches. One of these pharmacological approaches is botulinum toxin A application.[19,20] Therefore,

Table 3. Accompanying medical conditions in the study patients

	CM without bruxism (n=216)		CM with bruxism (n=54)		p
	n	%	n	%	
Emotional stress	103	47.7	19	35.2	0.099
Sleep disturbance	100	46.3	26	48.1	0.0807
Physical activity	60	27.8	14	25.9	0.785
Dizziness	98	45.4	21	38.9	0.391
Anxiety	47	21.8	16	29.6	0.221
Depression	16	7.4	10	18.5*	0.013
Vascular diseases	34	15.7	6	11.1	0.392
Metabolic disorders	39	18.1	10	18.5	0.937
Fibromyalgia	58	26.9	19	35.2	0.225

*: Represents a significantly higher rate; p: Chi-Squared test. CM: Chronic migraine

when evaluating migraine patients, we should not forget to question the patient in terms of bruxism. These studies also emphasize the importance of accepting bruxism as a contributing factor to the holistic management of CM.

CONCLUSION

To optimize the clinical care for CM patients with bruxism, it is crucial to comprehend the specific changes that bruxism introduces in these individuals. Therefore, further research is warranted to deepen our understanding in this regard. This comprehensive analysis offers valuable insights into the clinical characteristics associated with bruxism, aiding in the development of tailored management approaches.

Disclosures

Ethics Committee Approval: The study was approved by the Mersin University Clinical Research Ethics Committee (No: 580, Date: 25/08/2021).

Informed Consent: Written informed consent was obtained from all patients.

Peer-review: Externally peer reviewed.

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