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Impact Of Physical Activity and Screen Time On Occurrence Of Bruxism In Children - A Cross-Sectional Study

Research Article

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Abstract

Introduction: Bruxism is the habitual grinding, gnashing or clenching of teeth at times other than for the mastication of food. Bruxism is characterised by an involuntary sleep/awake parafunctional activity of the masticatory muscles, rhythmic or in spasm, and may present teeth clenching and/or grinding. The aim of this study is to evaluate the correlation between bruxism and physical activity.

Materials and Methods: The study was conducted among 300 dyads of parents and children between ages 4 and 6 years of age. A questionnaire containing questions about time spent on physical activity and evaluating occurrence of bruxism.

Results: The total number of children who participated in this study were 300. 160(53.33%) were male children, while the rest 140(46.67%) were female children. 152(95%) male children exhibited various signs of bruxism, while only 70(50%) of the female children had signs of bruxism. This could be attributed to the fact that 95% of the male children spent more than 2 hours with their gadgets and only 30.7% of the female children spent more than 2 hours on their gadgets. Children who practiced more physical activity, were less prone to bruxism. 91.7% of the male children got only less than 1 hour of physical activity, where as 68.5% of female children got more than 2 hours of physical activity. However, children who spent more time with gadgets were more prone to the bruxism, 80% of the male children spent more than 2 hours with their gadgets, while only 30.7% of the female children spent more than 2 hours with their gadgets.

Conclusion: On the basis of the data collected physical activities can reduce stress of daily stressful life. There is a mild association between the presence of parafunctional habits and the practice of physical activity in children of ages between 4 and 6 years of age. With the given limitations of the study it can be concluded that children who played more had reduced incidence of bruxism.

Keywords: Bruxism; Physical Activity; Gadget Usage; Temporomandibular Joint Disorder.

Introduction

Bruxism, is the habitual grinding, gnashing or clenching of teeth at times other than for the mastication of food, and was originally described by Marie and Pietkiewicz in 1907 [1]. The American Academy of Orofacial pain defines bruxism as, diurnal or nocturnal parafunctional activity including clenching, bracing, gnashing, and grinding of the teeth [2]. Bruxism is characterised by an involuntary sleep/awake parafunctional activity of the masticatory muscles, rhythmic or in spasm, and may present teeth clenching

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and/or grinding [3].

The condition has been variously attributed to dental, systemic or psychological factors. In most dental literature it is reported to be secondary to intraoral conditions such as malocclusion or localised conditions including mobile teeth, cuspal interferences, high restorations, premature contacts or occlusal disharmony [4]. The Systemic factors which are implicated in bruxism include intestinal parasites, subclinical nutritional deficiencies, allergies and endocrine disorders [5].

Physical activities can reduce stress in daily life. If not eliminated, stress is able to promote large increases in muscle tension, hypertension, asthma, heart arrhythmia and the development of parafunctions [6]. In this modern day, sedentary lifestyle has become more and more common, and has started to affect children more commonly, leading to diseases like diabetes due to excessive weight gain [7]. Children who lack interest in exercises or in games, children who don't have the time and money for exercises are in greater danger of developing parafunctional habits and other chronic illness than those who exercise regularly [8].

According to the American College of Sports Medicine, a good approach is to encourage children to try short periods of exercises with moderate intensity [9]. In relation to the type of activity, it is recommended any activity that uses major muscle groups in a continued, rhythmic and aerobic way (for example, walking, jogging, cycling) [10]. Children who belong to the lower economic statuses don't have access to platforms where in they can practice physical activity [11].

Studies including the correlation of physical activity with the beginning of parafunctional habits such as bruxism or even temporomandibular issue (TMD) are rare. This study aims at identifying the presence of parafunctional habits in children and confirm its possible association with the practice of physical activity.

Materials and Methods

Ethical clearance for the study was obtained from the Scientific review board of the university. The study was conducted among 300 dyads of parents and children between ages 4 and 6 years of age. A total of 160 boys and 140 girls took part in the study.

A questionnaire containing questions about time spent on physical activity was made along with another questionnaire evaluating bruxism and other parafunctional habits. The questionnaire was planned by multiple examiners and was given to the parents. Along with it, clinical oral examination of the children was done using icecream sticks. The presence of temporomandibular joint clicking noises were observed by the tactile method. An informed consent was obtained from the children and the children's parents who had participated in the study.

Children with the following conditions were not included in the study:

Changes in cognitive functions.

Children with large carious lesion.

Impaired communication skills.

History of recent trauma to the face.

If parental consent could not be obtained.

Evaluation of the parafunctional habits was conducted using a self-reporting questionnaire (yes/not) about the habits of nail biting, chewing gums with frequency, biting objects, biting lips/cheeks, and supporting the chin with the hand (adapted from the protocol proposed by K. Koyano et al [12]. The information on the practice of physical activity was gathered in accordance with the number of hours of exercise obtained by the child in a day.

I) Questionnaire

Questionnaire For Evaluating Bruxism:

Are you aware of or heard your child grind his/her teeth during sleep?
Yes
No

Have noticed your child's dentition is worn down?
Yes
No

Does your child complain of tightness or soreness of the jaws upon awakening ?
Yes
No

Does your child complain of aching temples upon awakening?
Yes
No

Does your child complain of difficulty in opening the mouth after waking up?
Yes
No

Have you heard or felt joint clicks in your child's jaws after he/she wakes up?
Yes
No

II) Clinical Examination

Abnormal wear of teeth-

Wear of enamel only.

Wear of enamel and dentin.

Wear up to 1/3rd of the length of the crown.

More than 1/3rd of the length of the crown.

Sounds associated with bruxism -

Present.

Absent.

Discomfort of the jaws-

Present.

Absent.

III) Evaluation Of Child's Physical Activity:

1. In your child's daily regime, time spent playing games
A) half an hour to one.
B) one to one and half.
C) more than one and a half.

2. Does your child utilise your P.T periods well?
A) yes
B) no

3. What time does your child play?
A) before school.
B) after school.
C) during school.
D) both after and at school.

4. What type of physical activity does your child do?
A) walking.
B) running.
C) bicycling.
D) games.
E) all of the above.

5. Is your child really interested in physical activity?
A) yes
B) no

6. When do you entertain yourself?
A) before school.
B) after school.
C) both.

7. Your child entertains himself/herself with ————
A) TV.
B) Mobiles, tablets and laptops.
C) gaming stations.
D) two and more from above.

8. Time spent on entertainment activities by your child
A) less than half an hour.
B) half an hour to one hour.
C) more than one hour.

9. Time spent studying at home
A) half an hour.
B) one hour.
C) more than one.

10. What is your child's academic performance?
A) below 35.
B) 35-50.
C) 50 -75.
D) 75 and above.

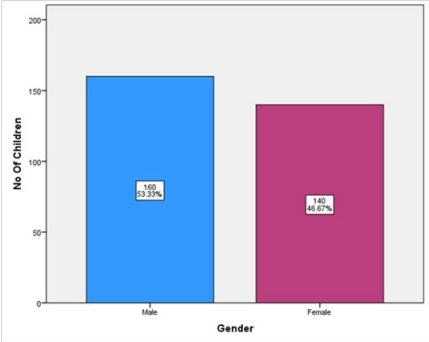
Statistical Analysis:

The values and variables were tabulated and analysed using the SPSS software by IBM. Chi square tests were done to assess the correlation and association. Any p value of less than 0.05 was considered as statistically significant. The independent variables were age and gender, while the dependent variables were timing of gadget usage, time spent of physical activity, signs of teeth wear, difficulty in mouth opening and sounds associated with bruxism.

Results

The results obtained from the study are given in the graphs and table below. (Graph 1) shows the gender distribution of the children who had participated in this study. 160 (53.33%) were male children and the res 140 (46.67%) were female children. (Graph 2) shows the total time spent on physical activity by the children. Only 104 (34.67%) of the children spent more than 2 hours on physical activity, while 31 (10.33%) of children spent 1-2 hours on physical activity, while a majority 165 (55%) of the children spent less than 1 hour playing. A majority 195 (65%) of the children used their gadgets for more than 2 hours. 61 (20.33%) of the children spent 1-2 hours on their gadgets. (Graph 3). Tooth wear was seen in most of the children, 45.33% of the children had wear of only enamel, while 26% of the children showed no signs of tooth wear. (Graph 4) All children 195(65%) who spent more than 2 hours on their gadgets presented with signs of bruxism. All children 44(14.67%) who spent less than 1 hour on their gadgets had no signs of bruxism. (Graph 5) 80% of the male children spent more than 2 hours with their gadgets, while only

Graph 1. This graph shows the gender distribution of the children who had participated in this study.

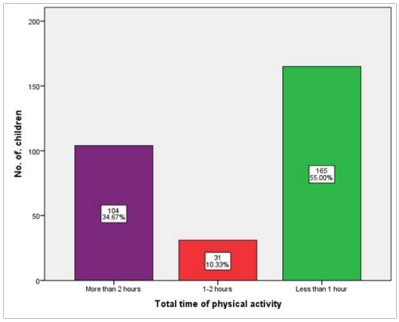


30.7% of the female children spent more than 2 hours with their gadgets. (Graph 6) 91.7% of the male children got only less than 1 hour of physical activity, where as 68.5% of female children got more than 2 hours of physical activity. (Graph 7) 77(74%) of the children who spent more than 2 hours on physical activity had no signs of bruxism. 54(33.7%) of the children who spent less than 1 hour on physical activity had wear of more than 1/3 rd of the teeth structure. (Graph 8) 36(22.5%) of the male children had more than 1/3rd of tooth wear, and 18(12.8%) of the female children had more than 1/3rd of tooth wear. (Graph 9) When clicking sounds in the TMJ were heard after waking up, it was found that 54(64%) of the children had more than 1/3 rd of tooth wear, while the rest 30(36%) wear of both enamel and dentin. No clicking sounds was heard on waking up when there was only enamel wear or when there was no signs of wear present. (Graph 10) In children who complained of difficulty in mouth opening after waking up it was found that 54(60%) of the children had wear of more than 1/3rd of tooth structure. 32(35%) had wear of enamel and dentin. (Graph 11) 95(31.67%) of the parents did not notice worn down dentition in children with wear of only enamel (Graph 12) 54(75%) had wear of more than 1/3rd of tooth structure when of parents heard grinding of teeth at night, and 136(64.5%) did not hear grinding of teeth at night when only signs of enamel wear were present (Graph 13).

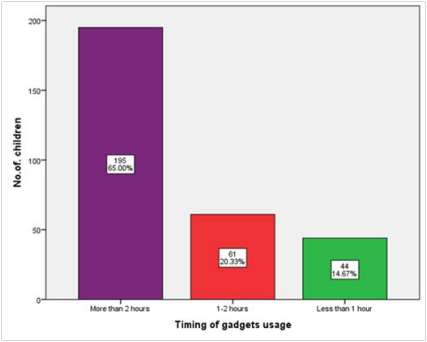
Discussion

Previously our team has conducted numerous original studies [13-26] over the past 6 years. The idea for this present study stemmed due to current interest in our community. Physical activity reduces the stress that aggravates psychophysical problems, our hypothesis was that physically less active children could present more parafunctions and extra facial pain [27].

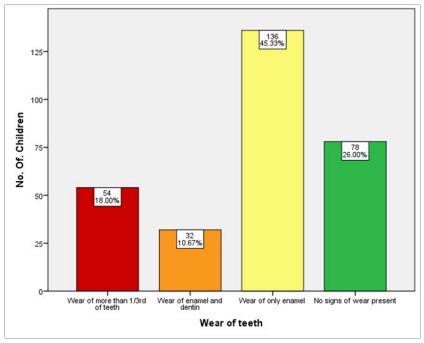
Graph 2. This graph shows the total time spent on physical activity by the children.



Graph 3. This graph shows the total time spent by children using gadgets. A majority 195 (65%) of the children used their gadgets for more than 2 hours. 61 (20.33%) of the children spent 1-2 hours on their gadgets. And 44(14.67%) of the students spent less than 1 hour on their gadgets.



Graph 4. This graph represents the amount of tooth wear seen in the children of the study population. 18% of the children had more than 1/3rd of tooth wear, 10.67% of the children had wear of both enamel and dentin, 45.33% of the children had wear of only enamel, while 26% of the children showed no signs of tooth wear.

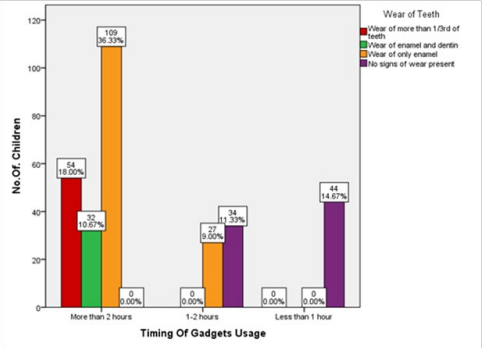


In this study male and female children between the ages of 4 and 6 were considered, male children were more affected by bruxism than female children, which was similar to the results obtained by Sruthi S and Deepa G in their study; whose study population included male and female children from 6 to 12 years of age [28].

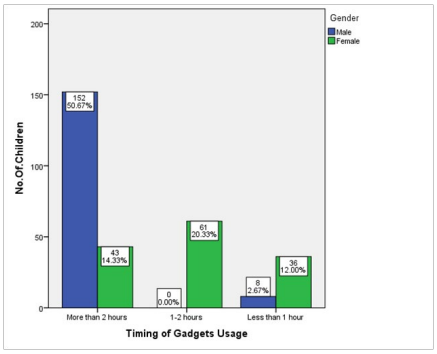
In accordance to the results obtained in this study, the amount of time spent on physical activity by children has a significant association with the parafunctional habits such as bruxism, daytime clenching, and extra facial pain. Children who practiced more physical activity, were less prone to bruxism. However, children who spent more time with gadgets such as the television, video games etc, were more prone to the parafunctional habits such as bruxism, daytime clenching and showed considerable wear of teeth and joint clicks than those who spent lesser time with gadgets. According to the study conducted by, Bonafe et al, 28% felt that they could feel or have heard their child's joint click, which was similar to the study conducted 30% of the children had difficulty in mouth opening after waking up, while studies conducted by Bonafe et al, showed about 36% [29].

Clinical examination of the children's teeth was done by looking the incisors, 50% of the children had some form of teeth wear, while in the study by Carolina Bortoletto et al, 37% of the

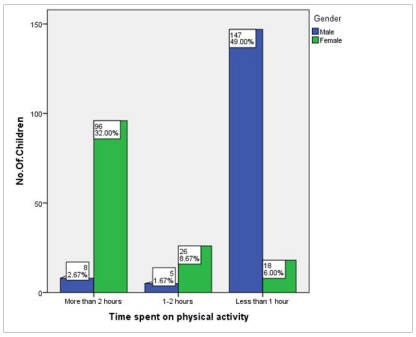
Graph 5. This graph shows the association between signs of bruxism and the timing of gadget use.
The children who had more than 2 hours of physical activity showed significantly less signs of bruxism than children who had less than 1 hour of physical activity. The chi square test revealed significant results. p value = 0.000 which is less than 0.005.



Graph 6. This graph shows the association between gender and the timing of gadget use.
There was a significant difference in the timing of gadget usage between male and female children. P value =0.000, p value lesser than 0.005, 80% of the male children spent more than 2 hours with their gadgets, while only 30.7% of the female children spent more than 2 hours with their gadgets.



Graph 7. This graph shows the association between gender and time spent on physical activity.
There was a significant difference in the time spent on physical activity between male and female children. P value =0.000, p<0.005, 91.7% of the male children got only less than 1 hour of physical activity, whereas 68.5% of female children got more than 2 hours of physical activity.



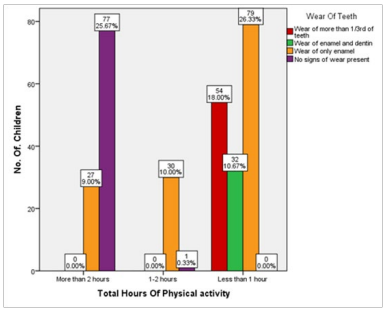
children grind their teeth showed about 40% of the children had nighttime teeth grinding and daytime clenching [30]. Winocur E et al, amongst Isralei adolescents showed that only 20% of the students had sleep bruxism. 28% of the children had clicking sounds in their TMJ which was similar to the results obtained in this study [31].

Children with sleep bruxism may have additional symptoms during the day, such as headaches, earaches, and pain in the mastication muscles. According to Carra et al, sleep bruxism in young children can be associated with muscle fatigue, insomnia, noisy breathing during sleep, and headaches. 15% of the children who participated in this study had discomfit of the jaws, it was relatively higher about 25% in similar studies conducted by Carra et al [32].

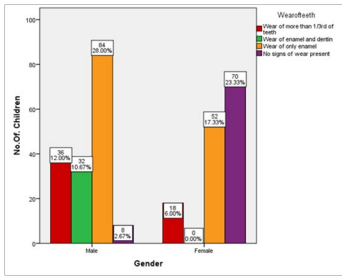
According to the International Classification of Sleep Disorders (ICSD-3), using criteria proposed by the American Academy of Sleep Medicine (AASM), Bruxism belongs to the group of movement disorders present in parasomnias [33]. The aetiology of bruxism is complex and multifactorial, involving systemic, psychological, occupational, and genetic factors. However, the primary pathogenesis is related to the central nervous system (CNS) activities. Evidence suggests that SB occurs in response to excessive micro disturbances and is also related to the patient's quality of sleep. Emotional factors, such as anxiety, seem to be associated with Bruxism. Bruxism is often seen in children and adolescents, with a prevalence of 3.5% and 40.6% [34]. And bruxism can be seen in 13% of adults [35].

50% of the children played for more than one and half an hour after school everyday, 45% of the children played for one and less than one hour everyday after school, while only 5% of the children played for only half an hour free school. According to the study done by Taveras et al, children who played for more than 300 hours per week were about 60% [36]. The most common physical activity done by children participating in this study was running which was 37%, bicycling was 10%, games were 28% and children who liked running, bicycling and games were 24%. In a meta analysis conducted by Bruijins BA et al, it was found

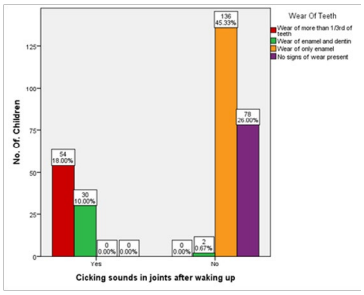
Graph 8. This graph shows the association between signs of bruxism and the total hours spent on physical activity. The chi square test revealed significant results p value = 0.000 which is less than 0.005.



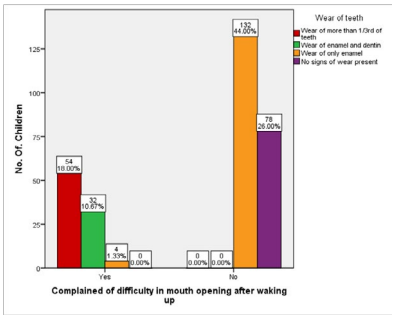
Graph 9. This graph shows the association between signs of bruxism and gender. The signs of bruxism were more pronounced in male children than the female children. But, the majority of the female children showed no signs of bruxism, while a majority of the male children showed signs of enamel wear.



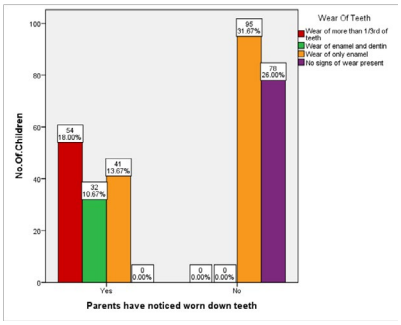
Graph 10. This graph shows the association between signs of teeth wear and clicking sounds of the jaws noticed by the parents. The children's parents noticed clicking sounds in the children's joints after waking up signs when there was more than 1/3rd of teeth wear. While no clicking joints sounds were observed when only enamel wear was present, and no signs of teeth wear were seen. The chi square test revealed significant results p value = 0.000 which is less than 0.005.



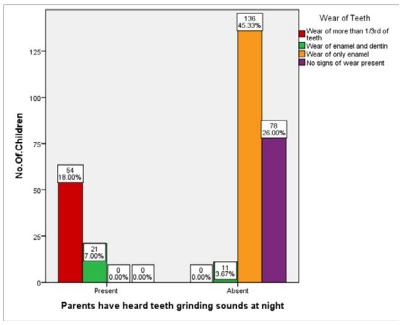
Graph 11. This graph shows the association between signs of teeth wear and difficulty in mouth opening after waking up in the morning. The children's parents noticed that their children had difficulty in mouth opening in the morning after waking up when there was more than rd of teeth wear. While no difficulty in mouth opening was observed when only enamel wear was present, and no signs of teeth wear were seen. The chi square test revealed significant results p value = 0.000 which is less than 0.005.



Graph 12. This graph shows the association between the worn down teeth noticed by the parents and wear of teeth noticed. The chi square test revealed significant results p value = 0.000 which is less than 0.005.



Graph 13. This graph shows the association between hearing of grinding of teeth at night noticed by the parents and wear of teeth noticed. The children's parents heard grinding of teeth at night when there was more than 1/3rd of teeth wear, While no teeth grinding was heard at night by parents when only enamel wear was seen and no signs of teeth wear were seen. The chi square test revealed significant results p value = 0.000 which is less than 0.005.



that the average physical activity for toddlers should be about 3 hours a day [37].

Time spent using gadgets, such as mobiles, Laptops, playstations, TVs was more than 2 hours in 65% of the children, 1 to 2 hours was 15%, less than 1 hour was 20%. In the study by Hosakava Rikuya et al, only 14% of the children used mobile phones for more than one hour, while the rest 86% of the children used their mobile phones for less than one hour [38].

Since physical activity reduces the stress that aggravates psychophysical problems, our hypothesis was that physically less active children could present more parafunctions and extra facial pain. Since bruxism/clenching have a multifactorial origin, they must be analysed with caution because many factors can trigger the onset and not only the absence of physical activity. Practice of physical activity is of paramount importance especially in young children, as it helps in preventing other commonly occurring conditions like obesity and juvenile diabetes.

Conclusion

On the basis of the data collected physical activities can reduce stress of daily life. There is a mild association between the presence of parafunctional habits and the practice of physical activity in children of ages between 4 and 8 years of age. Children who played more had reduced incidence of bruxism. Although both genders showed a medium level of physical activity, the boys were more active than the girls since they devoted more hours of physical activity, during more days of the week, and this difference is statistically significant. Children who spent more time with their gadgets were more prone to bruxism, than children who

spent less time on their gadgets. With its limitations, further well planned clinical trials are essential to give a solid conclusion and bring about correlation between bruxism and physical activity.

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