Family Medicine & Primary Care Review 2016; 18, 3: 282–285 doi: 10.5114/fmpcr/62785

ORIGINAL PAPERS

ISSN 1734-3402, eISSN 2449-8580

Assessment of the symptoms of bruxism in young people in the last high-school grades

ZOFIA MACIEJEWSKA-SZANIEC[1, A–G], BARBARA MACIEJEWSKA[2, A–E], KATARZYNA MEHR[1, D, G], PAWEŁ PIOTROWSKI[1, D, G]

[1] Clinic of Oral Rehabilitation, Poznan University of Medical Sciences
[2] Chair and Clinic of Phoniatrics and Audiology, Poznan University of Medical Sciences

A – Study Design, **B** – Data Collection, **C** – Statistical Analysis, **D** – Data Interpretation, **E** – Manuscript Preparation, **F** – Literature Search, **G** – Funds Collection

Summary **Background.** Parafunctions are involuntary habits harmful to the chewing system. Tooth contact parafunctions are developed mostly under high emotional tension associated with stress. One of them is bruxism, i.e. teeth clenching and/or grinding. Young people in the last high-school grades are a group particularly predisposed to developing parafunctions due to high mental tension and long-lasting stress associated with the *matura* examination.
Objectives. Assessment of the symptoms of bruxism in young people in the last high-school grades 30 days before the *matura* examination.
Material and methods. 109 students (58 girls, 51 boys; aged 18.07 ± 0.26 years) examined 30 days before the *matura* examination. Every subject had a medical interview in the form of a survey containing questions about parafunctions and symptoms of dysfunction of the stomatognathic system, a medical interview, and a dental examination, including the symptoms of bruxism (vertical cracks within the enamel of the incisors and canines, teeth impressions on the side of the tongue body, palpation tenderness of the muscles of the chewing system).
Results. The incidence of bruxism symptoms in the investigated group was 76.1% (83 students). Only 38.5% (42) students were aware of the problem of bruxism and reported it in at least one survey response. Higher incidence of the parafunction was observed in girls (teeth clenching under stress $p = 0.0001$; morning pain of the facial muscles $p = 0.0393$). The most common symptoms of bruxism were: increased tenderness of the muscles of mastication (71.5%) and teeth abrasion (50.5%).
Conclusions. 1. The symptoms of bruxism are present in most of the investigated young people, along with a poor awareness of the presence of this parafunction 2. The most common symptom of bruxism was palpation tenderness of the muscles of mastication.
Key words: stress, bruxism, parafunctions.

Fam Med Prim Care Rev 2016; 18(3): 282–285

Background

Parafunctions are incorrect, persistent, involuntary habits that, if repeated and uncontrolled, can have a deteriorating effect on the chewing system and its components (musculoskeletal system, temporomandibular joint and teeth with periodontium) [1]. These non-typical functions of the chewing system are qualitatively and quantitatively different from the physiological model [2]. There are two types of habits harmful for the chewing system: a) tooth contact parafunctions involving contact between teeth (bruxism – excessive and uncontrolled contact between teeth in the centric position, so-called teeth clenching, or in the eccentric position, teeth grinding); and b) non-tooth contact parafunctions without contact between the opposing teeth (compulsive gum chewing, biting of nails and skins around nails, chewing on foreign bodies such as pen caps, tongue parafunctions, biting the mucous membrane of the cheek or lips, occupational habits: biting threads or holding pins with teeth by tailors) [3–5]. In the literature, bruxism has been regarded as a 21st century disease as it is becoming a common problem in society and occurs in patients representing every age group [6].

Bruxism has a complex and multifactorial etiology. Among the factors contributing to its occurrence are local factors, i.e. disorders related to tooth contact and articulation, such as obstacles to mandibular closure (premature contact between teeth, e.g. caused by excessive height of fillings) or malocclusions [3, 6, 7]. However, the key role in the development of this tooth contact parafunction is played by the increased emotional tension associated with civilizational stress [3, 8, 9]. Long-lasting stress and upsetting situations are suppressed in the subconscious, but the impossibility to relieve stress causes increased tonus in the muscle groups within the chewing system, mostly during sleep (so-called nocturnal bruxism) or less frequently during the day (so-called diurnal bruxism), when the control of consciousness is abolished [2, 8]. This results in a very long and non-physiological load of tissues and, consequently, their damage. In many cases, the development of tooth contact parafunctions is related with the type of personality of the patient and the patient's ability to cope with stress [8, 9].

Young people in the last high-school grades are a group particularly predisposed to developing bruxism due to high mental tension and chronic stress associated with preparations for the *matura* examination, the examination itself, as well as making the first important decisions regarding their future lives. Among the symptoms suggesting the presence of this harmful habit are: clearly visible abrasion of the enamel on the incisal edges of the teeth, abrasion fields on the tooth cusps, vertical cracks within the enamel, cicatricial thickening or hemorrhagic ecchymoses of the cheek mucosa next

to the chewing surfaces of the lateral teeth, teeth impressions on the side of the tongue body, increased tonus of the muscles of the head, neck and shoulder girdle, as well as hypertrophy of the group of muscles involved in mastication [3, 6]. Systemic symptoms (abdominal discomfort, tension headache, otological symptoms) [4, 10, 11] are also often reported by patients with bruxism. These symptoms, due to the uncommon extraoral location, can very often be difficult to diagnose.

Objectives

The aim of the study was to assess the type and frequency of the various symptoms of bruxism in young people in the last high-school grades.

Material and methods

The study group consisted of young people attending the last grades of the Dąbrówka High School no. 7 in Poznan, Poland. The study was conducted 30 days before the *matura* examination. A total of 109 students (58 girls, 51 boys) aged 18.07 ± 0.26 years (101 eighteen-year-olds, 9 nineteen-year-olds) were evaluated. Every subject had a medical interview in the form of a survey (the questions regarded the awareness of teeth clenching/grinding during the day (circumstances of occurrence) and/or night and under stress, morning tenderness of the facial muscles, presence of incorrect habits such as chewing gum, biting pencils or nails), specialist dental examination (extra- and intraoral), with a particular focus on the symptoms of bruxism using a special questionnaire prepared by dentists. The following elements were evaluated in the study: vertical cracks within the enamel of the incisors and canines, teeth impressions on the side of the tongue body, palpation tenderness of the muscles of the chewing system (masseter muscles, temporal muscles, medial pterygoids, lateral pterygoids, sternocleidomastoid muscles, suboccipital muscles). Moreover, the degree of dental abrasion was assessed using Martin's scale (0° – no signs of abrasion; I° – uperficial abrasion of the enamel with cusps preserved, II° – partial exposure of dentin; III° – formation of large contact areas without cusps, lack of enamel; IV° – abrasion of the teeth at the necks; V° – exposure of pulp chamber). The results were subjected to statistical analysis using the Statistica PL 10.0 (StatSoft) package. In order to determine the significance of the differences between the investigated groups, non-parametric tests were used (for qualitative variables: the chi-squared test or Fisher's exact test). The results were considered as statistically significant at $p < 0.05$.

Results

The students exhibited high diversity and variability of the subjective and objective symptoms of bruxism. Of the 109 students, 38.5% (42) were aware of the problem of bruxism and reported it in at least one survey response. An analysis of selected survey questions is presented in Table 1. The students reported that teeth clenching/grinding was observed particularly frequently in stressful situations (a school test, solving a problem on a blackboard). The remaining 61.5% of the investigated group (67 students) were not aware of the presence of the parafunction in everyday life, but the specialist dental clinical examination revealed the presence of this harmful habit. The incidence of the symptoms of bruxism among the investigated young people was 76.1% (83 students). There was a statistically significant difference between the incidence of all symptoms of the parafunction in girls compared to that in boys (Tab. 1).

Table 1. Analysis of selected answers to the survey questions about parafunctions according to the sex of the investigated students

Selected survey questions	Total	Girls $n = 58$	Boys $n = 51$	p
Teeth clenching/ /grinding during the day	23	13	10	0.8158
Teeth clenching/ /grinding at night	29	16	13	0.8314
Teeth clenching under stress	40	31	9	**0.0001**
Morning tenderness of the facial muscles	35	23	12	**0.0393**

The statistically significant results are in bold.

The most common symptoms reported in the study were discomfort and pain of the lateral pterygoids and temporal muscles. In 69 students, bilateral hypertrophy of the masseter muscles was observed, and 100% of this group reported an additional parafunction, compulsive gum chewing, in the survey. Frequent bruxism symptoms also included pathological abrasion of the teeth, which occurred in 50.5% (55) of subjects; II° abrasion prevailed, while III° abrasion was observed in 7.3% (8) of subjects. Clearly visible teeth impressions on the side of the tongue body were observed in 41.3% (45) and vertical cracks in the enamel were visible in 37.6% (41) of students. The results are reported in Table 2.

Table 2. Percentage distribution of the results of dental examination including information on the sex of the subjects

Bruxism symptoms	Palpation tenderness of the muscles of mastication	Pathological abrasion of the teeth	Impressions on the tongue	Vertical cracks in the enamel
Girls	46	35	30	27
Boys	32	20	15	14
p	0.0879	**0.0352**	**0.0206**	**0.0487**

The statistically significant results are in bold.

Discussion

Bruxism is the most widespread tooth contact parafunction in the population. In the literature, the incidence of bruxism is reported at various levels between 50% and 80% [2]. Although this harmful parafunction occurs in every age group, the highest percentage of uncontrolled teeth clenching or grinding is reported in people under 30 years of age (54.67%) [11, 12]. Numerous population studies show the worrying phenomenon of the gradual reduction of the age of patients with bruxism. In the investigated group, the incidence of bruxism was as high as 76.1%, while Mankiewicz et al. reported even higher incidence – among 303 students, only 16 were free of the signs and symptoms of this parafunction [8]. Among the causes of the increasing number of patients with bruxism, particular attention should be given to the increasing level of stress, which generates increased mental tension, and the concurrent lack of appropriate skills to handle the considerable mental load [11, 13, 14]. For high-school graduates, the time to make the first important decisions regarding their future lives (choosing studies, first job) is psychologically a very difficult period in life. Long-lasting stress, high expectations from relatives

and teachers, significant mental effort, and the concurrent period of youthful rebellion make 18- and 19-year-olds a group strongly predisposed to developing a tooth contact parafunction, such as bruxism. Based on numerous psychological tests and clinical studies, it was found that certain personality traits (high level of neuroticism, perfectionism, mindset for achieving success, the need to control, hyperactivity) predispose subjects to a quicker development of this harmful habit [9, 13, 14]. Baron et al. conducted studies assessing the impact of increased emotional tension on the incidence of bruxism using a self-awareness worksheet [15]. It was observed that bruxism occurred more frequently in people with increased mental tension [15]. On the other hand, Mankiewicz al. found no clear link between bruxism and personality traits [8, 13].

Most authors agree that bruxism is diagnosed more frequently in women due to their higher sensitivity [5–8]. This hypothesis was confirmed in the presented study – a statistically significant difference was found between the incidence of all investigated parafunctional symptoms in girls and boys.

Patients are very rarely aware of the signs and symptoms of bruxism. The pathological alterations of the structure of the chewing system associated with this parafunction can initially develop asymptomatically, and bruxism is usually diagnosed late, based on the irreversible consequences of morphological and functional nature, located in the hard tissues of the teeth, periodontium and temporomandibular joints [4, 6]. Therefore, detailed dental examination is helpful in the verification of the results of the survey regarding the symptoms of bruxism, which in this study showed that among 109 surveyed students, only 38.5% (42) were aware of the problem of their parafunction. More than half, i.e. 61.5% (67), did not notice this parafunction in everyday life. This may suggest that knowledge about bruxism is scarce among patients despite multiple education and prevention programmes. Very often, bruxism is not the only harmful habit. Studies by Panek and Mankiewicz demonstrated that the occurrence of single parafunctions is very low (approximately 1%). However, double parafunctions (bruxism associated with compulsive gum chewing or nail biting) was observed in 40% of subjects [7, 8]. In as many as 86% of cases, the consequences of bruxism were pain sensations of the face, masseter muscles, neck, arms, and head [3, 4, 6, 10]. As a result, approximately 55% of patients with bruxism may experience discomfort in everyday functioning, which affects the quality of life [6]. The chewing system is a functional-morphological system subject to dynamic changes throughout life. It has a certain capacity to adapt to changes occurring within its components, but once this adaptive capacity is exceeded, irreversible changes develop and are often accompanied by pain [10]. The investigated group consisted of young people in whom the processes of adaptation to changes within the chewing system should be well developed. It is therefore worrying that 71.5% (78) of subjects experienced tenderness of any investigated muscle at such a young age. The subjects reported pain upon intraoral palpation of the lateral pterygoids, which is typical of people with dysfunctions of the chewing system [8]. Headache (mostly in the temporal region), often reported by patients with excessive teeth clenching/grinding [2, 4], can be caused by excessive tonus of the temporal muscles, which was observed in the study.

Bruxism is considered to be the most damaging tooth contact parafunction for the chewing system. The loss of enamel resulting from teeth grinding within six months is four times greater in people with bruxism than in people without bruxism [16]. In the presented study, abrasion of the teeth occurred in a total of 50.5% (55) of subjects. Prevailing was II° abrasion or partial exposure of dentin, particularly visible in the incisors and canines. However, eight girls already exhibited III° abrasion, which constitutes a concern and suggests a strong emotional background. Teeth impressions on the tongue, another common symptom of bruxism reported in the literature [4–7], were observed in 41.3% (45) of subjects. Moreover, along with the symptoms of bruxism, the subjects reported otological symptoms such as tinnitus, which have been confirmed by numerous scientific reports [10, 11, 17]. These problems significantly affect the everyday life of the patients and impair their functioning, decreasing the quality of life and productivity. Therefore, a comprehensive approach to the treatment of patients with bruxism is recommended.

The presented study does not exhaust the topic. Based on the obtained results, it would be reasonable to conduct studies assessing the impact of educational and psychological assistance programmes on the reduction of the symptoms of bruxism. Therefore, a multidimensional and multidisciplinary approach focused on all-around patient observation should be the goal pursued by dentists and family physicians.

Conclusions

1. Most of the investigated young people exhibited the symptoms of bruxism, along with a poor awareness of the presence of this parafunction, which indicates the need to implement educational programmes in schools to explain the harmful effects of bruxism on the stomatognathic system.
2. Palpation tenderness of the muscles of the chewing system was the most common symptom of bruxism in the clinical examination.
3. In periods of stress (*matura* exam), an increase in the intensity of the symptoms of bruxism occurs, particularly in girls.

Source of funding: This work was funded by the authors' resources.
Conflict of interest: The authors declare no conflict of interests.

References

1. Majewski S, Wieczorek A, Loster J, et al. Mięśnie żucia i stawy skroniowo-żuchwowe w aspekcie fizjologicznych funkcji układu stomatognatycznego. *Protet Stomatol* 2010; LX(1): 10–16.
2. Śmierciak A. Bruksizm – definicja, diagnostyka i leczenie. *Porad Stomatol* 2007; 6(1): 34–41.
3. Siemińska-Piekarczyk B, Zadurska M, Biedrzycka E, et al. Etiologia i objawy kliniczne bruksizmu u dzieci i młodzieży na podstawie piśmiennictwa i własnych obserwacji. *Czas Stomatol* 1998; 51(1): 47–51.
4. Prośba-Mackiewicz M, Wytrykowska A, Mackiewicz J. Subiektywne i obiektywne objawy zaburzeń czynnościowych w układzie stomatognatycznym. *Dent Forum* 2008; 36L(1): 17–21.
5. Rasławska J, Dawid K, Janiszewska-Olszowska J. Występowanie bruksizmu u przyszłych stomatologów. *Mag Stomatol* 2008; 18(7–8): 72–76.
6. Ziółkowska-Kochan M, Kochan J, Pracka D, et al. Bruksizm – problem interdyscyplinarny. *Czas Stomatol* 2007; 60(6): 391–397.

7. Panek H, Nowakowska D, Maślanka T, et al. Epidemiology of temporomandibular dysfunctions in young adult populations studied in Department of Prosthodontics, Silesian Piast University of Medicine in Wrocław, Poland. *Dent Med Probl* 2007; 44(1): 55–59.
8. Mankiewicz M, Panek H. Występowanie parafunkcji narządu żucia u młodocianych. *Dent Med Probl* 2005; 42(1): 95–101.
9. Frączak B, Ey-Chmielewska H, Zarek A. Wpływ czynników psychosocjologicznych i psychoemocjonalnych na możliwość generowania dysfunkcji stawu skroniowo-żuchwowego w badaniach ankietowych studentów stomatologii. *Dent Forum* 2008; 36(2): 27–31.
10. Maciejewska-Szaniec Z, Maciejewska B, Piotrowski P, et al. Charakterystyka zaburzeń czynnościowych układu stomatognatycznego u pacjentów audiologicznych. *Fam Med Prim Care Rev* 2014; 16(3): 255–256.
11. Mehr K, Piotrowski P, Maciejewska Z, et al. *The manifestation of selected otological symptoms and stomatognathic system dysfunction in youth of secondary school. Wellness in different phases of life*. Lublin: Wydawnictwo NeuroCentrum; 2011: 83–93.
12. Rasławska J, Dawid K, Janiszewska-Olszowska J. Występowanie bruksizmu u przyszłych stomatologów. *Mag Stomatol* 2008; 8(7): 72–76.
13. Mankiewicz M, Panek H. Zależność nasilenia dysfunkcji stawów skroniowo-żuchwowych od poziomu neurotyzmu i ekstrawersji według Eysencka. *Dent Med Probl* 2005; 42(4): 605–609.
14. Panek H, Śpikowska-Szostak J. Wpływ stresu i cech osobowości na dysfunkcje skroniowo-żuchwowe i bruksizm na podstawie piśmiennictwa i badań własnych. *Dent Med Probl* 2009; 46(1): 11–16.
15. Baron S, Herman J, Wojtyna J. Aspekt zaburzeń emocjonalnych u młodzieży szkół średnich w rozwoju parafunkcji i dysfunkcji stawów skroniowo-żuchwowych. *Mag Stomatol* 2003; 13(10): 68–71.
16. Sierpińska T, Gołębiewska M. Wpływ zaburzeń morfologiczno-czynnościowych układu stomatognatycznego na jakość starcia zębów. *Protet Stomatol* 2006; LVI(5): 342–345.
17. Tuz HH, Onder EM, Kisnisci R. Temporomandibular disorder (TMD) is associated with an increased prevalence of otologic complaints. *J Evid Based Dent Pract* 2004; 4(2): 167–168.

Address for correspondence:
Zofia Maciejewska-Szaniec MD, PhD
Klinika Rehabilitacji Narządu Żucia UM
ul. Bukowska 70
60-812 Poznań
Polska
Tel.: +48 507 599-414
E-mail: zofiamaciejewska@wp.pl

Received: 17.03.2016
Revised: 13.04.2016
Accepted: 22.04.2016