Short Communication

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The Relationship between Malocclusion and Oral Habits in Children Aged 3–5 Years Old in Kindergartens of Ramsar, Iran

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ABSTRACT

BACKGROUND AND OBJECTIVE: Oral habits are risk factors for the incidence of malocclusion in deciduous teeth. Investigating the factors associated with malocclusion is essential for the policies of public health. The present study was conducted to determine the prevalence of malocclusion and oral habits in children aged 3 – 5 years old in kindergartens of Ramsar, Iran.

METHODS: In this cross-sectional study, 180 children with complete primary dentition and without previous orthodontic treatment were randomly examined in kindergartens of Ramsar. After filling out questionnaires about the oral health of the child by the parents, the intraoral examination was performed using mirror, catheter and periodontal probe in terms of occlusion.

FINDINGS: Malocclusion was observed in 138 children (76.7%), while 80 children (44.4%) had oral habits. There was no significant relationship between total habits and malocclusion. Children with bruxism had a higher incidence of edge to edge overjet, and overbite. There was a significant relationship between bruxism and the condition of overjet and overbite ($p<0.0001$). Of 54 children with bruxism, abnormal overjet in 31.5% of them was edge to edge, in 20.4% of them was increased and in 1.9% of them was reverse, and abnormal overbite in 35.2% of them was edge to edge and in 27.8% of them was deep. There was a significant relationship between finger-sucking habit and open bite dental occlusion ($p<0.004$) and of 16 children with finger-sucking habit, 37.5% were open bite.

CONCLUSION: The results of this study showed that there is no relationship between total oral habits and malocclusion in children.

KEY WORDS: *Bruxism, Children's teeth care, Malocclusion, Epidemiology.*

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Introduction

Malocclusion is an evolutionary anomaly of the teeth or dental arches, and in mild cases, causes a beauty problems and in more severe cases, causes functional damage and dysfunction. Since malocclusion may have a negative social impact due to interference with the quality of life of individuals, preventive and therapeutic measures need to be taken (1).

Sucking behavior of children results from the physiological needs of the child for feeding. Continuing these behaviors may lead to long-term changes in face and intra-oral structures and evolving occlusion. In addition, non-nutritional sucking habits may also be responsible for some forms of malocclusion, such as anterior open bite, posterior crossbite, overjet greater than 3mm, and class II molar and canine relationship (2, 3). Bruxism usually occurs in the sleep, and due to an interference in proper occlusion, people grind their teeth to try to eliminate the disturbing factor. Some studies have found a significant relationship between class II molar relationships and flush terminal plane with bruxism (4).

In one study, the most common oral habits in children were reported to be anterior open bite, increased overjet, class II malocclusion, and posterior crossbite, while non-nutritional sucking habits and tongue thrust were noted as the most important risk factors for the occurrence of these malocclusions (5). Another study showed that more than one third of preschool children had one or two types of malocclusions, and the most common malocclusion was anterior open bite, which was associated with thumb sucking habits (6).

Among Brazilian children, there was a high prevalence of malocclusion associated with harmful oral habits that could affect the teeth system and had a negative and significant impact on the quality of life of children and their families (7). Considering that ages 3 to 12 are proper ages for diagnosis, prevention, or treatment of jaw anomalies and dental anomalies, it is possible to predict possible problems and perform preventive and cross-sectional therapies. In addition, the lack of complete growth in this age group can improve the inappropriate condition of the jaws (8).

Since the number of studies conducted on the incidence of malocclusion and oral habits in children is limited, the present study was conducted to determine the prevalence of malocclusion and oral habits in children aged 3–5 years old in kindergartens of Ramsar, Iran.

Methods

This cross-sectional study was approved by the Ethics Committee of Guilan University of Medical Sciences with the code of ethics IR.GUMU.RASHT.REC.1394.1570, and was conducted among 180 children aged 3–5 years old, selected by cluster sampling from kindergartens of Ramsar. An average of 15 people were considered at any age. The number of required clusters was at least about 12 clusters. Each age was selected through systematic random sampling, so that one group of children at the target age was randomly selected in each kindergarten.

For example, if the number of children selected in each kindergarten was 15, five children were randomly selected from any age. Children were included if they had complete primary dentition, without permanent teeth, lack of interproximal caries or extensive caries. Non-cooperative children and children with systemic disorders such as respiratory problems, congenitally missing teeth, hyperdontia and craniofacial abnormalities, children with enlarged adenoids and children under orthodontic treatment were excluded. The questionnaire consisted of a consent form and information about the child's oral habits (thumb sucking, pacifier sucking, nail biting, biting the lips and cheeks, bruxism, lip sucking, lip biting, using glass baby bottles after the age of two, placing pen or pencil between teeth), age of starting and leaving the habits, duration of habit (only during sleep, only during the day, during the day and night), incidence of habit (during discomfort and anger, when watching TV, when playing computer games, when talking, during sleep) was completed by parents.

Oral clinical examinations were performed by a general dentist in a normal setting. To record overjet, overbite and occlusion type, the child was asked to close his teeth in the centric occlusion (9). The occlusion was examined from two points:

1. **Molar relationship has 3 types:** Flush terminal plan (FTP), mesial step (MS), and distal step (DS)
2. **Canine relationship:** CL I, CL II, CL III.

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The relationship between primary canines was investigated this way: if the cusp of the maxillary canine is parallel to the distal surface of the mandibular canine, the relationship is CL I, if the cusp of the maxillary canine is mesial to the distal surface of the mandibular canine, the relationship is CL II, and if the cusp of the maxillary canine is distal to the distal surface of the mandibular canine, the relationship is CL III (10). The normal overjet was 1 – 3 mm, more than 3 mm was increased overjet, and less than 1 mm was considered edge to edge. The normal overbite was 1–3 mm, less than 1 mm was edge to edge and more than 3 mm was deep bite (11, 12). Data were analyzed using chi-square, Fisher exact and Independent t-test. P<0.05 was considered significant.

Results

Of 180 examined children, 12% were three years old, 30% were four years old and 58% were five years old (55% girls and 45% boys). Most patterns of right and left molar relationship were associated with FTP pattern (56% and 63%, respectively), followed by MS pattern (30% and 22%, respectively).

There was no statistically significant difference between right and left. The highest frequency of relationship between right and left primary canines was related to CL I (67% and 66%, respectively) and the lowest was related to CL III (27%). There was no statistically significant difference between right and left. One hundred six children (59%) had normal overjet, 47 children (26%) had increased overjet, and 27 children (15%) had decreased overjet (edge to edge or reverse overjet). Ninety five children (53%) had normal overbite, 56 children (31%) had deep bite and 29 children (16%) had open bite. In the study population, 21 children had anterior crossbite, and 19 children had posterior crossbite (8.3% unilateral and 2.3% bilateral) (Table 1). The most common malocclusion was abnormal bite (46.7%), followed by abnormal overjet (41.1%). The frequency of malocclusion in girls and boys had no statistically significant difference.

The prevalence of oral habits in the study population was 44.4%. The most common oral habit in children was bruxism (30%) and the least common was lip sucking habit (1.1%). The two habits of nail biting and bruxism showed a significant difference between boys and girls, which was more common in boys than girls (Table 2). There was no significant relationship between total oral habits and malocclusion. No relationship was found between crossbite and oral habits. There was a significant correlation between edge to edge relationship and bruxism habit (p<0.0001); among 54 children with bruxism, abnormal overjet status in 31.5% of them was edge to edge, in 20.4% of them was increased and in 1.9% of them was reversed. Other oral habits did not show significant correlation with overjet (Table 3).

Table 1. Frequency of malocclusion in children aged 3–5 years old in Ramsar

Malocclusion	Frequency N(%)
right primary molar / abnormal	26 (14.4)
left primary molar / abnormal	25 (13.9)
right primary canines / abnormal	62 (34.3)
left primary canines / abnormal	60 (33.3)
abnormal overjet status	74 (41.1)
abnormal overbite status	84 (46.7)
anterior crossbite / abnormal	21 (11.7)
posterior crossbite / abnormal	19 (10.6)

Table 2. Evaluation of the relationship between genders with oral habits in children

Gender / Oral habit	Boy N(%)	Girl N(%)	P-value
pacifier sucking	6(7.4)	3(3)	0.180
bruxism (or clenching)	32(39.5)	22(22.2)	0.012
nail biting	16(19.8)	4(4)	0.001
lip biting	3(3.7)	2(2)	0.494
lip sucking	2(2.5)	0	0.116
thumb sucking	9(11.1)	7(7.1)	0.343

In addition, there was a significant relationship between the overbite and the bruxism habit (p<0.0001); among 54 children with bruxism, abnormal overbite status was edge to edge in 35.2% of them, and deep in 27.8% of them. Other oral habits were not significantly correlated with overbite. Moreover, there was a significant relationship between thumb sucking habit and open bite (p<0.004). Of 16 children with thumb sucking habit, 37.5% were open bite.

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Table 3. Relationship between oral habits and overjet and overbite

Malocclusion	Oral habit	Pacifier sucking N(%)	Bruxism N(%)	Nail biting N(%)	Thumb sucking N(%)
Overjet Status	NORMAL	5(55.6)	25(46.3)	14(70)	6(37.5)
	INCREASED	4(44.4)	11(20.4)	3(15)	7(43.8)
	REVERSED	0	1(1.9)	0	0
	EDGE TO EDGE	0	17(31.5)	3(15)	3(18.8)
	p-value	0.447	0.0001	0.581	0.247
Overbite Status	NORMAL	6(66.7)	20(37)	15(75)	5(31.2)
	EDGE TO EDGE	0	19(35.2)	3(15)	4(25)
	DEEP BITE	3(33.3)	15(27.8)	2(10)	1(6.3)
	OPEN BITE	0	0	0	6(37.5)
	p-value	0.6140	0.0001	0.1490	0.0040

Discussion

In this study, the prevalence of malocclusion in children aged 3–5 years old was 76.7% in kindergartens in Ramsar. In general, there was no relationship between oral habits and malocclusion, but there was a correlation between the edge to edge dental relationship and bruxism habit. In addition, there was a relationship between the thumb-sucking pattern and open bite dental relationship. Considering the position of the thumb in the mouth and the force applied to the anterior teeth, this is completely justifiable. The incidence of malocclusion in different populations has been reported to be between 40.5% and 75.8% (1, 13–16).

The difference in the incidence of malocclusion may be associated with individual characteristics, socio-economic factors, cultural factors and sample size. In this study, the most common malocclusion was abnormal bite followed by abnormal overjet, which is consistent with the study by Cavalcanti et al. (16). In the study of Ranjpour et al. in Qazvin, the prevalence of FTP molar relationship was lower than this study, and the MS relationship was higher, while the prevalence of DS relationship was similar to this study (12).

In the study of Reddy et al., the prevalence of FTP was similar to the present study and the prevalence of MS was 39.2%, while no case of DS was observed (15). The frequency of class III and II of canine relationships in various studies has been reported relative to the study population and different racial and genetic characteristics (12, 17, 18). In the studies of Reddy et al. (15) and Ranjpour (12), the frequency of normal overjet was higher and abnormal overjet was lower than the present study, because in both studies, 1 to 3 mm overjet was considered to be normal. The prevalence of decreased deep bite and overbite in this study was greater than Ranjpour's study (12). The reason for this difference is that decreased overbite is considered below zero, while in the present study, zero overbite (edge to edge) was also considered in the decreased group. In the present study, the prevalence of posterior crossbite was lower than the study of Cavalcanti et al. (16), while the prevalence of edge to edge and anterior crossbite relationship was similar to that of Onyeaso et al. (19) among Nigeria's 3 – 5 – year – old children. The prevalence of oral habits in children aged 3 – 5 years old in Ramsar is 44.4%.

The most common oral habit was bruxism, followed by nail biting and thumb sucking habits. The prevalence of oral habits in various studies has been reported to be varied according to the type of examined habits and the age group of the children. In the study of Franco varas et al. (20), the prevalence of oral habits in children aged 2 – 6 years old was 90.7%, and pacifier sucking and thumb sucking were the most common habits. In the study of RG et al. (21), the prevalence of sleep bruxism among children aged 3–5 years was 14%. In the present study, the awake bruxism and sleep bruxism were evaluated together and according to parents' report based on the sound created during teeth grinding, which is used in most studies (22, 23).

A very diverse prevalence of 8.5% to 55.3% has been reported for bruxism in various studies (24). This difference is due to different age groups and parents' reports of bruxism. The prevalence of bruxism and nail biting in boys is more common than girls. Regarding gender differences, studies have reported contradictory results, and some of them have shown no difference between the genders. Studies show that these habits are correlated with child's anxiety and the higher prevalence of these habits in boys in the present study can be justified by more willingness to play video games, watching more stressful television programs and more

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activity (23). In the evaluation of the relationship between oral habits and malocclusion, the research showed that there was a significant relationship between edge to edge dental relationship and bruxism habit; the prevalence of bruxism was significantly increased in children with edge to edge relationship. The bruxism habit may lead to erosion of the occlusal surface and the incisal edge, and the edge to edge dental relationship can make a person prone to bruxism and dental erosion, and thereby reduce vertical dimension by creating unbalanced dental occlusion.

Other oral habits did not show any significant relationship with overjet status. Due to the limitations of this study in sample collection, it is suggested that more precise studies be carried out considering the increase in the number of samples and considering the severity of habits in the development of malocclusion.

More than half of the children had flush terminal plan (FTP) and the lowest frequency was related to distal step (DS). The prevalence of oral habits in children was 44.4% and the most common habit was bruxism. In general, there was no relationship between total oral habits and malocclusion. Children who had bruxism had edge to edge overjet and overbite with a higher prevalence. There was a relationship between thumb sucking and the open bite dental relationship.

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