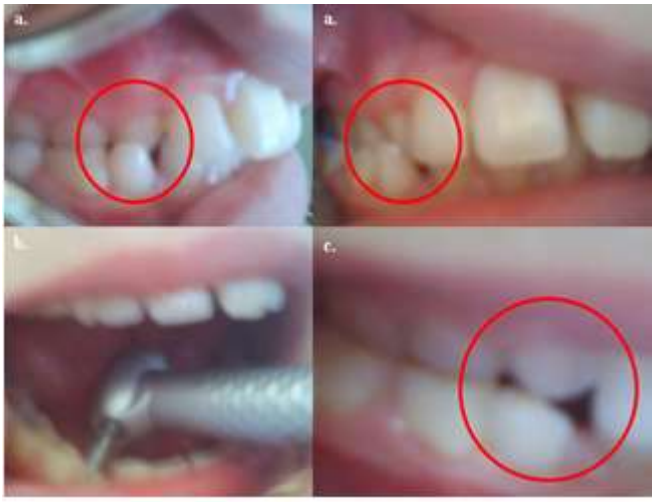

Figure 1: Selective teeth grinding in I group of patients with anterior cross bite a. before treatment, b. during treatment, c. after treatment

Figure 2: Selective teeth grinding in II group of patients

Bruxchecker is a simple and effective device that is used for determining the patterns of occlusal contacts during lateral grinding movements of the lower jaw performed by patients with bruxism and it is being used to objective diagnosis of this condition. Using the bruxchecker, we can record the occlusal contact points and direction of grinding during nocturnal bruxism. Bruxchecker can also be used as indicator of the relationship between the condition of the occlusion and the occurrence of periodontal disease and temporomandibular dissorder (TMD). The fabrication of bruxchecker is done on a model casted from the anatomic impression of the patient's teeth. On the working model, we remove any bubbles that may remain after the casting. The model is placed in the chamber of the apparatus for thermal pressing and immersed in its bedding until only the crowns of the teeth remain uncovered. The model is then used to adapt the specially developed foil with the method of heat pressure and vacuum folding. This foil is a prefabricated polyvinyl layer with thickness of 0.1 mm, colored on one side with edible colors. The foil is placed on the working model with its colored surface placed upward. The time for heat adjusted molding under pressure is 15 seconds, and the temperature should be 220 ° C. Different apparatuses for pressure molding work with various time intervals, the duration for molding in New Biostar with halogen heating is 25 s, for Ministar is 30 s, and for Ministar-S it is 35 s. Once the adaptation of the foil achieves even thickness of less than 0.1 mm in the entire layer so that it doesn't cause a change in the strength of the masticatory muscles under EMG testing, the adapted foil is removed from the apparatus and cut with scissors at the cervical margin of the teeth. The vestibular margin of the foil in the region of the frontal teeth is longer than the corresponding cervical edge to prevent deformation of the foil during placement and removal of the dental arch. Separate foils should be fabricated for each period of testing to prevent receiving incorrect results. The patient wears the bruxchecker during sleep. The white dots created by occlusal contacts on the bruxchecker from clenching of the teeth (vertical bruxism) and white surfaces in the areas where teeth grinding was preformed on the bruxchecker (horizontal bruxism) can be noticed immidiately after the moment the bruxchecker is removed from the patient's mouth (Fig 4).

Figure 3: III group of patients with deep bite

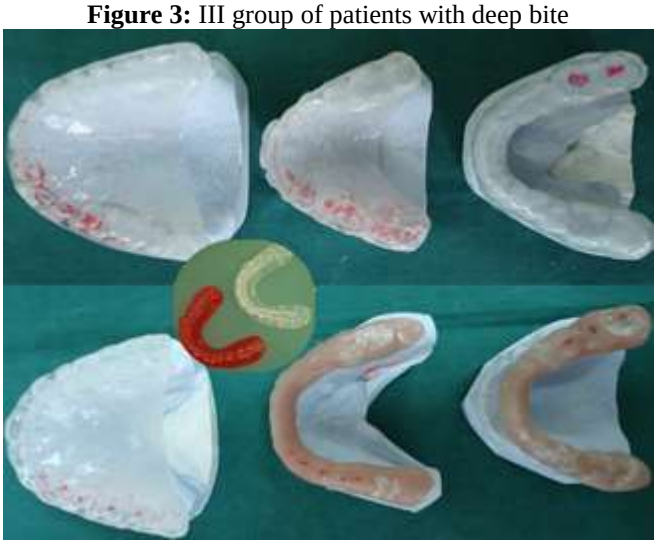

Figure 4: Occlusal patterns of horizontal and vertical bruxism on bruxchecker

In the next control examinations we preformed selective teeth grinding of the deciduous teeth with a purpose of removal of traumatic occlusal contacts in cases in which this therapeutic option was possible. Simultaniously, each of the patients were given instructions for performing myofunctional exercises. The degree of decrease in frequency of the episodes of bruxism was determined in the following control

examination according to the data recorded in the individual charts of the patients for everyday self-evaluation. Under the term bruxism episode was considered every sleep cycle in which the patient confirmed the presence of teeth demarcations on the bruxchecker corresponding with the appearance of bruxism patterns.

4. Results/Discussion

According to the data collected from this investigation, not every patient with traumatic occlusal contacts showed symptoms for bruxism. Table 1.1. represents the results from each of the examined 3 groups of patients, the total number of patients in each group and the extent of patients with diagnosed bruxism in the first visit in percentage for each group. From the total number of examinees with traumatic occlusion, in the first group of patients, 93.42 % were diagnosed with bruxism. In the second group 80 % of the total number of patients with traumatic occlusion had symptoms of simultaneous bruxism. The bruxism in the third group of examinees was present in 82.86 % of patients (Table 1.1.)

Table 1.1: Correlation between diagnosed traumatic occlusion and bruxism

Table 1.1.	Total number of patients		Patients with diagnosed bruxism	
Group 1	35	100%	32	93.42 %
Group 2	35	100%	28	80 %
Group3	35	100%	29	82.86 %

Each of the three groups of patients responded differently to the treatment of removal of the premature contacts. The results of the efficiency of treatment, expressed by frequency of episodes of bruxism from the beginning of treatment measured in percentage for each of the groups and determined according to the findings of the bruxchecker are inserted in Table 1.2.

After the undergone treatment, in the first group of patients, the episodes of bruxism during the period of текот the seven control examinations were decreased 91.8%, 80.3%, 69.7%, 61.0%, 55.3%, 41.4 % и 37.4 % accordingly. The trend of reduction of the bruxism episodes in the second group of patients on the regular control examinations was 73.3 %, 69.2 %, 60.1 %, 55.29 %, 48.43 %, 44.27% and 40.38%. In the fourth group of patients the degree of the bruxism in each control examination was 81.2 %, 79.2 %, 73.43 %, 67.81 %, 62.31 %, 54.91 %, 52.81 % (Table 1.2).

Table 1.2: Efficiency of traumatic occlusion treatment expressed by the bruxism episodes in each examination

Table 1.2.	Brux-ism ep.1 exam.	Brux-ism ep.2 exam.	Brux-ism ep.3 exam.	Brux-ism ep.4 exam.	Brux-ism ep.-5 exam	Brux-ism ep. 6 exam.	Brux-ism ep. 7 exam.
Group 1	91.8%	80.3%	69.7%	61.0%	55.3%	41.4 %	37.4 %
Group 2.	73.3 %	69.2 %	60.1 %	55.29 %	48.43 %	44.27%	40.38%
Group 3	81.2 %	79.2 %	73.43 %	67.81 %	62.31 %	54.91 %	52.81 %

From our investigation we can observe that the bruxism as a phenomenon is with significant frequency in the childhood period. According to the data received from our patients we observed that there is a correlation between the frequency of the episodes of bruxism and the verified presence of traumatic occlusion in the patients. The highest frequency of the bruxism episodes was found in patients with most emphasized traumatic occlusal contacts i.e. the first group of patients with anterior cross bite in which the bruxism was quantified with 93.42 % of the diagnosed patients. The patients that had milder form of the same disorder in the occlusion in the form of tete a tete bite had lower frequency of episodes of bruxism and were 80 % from the total diagnosed patients. The remaining patients in which the traumatic occlusal contact had manifested itself with the development of deep bite had medium frequency of the episodes of bruxism with 82.86 % of the diagnosed patients.

The treatment with removal of the traumatic occlusal contacts i.e. selective teeth grinding had positive effect on the patients with traumatic occlusion without accompanying bruxism as well as the patients with additionally diagnosed bruxism. In each of the patients that had traumatic occlusion with accompanying bruxism was observed a decrease in the episodes of bruxism after the removal of the traumatic occlusal contact. The best response to the treatment was again observed in the first group composed of the patients with the most pronounced traumatic occlusion in which the average decrease of symptoms and episodes of bruxism between two control examinations was 9.06%. The treatment had the lowest efficiency in patients from the third group with average decrease of symptoms and bruxism episodes between control examinations of 4.73%. The patients from the second group had a intermediate average decrease of bruxism episodes between two control examinations and it was estimated 5.41%.

No one has yet with certainty determined the reason behind the development of bruxism in children. The fact still remains that the harmful oral habits, temporomandibular dysfunction (TMD), malocclusions, hypopnea, the high levels of anxiety, the type of the personality of the child and the everyday stress are among the key factors that contribute to the development of bruxism in children. However, the role of all the contributing factors which lead to the development of bruxism in children pales in comparison with the occlusal obsticles and premature contacts. It is considered the development of buxism in children is related to the fact that in the childhood period the upper and lower teeth of the children are in a phase of constant replacement or eruption and don't intercuspidate well with each other. In some cases the bruxism is related to the growth and the development of the child. Often bruxism is a response of the child to the changes in the life style, frequent change of habitat, new school or teacher, arguments with parents and ect. There are claims that the bruxism in children appears as a response to the feelings of pain. The stress (anxiety, anger and fear in the child) can also be a cause for bruxism [3]. Some children have habits of gnashing their teeth when they are angry, under the influence of stress or scared. The frequency of oral parafunctions is higher in children. These habits include: thumb biting, prolonged use of pacifier, nail biting that lead

to bad prognosis for similar oral parafunctions in the childhood and adult period. The development of bruxism in children can also be related to allergies, deficient nutrition, face or oral trauma. It is very frequent in children that are diagnosed with: mouth breathing, adenoid hypertrophy, obstructive or sleep apnea, malocclusion and craniomandibular anomalies. Anterior and downward posture of the head and neck (scoliosis) is related to the development of bruxism in children. This posture may affect the air flow in children with bruxism and further deteriorate the manifestation of this oral parafunction. The scoliosis posture is frequently found in children with hypertrophy of the masticatory musculature and high levels of anxiety that correspond to the clinical findings for bruxism. There is a close relationship between bruxism in children and obstruction of the upper airways. Tonsilary hyperplasia is the most common cause for the most sleep disorders. The enlarged tonsils and adenoid glands may cause obstruction of the upper airways and lead to obstructive sleep apnea. The most common symptom in children with sleep apnea is mouth breathing. Children that have breathing obstruction are prone to protrude their mandible forward in order to keep their airways open. These activity stimulates the receptors of the upper airways to enhance the muscle tonus and facilitate the development of bruxism. The development of bruxism in younger children may be connected to the immaturity of the neuromuscular system of mastication. The dentition of children in the contemporary age is significantly less damaged in comparison to the damage of teeth surfaces in the past, because the food is more refined and softer to chew. The consistency of the food may directly affect the craniomandibular growth. When the food is not hard enough, the deciduous teeth lack the physiological occlusal wear and this leads to insufficient growth of the apical base of the children. Without appropriate stimulation, the length of the alveolar ridge is not large enough to enable eruption of all of the permanent teeth [4]. The appearance of bruxism causes huge occlusal wear in the shape of wider, smoother contact surfaces between antagonists compared to the occlusal surfaces that originate from physiological chewing activity. These contact surfaces allow unhindered horizontal movements of the mandible in relation to the entire length of the maxilla. In this manner the alveolar ridge receives the necessary growth stimulus. This is the reason why the bruxisam in children may be perceived as evolutionary phenomenon that compensates for the change in the food diet in children to enable physiologival craniofacial growth [5]. Other than in children with physiological development, the bruxism has been noted in some congenital disorders. The bruxism is a common occurrence in children with special needs such as children with Down syndrome or cerebral palsy. The children that suffer from mosaic trisomy (trisomy of the 8 chromosome) have the highest rate of bruxism. The most specific symptoms for mosaic trisomy are change in the muscular tonus that is sometimes elevated and other times flattened in relation to its physiological boundaries. The children with antisocial persona and aggressive character traits have increased risk from appearance of bruxism. The degree of the anxiety in children is a dominant factor for development of bruxism. The children that suffer from nocturnal bruxism have a tendency for developing anxious psychological disorders. The childhood bruxism is in close relationship with hyperactivity and deficit of attention. The syndrome of attention deficit hyperactivity disorder (ADHD) is a hindrance in the development of the child that is neurological by nature. In patients with this disorder the transmission of the neurotransmitter dopamine has been compromised, which leads to disorders of personality and behavior, anxiety, trepidation and bruxism. Numerous studies show that the appearance of bruxism is more common in children with ADHD that receive treatment than in children with the same condition that haven't been treated. This implies to the fact that one of the side effects of the medications that stimulate the CNS is the appearance of bruxism [6]. Although TMD is a disorder that usually afflicts the more mature population, the children are also not spared from this condition. TMD in children is mostly asymptomatic. Sometimes the TMD in children is manifested as otalgia or headache, and thus it is misdiagnosed from the podiatrists and otolaryngologists. The appearance of TMD in children is with increased frequency in the period between the mixed and permanent dentition. The bruxism in children appears most commonly as an accompanying disorder to the TMD. Children with bruxism and TMD often exhibit signs of crepitation in the temporomandibular jount (TMJ), irregular movements of the mandible, limited opening of the mouth, periauricular pain, facial pain, headache and sensitivity of movement. One of the most common factors responsible for the development of TMD in children is the functional overload of the TMJ caused by the bruxism. The development of bruxism in children begins at the age between 4-8 years, it is most intense between 10 and 14 years of age and decreases in the later years. The episodes last only 6 seconds with repetitions of 6 times in each hour.They appear in the second phase of REM sleep [7]. The problems caused by the childhood bruxism are not as serious as the sounds produced by the child with this condition during sleep. Most often the childhood bruxism is transitory and with spontaneous disappearance by the time the child enters the adolescent period. Most children stop making grinding sounds when the replacement of the deciduous teeth is over. Only in a small part of children, the bruxism continues in the adolescent period. If the stress is the basic reason for bruxism, then this condition will continue to be until the stress factor remains. [8] The preventive measures could only be taken in controlling and avoiding stressful and emotional situations, while some forms of bruxism are a natural response of the child to the growth and development and thus cannot be prevented. If the condition is out of control and the bruxism is a potential damage to the oral health of the patient, the dentist should perform a selective teeth grinding on the deciduos dentition. Complete reshaping of the teeth surfaces is unnecessary. The removal and polishing of the sharp edges and more pronounced premature contacts without damage to the permanent teeth is a sufficient treatment for the children with bruxism. If the patient suffers from persistent nasal infections then a tonsillectomy should be performed in a consultation with the otorinolaringologist. The patient should be advised to avoid chewing gums because the movement of the masticatory muscle may provoke development of a reflex that will be repeated during the night. Sleeping without pillow causes better posture of the head and neck and permeability of the upper airways and thus is recommended in children suffering from bruxism. The

masticatory muscles of the children with bruxism should be covered with warm poultice before going to sleep in order to relax the jaw muscles and reduce the bruxing activity. The nocturnal bruxism is related to the habits of sleeping and this is why its' frequency is higher in children that fall asleep in front of the TV or listening to radio. A special attention should be given to the long and peaceful sleep in children with bruxusn [9]. They should have short naps at least once during the day, at night they should go to sleep at a regular time and the parents should read to them before sleep instead of letting them watch TV or listen to radio. The child should also if it is possible sleep in a separate room from the parents in order to achieve undisturbed physiological sleep. Occlusal splints or orthodontic appliances such as anterior bite plates that eliminate the contacts between the opposing teeth in the dental arch could also be used in the treatment of bruxism in children until the therapy with selective teeth grinding is over. Regardless if the reason behind the development of bruxism in children is somatic or psychological, measures for relaxation before sleep may help a lot in controlling of this condition. As such relaxation measures that are able to calm the child could be considered hot bath before sleep, listening to soothing music or reading a book. Each parent should discover the appropriate relaxation activity that the child loves and incorporate it in a regular routine before going to sleep [10]. All of these corrective measures help to limit the bruxism developed in children to a tolerating level.

5. Conclusion

The role of bruxism as a phenomenon that appears in children is to bring a transitory condition that helps the organism to cope with the changes in occlusion that occur during the eruption of the permanent and replacement of the deciduous teeth. However, if the imbalance of the occlusal contacts specific for the deciduous dentition continue to exist in the later years, the bruxism may progress in a more severe condition with considerable complication for the entire stomatognathic system. From this investigation we came to the conclusions that:

1. The episodes of bruxism are more pronounced in children with traumatic occlusion;
2. The frequency of the episodes of bruxism is in a proportion with the severity of the traumatic occlusion;
3. Bruxism in children has a positive reaction to the treatment with selective teeth grinding and removal of traumatic and premature occlusal contacts which gives us the right to draw a conclusion that there is a cause and effect relationship between the bruxism and traumatic occlusion and that the traumatic occlusion plays an important role in the development of bruxism in children.

6. Future Scope

This study has a essential influence on how the therapists in their everyday practice should approach the patients with bruxusm. The treatment of the bruxism patients should include a complete analisys of the occlusion of the patient and mandatory selective teeth grinding if any discrepancies in the occlusal contacts have been detected.

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