

Temporomandibular Disorders and Parafunctional Habits in Children and Adolescence: A Review

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Abstract:

The aim of this study is to review the existing literature about temporomandibular disorders (TMD) and parafunctional habits (bruxism) and their relationship in children and adolescents, which is still controversial. TMD is a collective term used to identify a group of musculoskeletal conditions of the temporomandibular region. Bruxism defined as the habitual nonfunctional forceful contact between occlusal tooth surfaces. Some studies have linked oral parafunctional habits to TMD, whereas others did not observe this relationship. The role of bruxism -as is currently described- can be considered a controversial and unresolved issue. Taking all evidence together, the authors suggest that there is not any clear relationship between bruxism and TMD.

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INTRODUCTION

TMD is a group of associated disorders in which pain in the preauricular area, the temporomandibular joint or the masticatory muscle soreness, limitations or deviation during opening or closing of the mouth in the lower jaw and noises in the temporomandibular joint during mandibular function is usually reported [1].

However, it is generally assumed that TMD would mainly affect adult patients; nevertheless, children have also shown a similar incidence of signs and symptoms in various studies [2-4]. It is generally estimated that 10-40% of the population suffers from severe head pain, of which periauricular or temporoman-

dibular pain constitutes a large proportion in chronic sufferers [5].

The etiology of TMD in children and adolescents is considered multifactorial in nature and has been related to trauma, malocclusion, and oral Para functions such as bruxism, nail biting, and non-nutritional sucking. [6,7,8]. However, the relationship between oral parafunctional habits and TMD, if it exists, seems to be controversial and unclear.

Bruxism

Bruxism is a group of oral parafunctional habits, which contains all kinds of clenching and grinding activities, due to some disorders in masticatory system. It usually occurs while a

child is sleeping, though some children grind their teeth during the day [5,9]. It has prevalence in the general adult population from 10% [10] to 20% [11,12]. Reported prevalence in children ranges from 7% to 15.1% [11,9], with girls apparently more frequently affected [11,13]. This is partly due to greater numbers of estrogen receptors within the articular cartilage of TMJ sufferers [14,15] as well as increased levels of stress hormones in females TMD sufferers [16] while there still remains much debate on the matter; many studies are now showing similar statistical distributions between genders [5,17,18].

Causes of Bruxism

Four main causes of bruxism have been recognized:

1-Psychological factors :As it is mentioned in some case control surveys, patients suffering from bruxism show a higher level of aggression compared to healthy people attending these investigations. According to some researches personality disorders, increased stress, the presence of depression and stress sensitivity are presumed to be associated with the manifestation of bruxism [19,20]. Children with bruxism are apparently more anxious than non-bruxers [9,21].

Preliminary evidence suggests that juvenile bruxism is a self-limiting condition that does not progress to adult bruxism [22], but it has been shown that there is a possible etiological relationship between personality, tooth clenching and signs and symptoms of craniomandibular disorders [23]. This arises the question that whether the problem in adults could be avoided if signs of bruxism, such as high levels of anxiety, TMD and tooth damage are treated in childhood [24,25]. Adult bruxers more frequently report being single and having a higher educational level [26].

2-Morphological factors such as dental occlusion and anatomy of orofacial skeleton are thought to be involved in the etiology of brux-

ism. Occlusal discrepancies were historically considered the most common cause of bruxism, more recently the role of occlusion has been debated [11,27].

Several occlusal factors like large and inverse overjets and overbites were suggested to be related to self-reported bruxism in a study about children [28].

However most studies on this subject now agree that there is no, or hardly any relationship between self reported and clinically established bruxism in one hand and occlusal factors on the other hand, neither in adult samples [29] nor in children [30]. Nowadays these factors are thought to play only a small role, if at all. Recent focus is more on the pathophysiological factors [9].

3-Pathophysiologic factors: bruxism may be a consequence of the immaturity of the masticatory neuromuscular system, altered brain chemistry, alcohol, trauma, disease, and medications. Potentially systemic causes of para-functional activity via food allergies, nutritional deficiencies and endocrine dysfunction have been mentioned in the literature [31,32]. Investigating the effects of nutritional and endocrine disturbances along with alimentary parasites on masticatory muscle function, as well as trigeminal sensitivity to potential allergens may provide a useful avenue for future research in both TMD and masticatory muscle hyperactivity [5].

Certain neurochemical factors, medications, and drugs were described. Serotonin re-uptake inhibitors may cause bruxism after long term usage [33].The amphetamines like medications that are used in the management of attention deficit hyperactivity disorder, like methylphenidate, have bruxism as a possible side effect [34]. In addition, bruxism was found more frequently in heavy drug addicts [35] as well as smokers [36].

4-TMD: TMD sufferers tend to have a higher incidence of psychological disturbances such as stress, anxiety, and depression. As men-

tioned earlier this factors could lead to the parafunctional habits [5,11].

The union of two or more etiological factors is needed to produce bruxism, but the magnitude of these factors is not important in relation to the magnitude of bruxism [25].

Wear facets are suggested to be indicators of clenching and grinding [37]. They are caused by long lasting, dynamic tooth to tooth contacts than by other factors like nutrition and salivary buffer and can be found mainly in the canine and incisor region [38]. Wear facets from bruxism have been reported to be common in the primary dentition .The reported prevalence of wear facets varies from 5% to 81% [39]. It is suggested that incisal tooth wear was not associated with self-reported TMD pain [40]. Bruxism could lead to thermal hypersensitivity, tooth hypermobility, injury to the periodontal ligament and periodontium, hypercementosis, fractured cusps and pulpitis and pulpal necrosis [41].

Dental damage with abnormal wear to the teeth is the most frequent sign of the disorder.

Other complications are damage to the structures surrounding the teeth, which include recession and inflammation of the gums and resorption of the alveolar bone. Hypertrophy of the muscles of mastication can occur, and bruxism is often associated with facial pain [42].

TMD

TMD is a collective term adopted to encompass a group of conditions of the temporomandibular joint, dentition, supporting bone and masticatory muscles [43]. Due to the different diagnostic criteria implemented and the diversity in clinical examinations, a wide range (6-68%) of prevalence for temporomandibular disorders is reported [44-46]. It is believed that TMD is mainly observed in adult patients. The incidence of TMJ sounds, limitation on mouth opening, masticatory muscle soreness, and pain in the TMJ area are often due to great

changes in occlusion and TMJ, increasing from the primary dentition to the mixed dentition. Nevertheless, a high prevalence of TMD is also reported in some children [3,4,11,23].

A mechanistic dysfunction model has been the main causal principle of TMD. Malocclusion, deformity or bruxism lead to abnormal movement of the temporomandibular joint (TMJ) and consequently to TMD [47].

A flexion-extension injury, an injury while eating, yawing, or prolonged mouth opening during dental appointments can cause signs and symptoms of TMD, because trauma to the head, neck, or jaw is considered a trigger factor for temporomandibular disorder. Parafunctional habits can also result in such disorders because of repetitious adverse loading of muscles and trauma to the masticatory system.

Other factors affecting the patient's disorder are hormonal and psychosocial variables, which may be linked with any predisposing or initiating factors. [11,48].

According to the diverse results of different studies about the relationship of occlusal variables and TMD, there is no agreement about the impact of occlusal factors on signs and symptoms of TMJ disorders [49-52]. The possibility that orthodontic treatment could cause TMJ pathology has been extensively dealt with in the scientific literature. Regardless of various methods implemented, surveys investigating the effects of orthodontic treatment on the TMD have found no improving or exacerbating results [53].

The most common clinical sign of TMD is clicking [53-55]. In different studies clicking in children are reported at a rate ranging from 6.8 to 65% [49,56,57]. This large range of results can probably be attributed to the examination methods. Studies which used stethoscope showed high incidence of TMJ sounds [3,57,58], and there were lower incidence compared to those in which no stethoscope was used [4,41,55]. The prevalence of TMJ sounds seems to be increased from primary to

permanent dentition, due to the longer duration of muscle tension among older age groups, causing intracapsular changes and consequently TMJ sounds [59,60].

The predominant deviation to the left during opening could be due to the physiological strength of the right lateral pterygoid muscle [4].

It has been reported that there is high incidences of TMD in patients with deciduous crowns and unilateral chewing [6].

Since signs and symptoms of TMD obviously make an early appearance, routine dental examinations should include their evaluation to identify patients who should be observed more closely. Nevertheless, signs and symptoms in growing individuals may be due growth changes and the importance of early diagnosis to provide normal growth and development of oral system should be mentioned [61].

Relationship between TMD and Bruxism

Pain from TMD is a public health problem in children and adolescents. Treatment demand is estimated to be between 2%-5% in this age group. Bruxism is a parafunctional habit implicated in TMD based on the hypothesis that the increased muscle activity triggers pain in the masticatory muscles and temporomandibular joint [52,62-64].

TMD and bruxism have been the subject of considerable number of studies in recent years, but there is inconsistency in the literature about relationship between TMD and

Bruxism in children and adolescence. In some surveys bruxism was not considered related to signs and symptoms of TMD in young children [65] but a number of studies showed that there is significant relationship between attrition, symptoms of TMD and deviation on opening [6,66] and also there was a significant association between bruxism and most of the TMD signs and symptoms in children in this investigations [41,67]. Some studies indicate that there is strong evidence for the absence of

a substantial association between tooth wear and TMD, and others found a relationship between tooth wear and TMD in young children [40]. It seems that there are too many factors affecting the results of studies investigating the relationship of TMD and bruxism. Age of subjects participating in the study can be a determining factor; surveys have shown that TMD may produce no sign or symptoms in young children and symptomatic cases maybe misdiagnosed as headache or otalgia by the pediatrician or otolaryngologist [68,69]. It is mentioned that just around the age of 6 years, a mixture of primary and permanent teeth can be found in the subjects, so the presence of a mixture of primary and secondary dentition may complicate the analysis of such an association [70].

It also appears that variables such as intensity, frequency, and duration of bruxism episodes may need to be refined. For example, one study pointed out that signs and symptoms of TMD were found to be proportionally increasing when the intensity of grinding increased. Apart from these facts, the results of different studies are based on very different samples and various examination methods [11,71]. Some results suggest that TMD+bruxism patients may present many other additional oral jaw habits, which may concur to increase masticatory muscle activity thus leading to TMD signs and symptoms [72]. There is evidence that the most common chief complaints in TMD bruxers and non-bruxers were facial, temporomandibular joint, headache, and/or cervical pain, and joint noises and the need for medical and dental consultations increased with the severity of bruxism [73]. It has been mentioned that populations with high anxiety level may more likely develop TMD and bruxism. While high anxiety is one of the main factors in bruxism development, it is postulated that stress, anxiety, and depression is more probably seen in TMD sufferers [74,75].

Previously dental occlusion and morphological

elements were thought to be one of the most considerable factors in development of bruxism but nowadays it has lost its importance [27,47,76]. Subjects with normal occlusion have lower odds for symptoms and signs of TMD, whereas some occlusal characteristics more frequently found in the class II malocclusion group, increased the odds for symptoms and signs of TMD [77], and a 20 year follow up supports the opinion that no single occlusal factor is of major cause for the development of TMD, but a lateral forced bite between retruded contact position and intercuspal position as well as unilateral crossbite may be a potential risk factor in this respect. Furthermore, subjects with a history of orthodontic treatment do not run a higher risk of developing TMD later in life [78].

Theoretically, the jaw-opening reflex relies on activation of the lateral pterygoid and anterior digastric muscle in order to disengage the occlusion. This activity occurs in response to mechanoreceptors stimulation. It may be reasonable to suggest that excessive mechanoreceptor irritation via grinding or clenching may lead to lateral pterygoid fatigue and hence TMD symptoms. It has been postulated that intrafusal masticatory muscle fiber fatigue is implicated in the onset of both TMD and bruxism. Moreover, it is claimed that parafunctional habits like bruxism could lead to muscle fatigue and finally to the pain in the masticatory muscle and TMJ [79], which is one of the frequent TMD symptoms. At present, a cause-and-effect relationship between TMD and bruxism has not been established yet.

There is controversy among clinicians about the treatment of children with bruxism and TMD. There are some ways like patient/parent education, occlusal splints, psychological techniques and medications [21,80,81].

As the symptoms are common among youth, it has been recommended that a TMD evaluation should be part of the routine examination. The mostly used treatment for

TMD and bruxism involves intra oral splints, which position the mandibular condyle in an optimal position within TMJ and interrupt the habit of bruxism but the risk of long-term side effects has evolved some concerns [82]. In spite of the high frequency of signs and symptoms there has been little need or demand for treatment of TMD in children and adolescents because of its mild and occasional character [3,83-85].

CONCLUSION

It seems that TMD etiology is considered multifunctional and still controversial. Different diagnosis criteria for both TMD signs and symptoms and bruxism make it difficult to reach reliable evidences. Taking all evidence together, the authors suggest that at present there is not confidence about the relationship between TMD and Bruxism.

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