SUMMARY

Background/Aim: It is possible to find studies in the literature evaluating the relationship among self-reported bruxism, psychological factors, and myogenous temporomandibular disorder. In addition, the relationship between these issues has not yet been clarified. The objective of this study was to evaluate the association between peripartum depression, self-reported bruxism, and myogenous temporomandibular disorders among postpartum women in Turkey. Material and Methods: This study included 220 women, whom were asked about their bruxism behaviour during day and during sleep. Besides, all of them assessed with Short-Form Fonseca’s Anamnestic Index for myogenous temporomandibular disorder and the Edinburgh postnatal depression scale for peripartum depression. Results: The results showed that, self-reported bruxism was observed at a statistically significantly higher rate (94.3%) in peripartum depression group. 86.5% of the patients with self-reported bruxism had myogenous temporomandibular disorder (p<0.001). As a result, 80.0% of the patients with peripartum depression had myogenous temporomandibular disorder (p<0.001). Conclusions: In conclusion, a significant relationship has been found between peripartum depression and self-reported bruxism, self-reported bruxism and myogenous temporomandibular disorder, and peripartum depression and myogenous temporomandibular disorder. The present study is the first to evaluate the relationship between peripartum depression, self-reported bruxism, and myogenous temporomandibular disorder so it could be considered as a pilot attempt, and further studies using more representative samples are encouraged.

Key words: Self-Reported Bruxism, Peripartum Depression, Myogenous Temporomandibular Disorder, Fonseca Anamnestic Index, Edinburgh Postnatal Depression Scale

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in the stomatognathic system, causes hyperactivity of the muscle groups and pain in the masticatory muscles\textsuperscript{9}. It is divided into two subgroups: awake bruxism (AB) and sleep bruxism (SB)\textsuperscript{10}. SB is defined as activity of the masticatory muscles during sleep that may be rhythmic (phasic) or non-rhythmic (tonic). AB is defined as activity of the masticatory muscles during wakefulness that is characterized by sustained or repetitive tooth contact and/or by bracing or thrusting of the mandible. Neither SB nor AB is a movement disorder in otherwise healthy individuals.

Psychology is an important influence among the etiological factors of bruxism and/or TMD\textsuperscript{6,11–13}. In particular, anxiety, manic symptoms, and depression can cause bruxism, which might be an important factor for the pathogenesis of TMD\textsuperscript{12,14,15}. Peripartum depression (PPD), previously called “postpartum depression” by the Diagnostic and Statistical Manual of Mental Disorders-V (DSM-V), is considered to be one of the most common complications of labor and is defined as a subtype of major depression that occurs during pregnancy or within the four weeks postpartum period\textsuperscript{12}. Untreated PPD not only affects the mother, but can also lead to cognitive, psychological, social, and behavioral problems for the child\textsuperscript{10}.

The objective of this study was to evaluate the association between PPD, bruxism, and myogenous TMD (mTMD) among postpartum women. The researchers hypothesized that there was a correlation between PPD, bruxism, and mTMD among postpartum women.

Material and Methods

Study design and subjects

This study included 220 women who had given birth within the four weeks in the Gynecology and Obstetrics Clinic of \textsuperscript{\textcopyright}U\textsuperscript{\textregistered}sk University Education and Research Hospital. The study was carried out between October 2019 and February 2020. Their ages ranged from 17 to 45. This study was approved by the Ethics Committee of \textsuperscript{\textcopyright}U\textsuperscript{\textregistered}sk University (Reference number: 237-04). Written consent forms were taken from all of the women involved in the study.

Demographic information for the study participants was recorded. Having given birth within the previous four weeks was sufficient for the inclusion criteria. The exclusion criteria were as follows: 1) Systemic disorders, 2) having previously received psychiatric support, 3) having previously used antidepressants or sleeping pills, 4) having undergone orthodontic treatment, orthognathic surgery, or TMJ surgery, 5) having experienced trauma in the TMJ, 6) having received treatment for TMJ pain or having been diagnosed with pathologic lesions or symptoms in the TMJ 7) and using partial or total dental prosthesis, or had tooth loss.

Signs of bruxism were diagnosed in consideration of the patient’s history during their first visit to the gynecology and obstetrics clinic. According to international consensus recommendations, the diagnosis of possible bruxism was based on self-reports\textsuperscript{17}. The questionnaire items for self-reported bruxism were as follows:

1. Are you aware that you grind your teeth during sleep?
2. Has anyone ever told you that you grind your teeth during sleep?
3. Upon awakening in the morning or during the night, do you have your jaws thrust or braced?
4. Do you clench your teeth while awake?
5. Do you grind your teeth while awake?\textsuperscript{18,19}. The responses to all questions were yes/no.

Fonseca anamnestic index (FAI)

A questionnaire based on FAI was used to categorize the severity of each participant’s TMD. The participants were asked to answer questions without any time restrictions. Only one answer was requested for each question, with the value of each answer being “yes = 10,” “no = 0,” and “sometimes = .5.” In this study, this total score was not considered, since the authors evaluated mTMD with a few questions of FAI (items 1, 2, 3, 6, and 7)\textsuperscript{18} (Table 1). These questions constitute the Short-Form FAI (SFAI) and include the following questions respectively. 1) Do you have difficulty opening your mouth, 2) Do you have difficulty moving jaw to the side?, 3) Do you get tired /muscular pain while chewing?, 6) Do you have earaches or pain in craniomandibular joints?, 7) Have you ever noticed if you have noises in the TMJ when you chew or when you open your mouth?

| Table 1. Fonseca’s Anamnestic Index Questionnaire |
|-----------------------------------------------|
| Questions                                      |
| 1. Is it hard for you to open your mouth?       |
| 2. Is it hard for you to move your mandible from side to side? |
| 3. Do you get tired /muscular pain while chewing? |
| 4. Do you have frequent headaches?              |
| 5. Do you have pain on the nape or stiff neck?  |
| 6. Do you have earaches or pain in craniomandibular joints? |
| 7. Have you noticed any TMJ clicking while chewing or when you open your mouth? |
| 8. Do you clench or grind your teeth?           |
| 9. Do your feel your teeth do not articulate well? |
| 10. Do you consider yourself a tense (nervous) person? |
Edinburgh Postnatal Depression Scale (EPDS)

The EPDS was used to assess the patient’s PPD. It is a 10-item self-report scale with four response categories for each item, ranging from a score of 0 (no presence of the symptoms) to three (marked presence or change) (Table 2). The global score of questionnaire was determined between 0 and 30 points. Those who scored 13 or more were considered women with depression20.

Table 2. Edinburgh Postnatal Depression Scale

| 1. I have been able to laugh and see the funny side of things | As much as I always could | Not quite so much now | Definitely not so much now | Not at all |
|-------------------------------------------------------------|---------------------------|----------------------|---------------------------|-----------|
| 2. I have looked forward with enjoyment to things           | As much as I ever did     | Rather less than I used to | Definitely less than I used to | Hardly at all |
| 3. I have blamed myself unnecessarily when things went wrong | Yes, most of the time    | Yes, some of the time | Not very often | No, never |
| 4. I have been anxious or worried for no good reason       | No, not at all            | Hardly ever          | Yes, sometimes | Yes, very often |
| 5. I have felt scared or panicky for no very good reason   | Yes, quite a lot         | Yes, sometimes      | No, not much | No, not at all |
| 6. Things have been getting on top of me                   | Yes, most of the time     | Yes, sometimes      | Not very often | No, not at all |
| 7. I have been so unhappy that I have had difficulty sleeping | Yes, most of the time     | Yes, quite often    | Not very often | No, not at all |
| 8. I have felt sad or miserable                             | Yes, most of the time     | Yes, quite often    | Not very often | No, not at all |
| 9. I have been so unhappy that I have been crying          | Yes, most of the time     | Yes, quite often    | Only occasionally | No, never |
| 10. The thought of harming myself has occurred to me       | Yes, quite often          | Sometimes          | Hardly        | Never |

Results

A total of 220 patients participated in the present study. Their mean age was 28.4±7.4 and ranged from 17 to 45. Among the participants, 70 (31.8%) were considered with PPD according to EPDS and 150 (62.2%) were psychologically healthy. Self-reported bruxism prevalence was 47.3% and mTMD prevalence was 45.3% among woman in postpartum period. The prevalence of participants with both self-reported bruxism and mTMD was 40%. Descriptive statistics were presented in Table 3.

Table 3. Descriptive statistics

| Age   | Mean± SD | Frequency (N) | Percentage (%) |
|-------|----------|---------------|---------------|
| PPD   | 28.4±7.4 | 70            | 31.8          |
| mTMD  |          | 100           | 45.5          |
| Self-reported bruxism | 104 | 47.3 |
| Self-reported bruxism+ mTMD | 90 | 40.0 |

SD: standard deviation, PPD: peripartum depression, mTMD: myogenous temporomandibular disorder

Table 4. Association between SFAI questions and bruxism among postpartum woman

| Self-reported bruxism | P* value |
|-----------------------|----------|
| Yes                   | No       |
| 1. Is it hard for you to open your mouth?  |
| Yes: 43 (89.6%)       | 5 (10.4%)  |
| No: 8b (18.6%)        | 35 (81.4%)  |
| Sometimes             |
| Yes: 1a (5.3%)        | 16 (94.7%)  |
| No: 44 (89.8%)        | 5 (10.2%)  |
| 2. Is it hard for you to move your mandible from side to side?  |
| Sometimes             |
| Yes: 7 (12.5%)        | 46 (86.8%)  |
| No: 40                | 5 (10.1%)  |
| 3. Do you get tired /muscular pain while chewing?  |
| Yes: 40 (88.9%)       | 5 (11.1%)  |
| No: 11                | 53 (87.8%)  |
| Sometimes             |
| Yes: 100.0%           | 0.0%       |
| No: 24                | 8 (9.5%)  |
| 4. Do you have earaches or pain in craniomandibular joints?  |
| Yes: 75.0%            | 25.0%     |
| No: 41.5%             | 58.5%     |
| Sometimes             |
| Yes: 38 (58.5%)       | 12 (41.5%)  |
| No: 31 (43.1%)        | 41 (56.9%)  |
| 5. Have you noticed any TMJ clicking while chewing or when you open your mouth?  |
| Yes: 17 (63.0%)       | 10 (37.0%)  |
| No: 4 (36.4%)         | 7 (63.6%)  |

**Chi Square, SFAI: short form of Fonseca Anamnestic Index

There was a significant association between SFAI questions (1, 2, 3, 6) and self-reported bruxism p<0.001, but no association was found for question 7 (p=0.157) (Table 4).

Table 5. Frequency (%) distribution and association self-reported bruxism with mTMD results (n=220)

| mTMD | Self-reported Bruxism | P* value |
|------|-----------------------|----------|
| Yes  | 90b                   | 14b      | <0.001 |
| No   | 85%                   | 13.5%    |        |

mTMD: myogenous temporomandibular disorder

*Chi Square. Same superscript lowercase letters represent no significant difference in columns at the 0.05 level

mTMD was observed at a statistically significantly higher rate in patients with self-reported bruxism. As a result, 86.5% of the patients with self-reported bruxism had mTMD (p<0.001) (Table 5).

In PPD group, self-reported bruxism was observed at a statistically significantly higher rate. As a result, 94.3% of the patients with PPD had self-reported bruxism (p<0.001) (Table 6A). mTMD was observed at a statistically significantly higher rate. As a result, 80.0% of the patients with PPD had mTMD (p<0.001) (Table 6B).

The prevalence of participants with both self-reported bruxism and mTMD was 79.4%.
In physiologically healthy group, self-reported bruxism was observed at a statistically significantly lower rate. As a result, the prevalence of self-reported bruxism was 25.3% (p<0.001) (Table 6A). mTMD was observed at a statistically significantly lower rate. The prevalence of mTMD was 29.3% (p<0.001) (Table 6B). The prevalence of participants with both self-reported bruxism and mTMD was 24%.

**Discussion**

PPD is considered to be one of the most common labor complications and is defined by the DSM-V as a major episode of depression occurring during pregnancy and within four weeks of childbirth. It has been reported that the rate of PPD is 3.5–40% worldwide and 6.3–50.7% in Turkey. The PPD rate in the present study was 31.8%, which was consistent with the existing literature. The substantial differences in the frequencies of PPD that were reported by the above studies can be explained by the significant differences in their designs, evaluation times after childbirth, sample sizes, and populations. Although PPD and non-perinatal major depressive disorders have the same DSM diagnostic criteria, a few symptoms are more prominent in PPD than in major depressive disorders. Among these symptoms, high-level anxiety is particularly more prevalent in PPD than in major depression. The EPDS, which consists of self-reported questionnaires, was used instead of having psychologists conduct interviews with the patients. The EPDS was preferred because of factors such as the large number of patients in the present study and the patients’ abilities to spare time for interviews. In addition, the EPDS has been widely used for screening PPD and it has been stated that this scale is a method that gives simple, fast, and reliable results.

In this study, there were 2 main reasons for the self-reported diagnosis of bruxism. The first is that because of the number of participants in the present study it was not possible to make assessments by performing PSG or clinical examinations. In the literature, studies involving large numbers of participants included patients who had also been diagnosed with bruxism based on self-reports, as in the present study. The second reason is that the authors of the study had to carry out patient assessments at the Uşak University Medical Faculty Education and Research Hospital, Obstetrics and Gynecology Unit, since the patients who were in the postpartum period were not able to come to the Uşak University Faculty of Dentistry. Therefore, it was only possible to assess bruxism (awake and sleep) through taking chairside histories that led to diagnoses of “possible” bruxism.

According to our knowledge, there was no study that evaluate the relationships between PPD, bruxism, and mTMD in the literature. It is, however, possible to find numerous studies in the literature that show the effects of psychological factors such as depression, anxiety, and stress on the stomatognathic system, particularly with regard to bruxism. However, in their study, Smardz et al. evaluated the relationship between nocturnal bruxism and stress and depression. The results revealed no relationship between sleep bruxism and self-reports of perceived stress and depression. In the present study, the participants were diagnosed with sleep bruxism through PSG. Owczarek et al. evaluated the effects of stress, anxiety, and depression on the stomatological systems in students in the departments of dentistry and physiotherapy. The study reported a significant relationship between self-reported bruxism and depression, anxiety, and stress factors. In the results of another study assessing the relationship between anxiety, depression, and bruxism, Gungormuş et al. reported that anxiety and depression were statistically significantly higher among bruxers than in non-bruxers. In this study, the rate of self-reported bruxism was 94.3% in individuals with PPD, while it was only 25.3% in individuals without PPD, and this difference was statistically significant (p<0.001). Also, the prevalence of bruxism in all participants was 47.3%. The relationship between bruxism and depression was explained in two ways in the literature. First, bruxism could be induced...
by some drugs used in the treatment of depression. Uca et al.\cite{32} reported an increased incidence of bruxism in patients taking antidepressants than in those in the control group\cite{32}. In the present study, however, no participants were taking antidepressants. The second explanation involves the assumption that a “vicious circle” can occur between depression, bruxism, and TMD. This assumption can be explained by the work of Fernandes et al.\cite{30} who reported that the frequency of depression in individuals with bruxism was associated with TMD. The researchers stated that bruxism was a major risk factor for painful TMD, and that painful TMD caused depressive symptoms in individuals because of its substantial impact on their qualities of life\cite{30}. Therefore, in the present study, the prevalence of mTMD was also investigated. It was observed that the rate of mTMD in patients with PPD was 80%. A statistically significant difference was found between the incidence of mTMD between patients with and without PPD (p <0.001). The rate of mTMD in patients with PPD was 80%, and a statistically significant difference was found between patients who had PPD and those who did not (p<0.001).

The relationship between bruxism and TMD remains controversial and complex\cite{33,35}. Most of the previous studies of the relationship between bruxism and TMD reported positive relationships between them. However, in their review Jimenez-Silva et al.\cite{34} reported a low-to-moderate level of evidence for this relationship. TMD is an umbrella term and involves a series of clinical alterations involving the masticatory muscle, TMJ, and associated structures\cite{17}.

Indexes such as the research diagnostic criteria for temporomandibular disorders (RDC/TMD) and the FAI have been developed for the purpose of establishing a diagnosis of TMD. However, although the RDC/TMD has demonstrated a high level of accuracy and reliability in diagnosing TMD, this index is difficult to apply as it requires face-to-face evaluation, lengthy protocols, and evaluator training and experience\cite{17}. The FAI is an index based on patient discourse, and evaluations are made according to the answers given by the volunteers\cite{17}. In addition, the FAI is a reliable and simple method to apply. The results of the studies conducted by Berni et al.\cite{36} and Pires et al.\cite{17} revealed that the SFAI, which consists of questions 1, 2, 3, 6, and 7 of the FAI, has a high reliability rate, especially in the diagnosis of mTMD\cite{17,36}. Gender factors are known to have an effect on bruxism and the incidence of TMD\cite{17}. In his study, Berni et al.\cite{36} stated that SFAI can be used reliably in the diagnosis of mTMD only in females, and likewise, Pires et al.\cite{17} and Rodriges et al.\cite{37} conducted their studies only with the participation of female individuals\cite{17,37}. It is important to note that the participation of only women in the present study is compatible with the literature with regard to diagnosing mTMD using the SFAI. The present study revealed statistically significant differences between self-reported bruxism and non-bruxism among individuals in all questions except for the 7th: “Have you noticed any TMJ clicking while chewing or when you open your mouth?” Muscle pain was emphasized in all of these questions, and it was found that individuals whose self-reports indicated bruxism had significantly greater muscular pain than those whose self-reports indicated non-bruxism. Among the studies evaluating the relationship between bruxism and TMD, there are those who argue that there is a particular relationship between bruxism and muscle-induced pain\cite{33,38}. Although these studies were conducted using RDC/TMD for evaluation, the result of the present study appears to be compatible with the literature. Moreover, in the 7th question no statistically significant difference was seen between self-reported bruxism and non-bruxism among the individuals. Previous studies reported inconsistent results about the effects of bruxism on TMJ clicking\cite{39,41}. The results of the present study suggested no association between bruxism and TMJ clicking. Also, although Sakaguchi et al.\cite{30} found that TMJ clicking was 3.7 times more likely to occur in adolescents with sleep bruxism\cite{40}, Prado et al.\cite{41} reported no association between clicking and sleep bruxism\cite{41}. Bruxism in the peripartum period could be considered to be relatively short, and the effect of bruxism on TMJ tissues might not be observed.

Among the etiological factors for TMD, the evaluation of psychological factors is still a matter of debate. Some researchers have claimed that there is a relationship between psychological factors and TMD, while others have disagreed. For example, Owczarek et al.\cite{28} reported that TMD positively correlates with the occurrence of depression and anxiety\cite{28}. In addition, Slade et al.\cite{42} stated that factors such as depression and intense stress increase a patient’s susceptibility to TMD pain\cite{42}. However, Lopes et al.\cite{43} found no direct relationship between major depression and TMD\cite{43}. The present study revealed a significant relationship between PPD and mTMD. As mentioned above, this can be explained by the vicious circle theory. The present study, which aimed to evaluate the associations between PPD, self-reported bruxism, and mTMD, could be considered as a pilot attempt, and further studies using more representative samples are encouraged.

There are a few limitations regarding the present study. Bruxism was not evaluated in terms of whether participants were awake or asleep. Therefore, the distinction between PPD and mTMD could not be made in individuals with bruxism in relation to when they were awake and asleep.

**Conclusions**

In conclusion, a significant relationship has been found between PPD and bruxism, bruxism and mTMD,
and PPD and mTMD. Future long-term studies are needed to evaluate the effects of PPD as a psychological factor in the relationship between bruxism and mTMD. Bruxism and mTMD should be counted among the risk factors for women who have complaints of orofacial pain in the peripartum period.

References

1. Ingawalé S, Goswami T. Temporomandibular Joint: disorders, treatments, and biomechanic. Ann Biomed Eng, 2009;37:976-996.
2. Ege B, Kıcıçık AO, Koparal M, Koyuncu I, Gonel A. Evaluation of serum prolidase activity and oxidative stress in patients with temporomandibular joint internal derangement. CRANIO, 2019;25:1-11.
3. Wadhwa S, Kapila S. TMJ disorders: future innovations in diagnostics and therapeutics. J Dent Educ, 2008;72:930-947.
4. Dimitroulis G. Temporomandibular disorders: a clinical update. BMJ, 1998;317:190-194.
5. Chisnoiu AM, Picos AM, Popa S, Chisnoiu PD, Lascu L, Picos A, et al. Factors involved in the etiology of temporomandibular disorders - a literature review. Clinul Med, 2015;88:473-478.
6. Güler N, Yatmacı PL, Ataoğlu H, Emlık D, Uckan S. Temporomandibular internal derangement: correlation of MRI findings clinical symptoms of pain and joint sounds in patients with bruxing behaviour. Dentomaxillofac Radiol, 2003;32:304-310.
7. Dias GM, Bonato LL, Guimarães JP, Silva JNN, Ferreira LA, Grossmann E, et al. A study of the association between sleep bruxism, low quality of sleep, and degenerative changes of the temporomandibular joint. J Craniofac Surg, 2015;26:2347-2350.
8. Lobbezoo F, Ahlberg J, Raphael KG, Wetselaar P, Giaros AG, Kato T, et al. International consensus on the assessment of bruxism: report of a work in progress. J Oral Rehab, 2018;45:837-844.
9. Smardz J, Martynowicz H, Wojakowska A, Zrabkowska MM, Mazur G, Wieckiewicz M. Correlation between sleep bruxism, stress, and depression- a polysomnographic study. J Clin Med, 2019;8:1-10.
10. Manfredini D, Landi N, Romagnoli M, Bosco M. Psychiatric and occlusal factors in bruxers. Aust Dent J, 2004; 49: 84-89.
11. Poveda-Roda R, Bagan JV, Diaz Fernandez JM, Bazan SH, Soriano YJ. Review of temporomandibular joint pathology. Part 1: classification, epidemiology and risk factors. Med Oral Patol Oral Cir Bucal, 2007;12:292-298.
12. Lobbezoo F, Ahlberg J, Giaros AG, Kato T, Koyano K, Lavigne GJ, et al. Bruxism defined and graded: an international consensus. J Oral Rehab, 2013;40:2-4.
13. Suma S, Veerendra Kumar B. Temporomandibular disorders and functional somatic syndromes: deliberations for the dentist. Indian J Dent Res, 2012;23:529-536.
14. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders DSM-5th Ed, Editor: Michael D, Jibson& Lisa S. Seyfried, USA, 2016;pp:109-110.
30. Fernandes G, Siqueira JT, Godoi Gonçalves DA, Camparís CM. Association between painful temporomandibular disorders, sleep bruxism and tinnitus. Braz Oral Res, 2014;28:S1806-83242014000100220.

31. Güngörü Z, Erçiyas K. Evaluation of the relationship between anxiety and depression and bruxism. J Int Med Res, 2009;37:547-550.

32. Uca AU, Üğüz F, Kozak HH, Gümuş H, Aksoy F, Seyihanoglu A, et al. Antidepressant-induced sleep bruxism: Prevalence, incidence, and related-factors. Clin Neuropharmacol, 2015;38:227-230.

33. Rosetti LMN, Rosetti PHO, Conti PCR, de Araujo CRP. Association between sleep bruxism and temporomandibular disorders: a polysomnographic pilot study. CRANIO, 2008;26:16-24.

34. Jimenes-Silva A, Pena-Duran C, Tobar-Reyes J, Frugone-Zambra R. Sleep and awake bruxism in adults and its relationship with temporomandibular disorders: a systematic review from 2003-2014. Acta Odontol Scand, 2017;75:36-58.

35. Manfredini D, Lobezzo F. Relationship between bruxism and temporomandibular disorders: a systematic review of literature from 1998-2008. Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 2010;109:26-50.

36. dos Santos Berni KC, Dibai-Filho AB, Rodrigues-Bigaton D. Accuracy of the Fonseca anamnestic index in the identification of myogenous temporomandibular disorder in femalen community cases. J Bodyw Mov Ther, 2015;19:405-409.

37. Rodrigues-Bigaton D, de Castro EM, Pires PF. Factor and rasch analysis of the Fonseca anamnestic index for the diagnosis of myogenous temporomandibular disorder. Braz J Phys Ther, 2017;21:120-126.

38. Raphael KG, Janal MN, Sirois DA, Dubrovsky B, Klausner JJ, Krieger AC, et al. Validity of sel-reported sleep bruxism among myofascial temporomandibular disorder patients and controls. J Oral Rehabil, 2015;42;751-758.

39. Olliver SJ, Broadent JM, Thomson WM, Farella M. Occlusal Features and TMJ Clicking: A 30-Year Evaluation from a Cohort Study Some studies reported that presence of TMJ clicking was related to bruxism. J Dent Res, 2020;99:1245-1251.

40. Nagamatsu-Sakaguchi C, Minakuchi H, Clark GT, Kunoki T. Relationship between the frequency of sleep bruxism and the prevalence of signs and symptoms of temporomandibular disorders in an adolescent population. Int J Prosthodont. 2008;21:292-298.

41. Prado IM, Abreu LG, Silveira KS, Auad SM, Paiva SM, Manfredini D, Serra-Negra JM. Study of associated factors with probable sleep bruxism among adolescents. J Clin Sleep Med, 2018;14:1369-1376.

42. Slade GD, Diatchenko L, Bhalang K, Sigurdsson A, Fillingim RB, Belfer I, et al. Influence of psychological factors on risk of temporomandibular disorders. J Dent Res, 2007;86:1120-1125.

43. Lopes SLPC, Costa ALF, Cruz AD, Li LM, de Almeida SM. Clinical and MRI investigations of temporomandibular joint in major depressed patients. Dentomaxillofac Radiol, 2012;41:316-322.

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