Prevalence of Malocclusion among Male School Children in Riyadh City

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Abstract

BACKGROUND: Malocclusion is defined as irregularity of the teeth or a molar relationship between the dental arches beyond the range of what is accepted as normal.

AIM: To determine the prevalence of malocclusion among male school children aged 12-15 years old in Riyadh, Saudi Arabia.

MATERIALS AND METHODS: Five hundred (500) school children in Riyadh city, Saudi Arabia with an age of 12-15 years participated in this study. The prevalence of malocclusion among the students was determined using a clinical examination form specially prepared for this study. The required information was collected from each subject, and descriptive statistics were performed.

RESULTS: The Molar Class I relation involved the highest percentage of the sample (71.2%) while Class II relation involved only 23% which was four times of Class III (5.8%). The maxillary arch crowding was present in 23.2% of the sample which was double than that of spacing. Whereas, the mandibular arch crowding was present in 28% of the sample which was three times more than spacing (8.8%). The open bite was present in 4% of the sample while deep bite was present in 9.6%.

CONCLUSION: The prevalence of malocclusion involved the highest percentage in Class I in comparison with other malocclusions.

Introduction

The high prevalence of malocclusion has made it a public health problem in the world; it is now considered the third highest oral health priority [1][2]. "A malocclusion is defined as irregularity of the teeth or a molar relationship between the dental arches beyond the range of what is accepted as normal [3]. Malocclusion is one of the most common dental problems as well as dental caries, periodontal disease, and dental fluorosis [1]. Also, maloccluded dentition can cause disturbances in oral function and psychosocial problems due to impaired dentofacial [4][5]. The prevalence of malocclusion during the mixed dentition period among different races and populations had been published by many authors [6] [7] [8] [9] [10] [11]. Despite the amount of literature on the subject, no study, to the best of our knowledge, was done across a huge geographically and ethnically identical Saudi male children in Central Region

(Riyadh city) other than the study of the Prevalence of malocclusion and need for orthodontic treatment conducted by Al-Emran et al., (1990) [6]. Therefore, the purpose of this study was to determine the prevalence of malocclusion among male school children aged 12-15 years old in Riyadh city.

Materials and Methods

This cross-sectional study was conducted among 12-15 years old male school children in Riyadh city, Saudi Arabia. Sampling included sample size calculation, determination of age sample, selection of schools and subject. A multi-stage stratified random sampling technique was used in selecting the schools. A group of 500 Saudi male schoolchildren representing those age ranged between 12 and 15 were randomly selected from governmental and

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private school for the study. These schools were categorised into five sections according to the geographic location of different parts in Riyadh City. These were Central (2 schools), Eastern (2 schools), Western (2 schools), Northern (2 schools) and Southern areas (2 schools).

The inclusion criteria were as follows; parent`s and child were originally from Saudi, child`s age between 12 and 15 years old, the child born and lived in the included area and of good health. The exclusion criteria were as follows: children or parents refused to participate in the study, children that have not completed the examination, craniofacial anomalies (clefts and syndromes), who were undergoing or had a history of orthodontic treatment and extracted of permanent teeth, impaction and delayed eruption of permanent teeth.

A full clinical examination was carried out in the school premises using a dental examination kit and special clinical form prepared for this study. During the examination, the following information was collected from each subject: molar relationship, canine relationship, incisors relationship, crowding, spacing, anterior and posterior crossbite, anterior overbite, open bite and overjet.

Ethical approval was officially obtained from the Scientific and Ethical Committee, Riyadh Elm University. After approval, the Riyadh Elm University has sent official letters to the Ministry of Education to justify the purpose and importance of conducting the study; explain the safety of the procedures; confirm the confidentiality of collected data and confirm that the participation is voluntary. Parents of the targeted children were contacted officially through letters which clearly and simply explained the study purpose, procedures, data confidentiality and voluntary participation in the study. All letters were received and signed by the parents of the participated children. Similarly, targeted children, whose offered parents' agreement, were verbally informed about the study purpose and procedures. Any child who has needed dental treatment was referred to Faculty of Dentistry, Riyadh Elm University for treatment.

All Information collected in the clinical forms were transferred into a spreadsheet and subsequently entered into the SPSS (Statistical Package for Social Sciences) software version 21. Descriptive statistics were generated to check for discrepancies and consistencies in the overall data.

Results

What the total number of the students participated in this study was 500 students aged 12-15 years. Table 1 showed the molar relationship of the study sample and the distribution of occlusion. Molar Class I relation involved the highest percentage of the sample (71.2%) while Class II relation involved only 23% which was four times more than Class III.

Table 1: Molar relationship

Type	Class I	Class II		Class III		Total
		Uni	Bi	Unl	Bl	
N=	356	34	81	10	19	500
%	71.2	6.8	16.2	2	3.8	100%
%	71.2	23		5.8		100%

The canine relationship showed the highest value among Class I relationships (68%). Class II bilateral is more than two times of that of unilateral (18.8% and 8% respectively), while bilateral Class III is more than three times of that of Unilateral (4% and 1.2% respectively). In general Class II canine relationship is about 5 times of that of Class III (Table 2).

Table 2: Canine relationship

Type	Class I	Class II		Class III		Total
		Uni	Bi	Uni	Bl	
N=	340	40	94	6	20	500
%	68	8	18.8	1.2	4	100%
%	68	26.8		5.2		100%

Regarding crowding and spacing of both arches (Table 3 & 4), the maxillary arch crowding was present in 23.2% of the sample which is double than that of spacing. Whereas, the mandibular crowding was present in 28% of the sample which is three times more than spacing (8.8%).

Table 3: Maxillary crowding and spacing

Type	normal	Crowding		Spacing		Total
		≤ 2mm	> 2mm	≤ 2mm	> 2mm	
N=	326	76	40	42	16	500
%	65.2	15.2	8	8.4	3.2	100%
Total %	65.2	23.2		11.6		100%

The anterior crossbite was found in 14 individuals who represent 2.8% of the total sample. The posterior crossbite was present in 30 individuals. Additionally, the posterior crossbite was present bilaterally in 23 students (4.6%) and unilaterally in 7 students (1.4%).

Table 4: Mandibular crowding and spacing

Type	Normal	Crowding		Spacing		Total
		≤ 2mm	> 2mm	≤ 2mm	> 2mm	
N=	316	120	20	34	10	500
%	63.2	24	4	6.8	2	100%
Total %	63.2	28		8.8		100%

Table 5 shows the anterior overbite relation. The prevalence of anterior open bite was observed in 4% (n = 20) from the overall subject. The overbite of 0:1/3 of the clinical crown was present in 45.2%, while that of 1/3:2/3 was seen in 41.2% of the sample. Cases of 2/3:3/3 of the deep bite was found in 8.8% of students, whereas, deeper bite (< 3/3 of clinical crown

length) were present in 0.8% only. Vertical relationship of the occlusion on the buccal segment (Posterior open bite) was found 0% (n:0) from the overall subjects.

Table 5: Anterior Overbite and open bite relation

Type	> 0	0: 1/3	1/3: 2/3	2/3: 3/3	< 3/3	Total
N=	20	226	206	44	4	500
%	4	45.2	41.2	8.8	0.8	100%

The sagittal relationship of the jaws (overjet) was summarised in table 6. A reverse overjet was observed in 14 students (2.8%). Normal overjet (0:4 mm) was seen in 377 students (75.4%) while a slight increase in overjet (4:6 mm) was found in 76 students (15.2%). Severe increase in overjet (6:9 mm) was seen in 33 students (6.6%).

Table 6: The overjet relationship

Type	> 0 mm (reverse overjet)	0: 4 mm	4:6 mm	6:9 mm	Total
N=	14	377	76	33	500
%	2.8	75.4	15.2	6.6	100

Discussion

In the present study, Class I molar relation showed 71.2% of the whole sample. This was in agreement with that of other studies conducted in Sweden [7] [8]. Higher proportions were found among Brazilian [9], Tanzanian [1] and Libyan [10] populations, whereas, lesser values were reported in Jordan [11], Kuwait [12], Turkey [13], Iran [14], Italy [15], Croatia [16], Hangiri [17] and Nigeria [18].

Class II division 1 in this study was seen in 17.4% of the sample. This was in line with the results obtained in Jordan [11], while a slightly lower value was seen in Libya [10]. Higher values were recorded among Kuwaitis [12], Turkish [13], Iran [14], Italy [15], Croatian [16], and Hungarian [17], whereas, fewer values were reported among Nigerian [18], Tanzanian [1] and Swedish population [7] [8].

Class II division 2 was 3.4% in this study which is in line with that of Iranian [14]. Fewer values were reported among Libyan [10] and Nigerian populations [18], whereas, higher values were found in Sweden [7] [8], Hungarian [17], and Turkey [13].

Class III cases (5.8%) in this study showed a similar value to that of Libyan [10]. However, it was less than that reported among Kuwaitis [12], Turkish [13], Iranian [14], and Hungarian [17] and higher than that found among Brazilian [9], Swedish [7] [8], Croatia [16], Italy [15], Tanzanian [1] and Jordanian [11].

The Canine relationship in the current study was 68% in Class I. lesser values were reported among Kuwaitis and Nigerian [12] [18]. Class II canine was found to be 26.8 in this study. This was in close relation to that of Nigerians [18] but lesser than that of Kuwaitis [12]. Class III canine was 5.2% in this study which is less than that of Kuwait [12] but higher than that Nigeria [18].

In the current study, crowding of the maxilla showed a lower value than that of the mandible (23.3% and 28% respectively). This was in agreement with the results observed among British [19], Libyan populations [10] and the Maxillary crowding of Sweden [7] [8]. Higher values were seen in Brazil [9], Croatia [16], Italy [15] and Jordan [11], whereas, lower values were seen in Tanzania [1], Hangiri [17], Nigeria [18], and Iceland [20].

In the present study, the spacing of the maxillary and mandibular arches are 11.6% and 8.8% respectively. These are higher than that found among British [19], Icelandic [20], Swedish [7][8] and Croatian populations [16], and lesser then that found among Hungarian [1], Tanzanian [1], Colombian [21], Iranian [14] and Libyan populations [10].

About anterior open bite, the Saudi sample show 4%. This was approximately similar to that found in Kuwait [12], Sweden [7] [8] and Croatia [16]. Very higher values were found among Tanzania [1], Brazil [9], Turkey [13], Colombia [16], British [19], French [22], and German [23], whereas, lesser values were found among Icelandic [20] and Jordanian populations [11]. In the current study, the deep bite (equal to or more than two-thirds of the clinical crown) was found to be 9.6%. Higher values were seen among Caucasian [24], Colombian [21], Nigerian [18], Kuwait [12], Icelandic [20], Turkish [13] and Iranian population [14] whereas, lesser values were seen Tanzanian [1], French [22], German [23], and Chinese populations [25].

Regarding overjet, the normal overjet was seen in 75.4% of the sample. An increase in overjet (4:6mm) was seen in 15.2% while more increase in overjet was seen in 6.6% of the sample. Higher overjet was seen among Caucasian [24], Chinese [25], Colombian [21], Kuwaitis [12], Jordan [11] Turkish [13], Icelandic [20] and German [23]. Lesser overjet were recorded among Tanzanian [1] and the Nigerian population [18]. The reverse overjet in this study was seen in 2.8%. higher values were seen in China [25], Colombia [21], Kuwait [12], Turkey [13], Tanzania [1] and Iran [14], whereas, lesser values were recorded among Jordanian [11], Nigerian [18], German [23] and Caucasian populations [24].

Anterior crossbite was found to be 2.8% in this study. Lesser values were found among Icelandic [20] and Croatian populations [16]. Much higher values were recorded in Jordan [11], Iran [14], Colombia [21] and Germany [23]. The unilateral and bilateral posterior crossbite in this study showed a

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prevalence of 1.4% and 4.6% respectively. Unilateral posterior crossbite showed higher values among Kuwaitis [12], Turkish [13], Iranian [14], Croatian [16], Hungarian [17], Colombian [21] and German [23] populations. Bilateral posterior crossbite showed similar value to that of Turkish [13]. Lesser values were seen among Iranian [14], Hungarian [17], Colombian [21] and Caucasians [24], whereas, the higher value was recorded in Kuwait [12]. From the above, the differences in results could be attributed to the different ethnic groups and also to differences in age distribution as well as the sample size.

In conclusion, (i) the prevalence of malocclusion of Saudi male school children aged 12-15 years showed the highest percentage in Class I in comparison with other malocclusions and (ii) the baseline information outlined in the present study can be appropriately used for the future planning to meet the orthodontic treatment need among the Saudi population.

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