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Effect of Bruxism on Occlusal Parameters in Children

Research Article

Deepa Gurunathan[1*], Niveditha Suresh Babu[2], Joyson Moses[3], Mahesh Ramakrishnan[4]

[1] Professor, Department of Paediatric and Preventive Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences(SIMATS), Saveetha University, Chennai 600 077, Tamil Nadu, India.
[2] Professor and Head of Department, Department of Conservative Dentistry and Endodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences(SIMATS), Saveetha University, Chennai 600 077, Tamil Nadu, India.
[3] Professor and Head of Department, Department of Paediatric and Preventive Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences(SIMATS), Saveetha University, Chennai 600 077, Tamil Nadu, India.
[4] Reader, Department of Paediatric and Preventive Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India.

Abstract

Background: Sleep bruxism has characteristically been defined by the American Academy of Sleep Medicine as 'an oral activity characterized by grinding or clenching of the teeth during sleep, usually associated with sleep arousals. Although numerous investigations stress the assumption of a central causation, such as neuropathophysiology and psychology, a detailed clarification regarding the aetiology of sleep bruxism is still lacking.
Aim: To evaluate the effect of bruxism on occlusal parameters in children.
Materials and Methods: 200 participants attending the department of Paediatric and Preventive dentistry in an age group of 5-18 years were screened to diagnose whether there is a presence of bruxism or not and to confirm the effect of bruxism on the occlusal parameters in children. Rubber-based impression was made to obtain cast of participants with as well as without bruxism and further cast evaluation of occlusal parameters was done according to the criteria of the American Academy of sleep medicine.
Results: There is no significant difference in the occlusal parameters of particvipants with or without bruxism.
Conclusion: No significant difference in occlusal parameters was found between bruxist and non-bruxist participants.

Keywords: Bruxism; Cast; Dental Impression; Occlusion; Occlusal Parameters.

Introduction

Bruxism is a movement disorder characterized by grinding or clenching of teeth which generally goes unnoticed in young children [1]. During a few years, explanatory models in the field of the dental profession, such as occlusal interferences or variances in the orofacial anatomy, are thought to be of inferior, possibly without any, relevance in the development of sleep bruxism activity [2]. For this reason, the perception in respect of the relationship between sleep bruxism and the stomatognathic system has changed [3]. Consequently, sleep bruxism is supposed to be induced centrally, whereas the effects of this parafunctional activity are predominantly found in the stomatognathic system [4]. Undoubtedly, apart from associated effects, such as unpleasant muscle and tooth sensations, limitation of jaw movements, oral and facial pain, and headache; tooth attrition, fractured cusps or entire teeth, shiny spots on restorations are well-known to be the most frequently occurring effects, in particular, on the dental hard tissue. Moreover, a possible association between bruxism and temporomandibular disorders (TMDs) is supposed, but the available literature reveals heterogeneous data [5].

The aim of the present study is to evaluate the effect of bruxism on the occlusal parameters in children.

Material and Methods

Study design

A cross-sectional study was carried out on thirty children visit-

***Corresponding Author**:
Dr. Deepa Gurunathan MDS,
Professor, Department of Paediatric and Preventive Dentistry, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences(SIMATS), Saveetha University, Chennai 600 077, Tamil Nadu, India.
Tel: +91-9994619386
E-mail: drgdeepa28@gmail.com

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ing the out-patient department of Paediatric and Preventive dentistry for dental treatment. Children were screened for presence of bruxism. The preset inclusion and exclusion criteria was followed for recruiting participants. The inclusion incriteria involved children in an age range of 5-18 years and healthy children. The exclusion criteria includes children with special care needs, children with severe psychotic disorders/psychological problems and children under antipsychotis, antidepressants, sedative drugs.

Sample

A convenient sampling population was taken to evaluate the effect of bruxism on the occlusal parameters in children.

Ethical Considerations

The study was approved by the Scientific Review Board of Saveetha Dental College and Hospitals, Chennai, India followed by the Institutional Human Ethics Committee (SRB/MDS/PEDO/17-18/0036). Prior to the study, written informed consent was taken from the parents/care-giver willing to participate in the study only after detailed explanation presented regarding the purpose and objectives of the study.

Clinical diagnosis

200 participants attending the department of Paediatric and Preventive dentistry in an age group of 5-18 years were screened to diagnose whether there is a presence of bruxism or not and to confirm the effect of bruxism on the occlusal parameters in children. Rubber-based impression was made to obtain cast of participants with as well as without bruxism and further cast evaluation of occlusal parameters was done according to the criteria of the American Academy of sleep medicine. The clinical criteria evaluated by the American Academy of sleep medicine are Unpleasant muscle & tooth sensations, Self-report of muscle fatigue or tenderness on awakening, Limitation of jaw movements Oral, facial pain and headache, Tooth attrition Tooth/teeth number, Fractured cusps or entire teeth, Tooth/teeth number, Shiny spots on restorations, Masseter hypertrophy upon voluntary forceful clenching (Figure 1-7). While the functional and occlusal parameters evaluated both in bruxist and non-bruxist participants were Vertical overbite, Horizontal overjet, Maximum active mouth opening, Maximum active right and left lateral movement of the

Figure 1. Represents "unpleasant muscle" criteria of the American Academy of Sleep Medicine (90% of participants reported absence of symptom while 10% of participants.

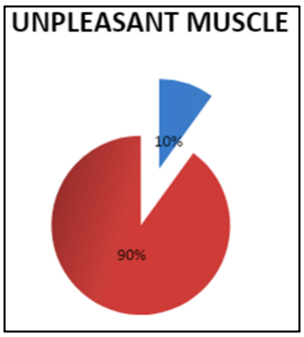


Figure 2. Represents "tooth sensation" criteria of the American Academy of Sleep Medicine (73% of participants reported absence of symptom while 27% of participants reported.

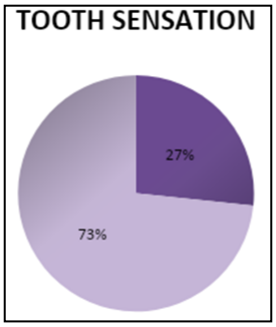


Figure 3. Represents "Tenderness on awakening" criteria of the American Academy of Sleep Medicine (90% of participants reported absence of symptom while 10% of participants reported presence of symptom).

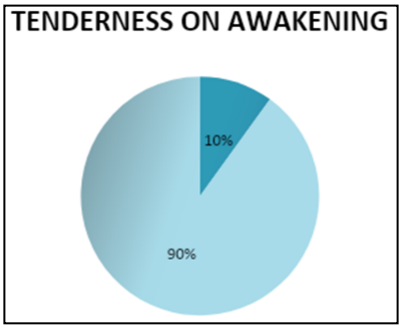


Figure 4. Represents "Jaw movements" criteria of the American Academy of Sleep Medicine (97% of participants reported absence of symptom while 3% of participants reported presence of symptom).

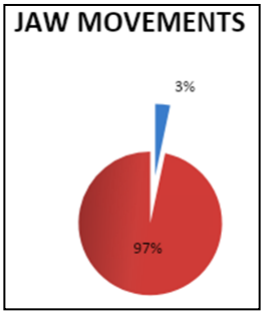


Figure 5. Represents "oral/facial pain/headache" criteria of the American Academy of Sleep Medicine (90% of participants reported absence of symptom while 10% of participants reported presence of symptom).

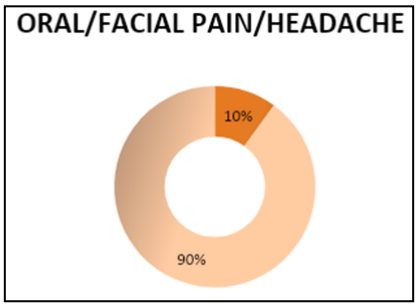


Figure 6. Represents "fractured cusp" criteria of the American Academy of Sleep Medicine (97% of participants reported absence of symptom while 3% of participants reported presence of symptom).

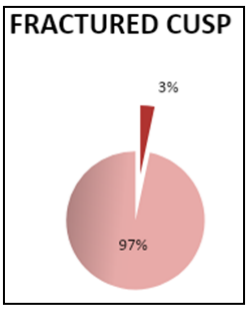
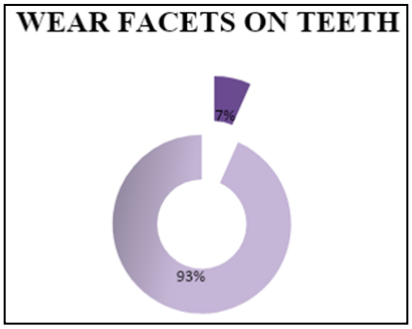


Figure 7. Represents "wear facets" criteria of the American Academy of Sleep Medicine (93% of participaNts reported absence of symptom while 7% of participants reported presence of symptom).



mandible, Maximum protrusive movement of the mandible, Presence of a slide fromcentric occlusion to maximum intercuspation, Length of the slide from centric occlusion to maximum intercuspation, TMJ, Lesions related to lip and cheek, Angle's classification of malocclusion, Anterior crowding in the mandible.

The collected data were analysed with IBM.SPSS statistics software 23.0 Version.To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables.

Results

200 participants were screened for bruxism, out of which only 30 children have potential findings of bruxism effects on occlusal parameters which comprises of 14 (46.7%) males and 16 (53.3%) females with a mean age of 10.23 + 3.401 (Table 1). Thirty pairs of cast (60 casts) were screened for any occlusal parameters to be affected by bruxism, out of which only three casts showed features of bruxism affected occlusal parameters such as presence of

anterior teeth fractured cusp, wear facets, crowding coupled with clinical diagnosis of pain in the TMJ, early morning tenderness of masseter muscle, early morning difficulty in mouth opening etc. The chief complaint of thirty diagnosed participants are tabulated in (Table 2).

Discussion

In the present study the effects of bruxism on occlusal parameters were analyzed using the obtained cast-models. The obtained casts acts as the negative replica of the supported findings found in the oral cavity however only three participants were found to present with findings of bruxist effects on the occlusal parameters such as presence of wear facts on the posterior teeth, fracture of the incisal edges of the anterior teeth along with clinical symptoms of tenderness of the masticatory apparatus on awakening and experiencing pain in the TMJ on opening mouth early in the morning this is in accordance to the findings of ommerborn who supplemented data on the presence of the following occlusal parameters indicating the effect of bruxism on the occlusal parameters in adults [6].

The present study is one of its kind in documenting the effect of bruxism on occlusal parameters in children even though no such kind of diagnostic protocol has been set forward for screening children with bruxism. In the present study the American academy of sleep medicine diagnostic protocol has been implemented to diagnose children with bruxism, thereby having a slight of modification in the existing protol such as facebow analysis in the children for examining their centric relation could be quite difficult to carry out in young children concerning their co-operative ability. The present study earmarks the herald of new or slightly modified diagnostic protocols for diagnosing children with bruxism as well as assessing the occlusal parameters in them to analyse the effect of bruxism on it.

Bruxism is a movement disorder characterized by grinding and clenching of teeth [6]. Awake bruxism is found more in females as compared to males while sleep bruxism shows no such gender prevalence [7]. Etiology of bruxism can be divided into three groups psychosocial factors, peripheral factors and pathophysiological factors [8]. Treatment modalities involve occlusal correction, behavioural changes and pharmacological approach. Tooth grinding is an activity particularly importantant to the dentist because of breakage of dental restorations, tooth damage, induction of temporal headache and temporomandibular disorders [9]. The term parafunction was introduced by Drum to suggest distinction between occlusal stress exerted during mastication and swallowing and occlusal stress which are brought into action outside of the normal function [10]. Parafunctional activities are non functional oromandibular or lingual activities that includes jaw clenching, bruxism, tooth grinding, tooth tapping, cheek biting, lip biting, object biting etc. that can occur alone or in combination and are different from functional activities like chewing, speaking and swallowing [11].

More and more pathophysiological factors are suggested to be involved in the precipitation of bruxism [12]. As the bruxism often occurs during sleep, the physiology of sleep has been studied extensively especially the 'arousal response' in search of possible causes of disorder [13]. Arousal response is a sudden change in the depth of the sleep during which the individual either arrives in the lighter sleep stage or actually wakes up. Such a response is accompanied by gross body movements, increased heart rate, respiratory changes and increased muscle activity [14]. Macaluso et al. in their study showed 86% of bruxism episodes were associated with arousal response along with involuntary leg movements [15]. This shows that bruxism is a part of arousal response indeed. Recently it is derived that disturbances in central neurotransmitter system may be involved in the etiology of the bruxism [16]. It is hypothesized that the direct and indirect pathways of the basal ganglion, a group of five subcortical nuclei that are involved in the coordination of movements is disturbed in bruxer [17]. The direct output pathway goes directly from the stratum to the thalamus from where afferent signals project to the cerebral cortex [18]. The indirect pathway on the other hand passes by several other nuclei before reaching it to the thalamus [19]. If there is imbalance between both the pathways, movement disorder results like Parkinson's disease [20]. The imbalance occurs with the disturbances in the dopamine mediated transmission of action potential. In case of bruxism there may be an imbalance in both the pathways [21]. Acute use of dopamine precursors like L-dopa inhibits bruxism activity and chronic long term use of L-dopa results in increased bruxism activity [22]. SSRTs (serotonin reuptake inhibitors) which exert an indirect influence on the dopaminergic system may cause bruxism after long term use.

Table 1. Demographic variables depicting gender distribution, frequency percentage and mean age.

GENDER	FREQUENCY	PERCENT	AGE
MALE	14	46.70%	
FEMALE	16	53.30%	MEAN + SD
			10.23 + 3.401
TOTAL	30	100.00%	

Table 2. Depicting chief complaint of recruited participants based on clinical diagnosis of American Academy of Sleep Medicine in frequency percentage.

CHIEF COMPLAINT	FREQUENCY	PERCENT
PAIN IN TEETH	22	73.30%
MUSCLE TENDERNESS	1	3.30%
GRINDING	1	3.30%
SENSATION	6	20.00%
TOTAL	30	100%

Amphetamine which increases the dopamine concentration by facilitating its release has been observed to increase bruxism [23]. Nicotine stimulates central dopaminergic activities which might explain the finding that cigarette smokers report bruxism two times more than the non smokers. Psychosocial Factors Number of studies is published in the literature regarding the role of psychosocial factors in the etiology of bruxismbut none of these describe the conclusive nature because of the absence of large scale longitudinal trials [22]. Bruxers differs from healthy individuals in the presence ofdepression, increased levels of hostility and stress sensitivity. Bruxing children are more anxious than non bruxers. A multifactorial large scale population study to sleep bruxism revealed highly stressful life and a significant risk factor. A study by Van Selms et al., [23]. demonstrated that daytime time clenching could significantly be explained by experienced stress, although experienced stress and anticipated stress were unrelated to sleep bruxism as recorded with ambulatory devices [17]. All these studies show possible relationship between bruxism and various psychosocial factors is growing but not conclusive. Peripheral Factors and several occlusal factors were suggested to be related to self reported bruxism in a study with children [24]. Giffin in his article has mentioned that for an effective management of bruxism, establishment of harmony between maximum intercuspation and centric relation is required. But most of the studies published in the literature on this subject now agrees that there is no or hardly any relationship between clinically established bruxism and occlusal factors in adults [25, 26]. Manfredini et al. in their review of literature have stated that there is still a lack of methodological sound studies to definitely refute the importance of occlusal factors in the etiology of bruxism [18].

However, looking into the existing literature there has to be more in-depth studies needed to relate and found the more of essential contributing factors for the proper establishment of the diagnostic factors aiding in the diagnosis of bruxism in children and also letting to establish the effect of bruxism on the occlusal parameters in children. In the present study even though there have not been insignificant number of participants to indicate the effect of bruxism on occlusal parameters but there has been some major diagnostic findings documented to support the potential effects of bruxism on the occlusal parameters in children. The potential limitations in the present study is the small sample size screened to found the prevalence of bruxism in children as well as the lack of proper diagnostic yardstick for the diagnosis of bruxism in children.

Conclusion

The present study highlighted the potential effects of bruxism in children where features such as wear facets in the molar teeth, fracture of the incisal edges in the anterior teeth, tenderness of the masticatory apparatus and difficulty in mouth opening in three children out of the 200 children screened for the diagnosis of bruxism based on the American academy of sleep medicine.

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