

# Prevalence of malocclusion in 14- 17 years old Adolescents in the Yazd Province, Islamic Republic of Iran

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**Background and aim:** The aim of this study was determining the prevalence of malocclusion amongst the male adolescents of Yazd province and comparing the results with that of other provinces of Iran.

**Materials and methods:** The sample of this epidemiologic study consisted of 1980 male students with age range of 14-17. The prevalence of class I, II, and III malocclusion according to the Angle's classification was determined. Prevalence of Overbite, overjet, crowding and posterior crossbite was evaluated as well.

**Results:** The prevalence of class I, II, and III malocclusion was 50.7, 19.5, and 16.6 percent respectively and normal occlusion was observed in 13.2% of cases. 47 percent of cases had normal overbite. Increased, reduced and edge to edge overbite was seen in 24, 11.9, and 13.1 percent respectively, and 4% had anterior open bite. Overjet was positive in 74.4% and negative in 12.4% of individuals. Prevalence of crowding and posterior crossbite was 40.5% and 10.5% respectively.

**Conclusion:** Class I malocclusion was the most common occlusal relationship in all of investigations done in different geographic districts of Iran.

**Clinical significance:** Determining malocclusion prevalence in each population is prerequisite of making macro policy in health care systems, this study provides information about prevalence of malocclusion in Yazd province and comparing it with that of other geographical districts of Iran.

**Keywords:** Malocclusion, Prevalence, Iran, Descriptive study

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## Introduction

To make macro policy of healthcare programs sufficient information is necessary. Dental care is an important part of healthcare system. Oral and dental indices such as occlusal relations of target groups are necessary for a harmonious dental care program. Identifying different malocclusions and determining the need for treatment in order to allocate appropriate manpower and budget is a prerequisite in every country. Malocclusion is a public concern especially in young populations such as Iranian population<sup>1</sup>. The prevalence of malocclusions is affected by ethnicity; age and method of registration and great variability exist even between various studies conducted on the same population<sup>2</sup>. Many investigations have been carried out on various populations and in overall prevalence of malocclusions have been reported to be in the range of 40-93 per cent<sup>2</sup>. In different geographical districts of Iran types of malocclusion have been studied as well<sup>3-9</sup>, but no study has been done to determine prevalence of malocclusions in Yazd province, therefore the aim of present study was to identify malocclusions in 10 cities of Yazd, the great central province of Iran, and to compare the results with other provinces of Iran.

## Material & Methods

The sample of the present cross sectional descriptive study was consisted of 1980 male students with age range of 14-17 in the academic year of 2005-2006 from public schools of 10 cities (including city of Yazd) of the Yazd province. This province is in the centre of the country, and its administrative center is the city of Yazd.

Sampling method was cluster random. Exclusion criteria consisted of having previous orthodontic treatment, history of maxillofacial surgery, obvious maxillofacial deformities including clefts and syndromes and non-Iranian nationals. Authorization from school unified district and verbal consent from students were obtained prior to study.

Examinations were done by one observer to avoid inter-examiner bias. Antero-posterior occlusal relations,

crowding, overjet, overbite, and posterior cross bite were evaluated. All the examinations were performed at school using natural light, disposable tongue sticks, mouth mirrors, and ruler (to measure overjet and overbite). Overjet, overbite and classification of occlusion were determined at centric occlusion by asking patients to close their teeth after swallowing their saliva and the observations were recorded on a predesigned form. The variables were assessed in the following manner and recorded.

Overjet was referred to as the horizontal distance between labial surface of maxillary and mandibular central incisors while the Frankfort plane was horizontal. If the maxillary incisors were anterior to mandibular incisors the value would be positive, otherwise negative. The overlapping of the incisal third of mandibular incisors by maxillary incisors was considered normal while less or more than that was considered decreased or increased overbite respectively. In case of existence of vertical gap between incisal edges of maxillary and mandibular incisors in centric occlusion, the term open bite and when upper and lower incisors occluded at the incisal edges, the term edge to edge were used.

Anterior or posterior crowding referred to overlapping of teeth or lack of enough space for un-erupted teeth, even without overlapping. This shows the relation between the size of teeth and the size of dental arch.

Diagnosis of posterior cross bite was established when the buccal cusps of maxillary molars or premolars were lingual to buccal cusps of mandibular molars or premolars in centric occlusion unilaterally or bilaterally.

Occlusal relations of individuals regarding molar and canine relations, overjet and overbite, and other dental arch problems were determined based on Angle's classification<sup>10</sup>. According to this classification 4 classes of normal occlusion, classes I, II, and III malocclusion exist.

Following completing examination and data recording, an intra-examiner reliability assessment was conducted by re-examination of 50 randomly selected subjects 4 weeks after first examination, which showed a high reliability ( $r = 0.97$ ,  $p < 0.001$ ).

## Results

Table 1 shows the distribution of different malocclusions according to Angle's classification. The prevalence of normal occlusion, class I, class II division 1, class II division 2, and class III malocclusions was 13.2, 50.7, 14.5, 5, and 16.6% respectively. Positive overjet was seen in 74.4% of cases while negative and edge to edge overjets were recorded in 12.4 and 13.1% of cases respectively (Table 2). In 47% of subjects a normal

overbite was present, while in 24% of cases the overbite was increased and 13.1% had edge to edge overbite. Anterior open bite was observed in 4% of subjects (Table 2). Posterior cross bites were found in 7% of cases unilaterally and 3.5% bilaterally (Table 2). 35.6% of subjects showed anterior crowding and 4.9% posterior crowding (Table 2). Reported prevalence of malocclusion in Iranian different populations at various geographic districts is shown in table 3 which is discussed in details later in discussion section.

**Table 1** Distribution of different malocclusions according to Angle classification

Malocclusion type	No.	%
Normal occlusion	261	13.2
Class I	1004	50.7
Class II division 1	287	14.5
Class II division 2	99	5
Class III	329	16.6

**Table 2** Distribution of overjet, overbite, crowding, and posterior cross bite in the study sample

v	No.	%
<b>Overjet</b>		
Positive	1474	74.4
Negative	246	12.4
Edge to edge	260	13.1
<b>Overbite</b>		
Normal	931	47
Increased	475	24
Reduced	236	11.9
Edge to edge	259	13.1
Anterior open bite	79	4
<b>Crowding</b>		
Anterior crowding	705	35.6
Posterior crowding	98	4.9
<b>Posterior cross bite</b>		
Unilateral	139	7
Bilateral	70	3.5

**Table 3** Reported prevalence of malocclusion (percentages) in Iranian different populations

Authors (year) [reference number]	Geographic district	Study sample age range	Malocclusion type			
			Normal	Class I	Class II	Class III
Sahafian (1978)[7]	Mashhad (North East of Iran)	6-18	4.7	54.9	33.7	12.7
Ramezanzadeh (1996)[8]	Kerman (South East of Iran)	12-16	4.7	69.7	18	7.6
Ravanmehr (1998)[4]	Tehran (capital of Iran)	12-14	16	48	20.8	15.2
Hedayati (1998)[9]	Shiraz (South West of Iran)	13-15	6.7	61.16	21.3	4.46
Atashi (2002)[5]	Tabriz (North West of Iran)	13-15	4	57	21.9	17.1
Ramezanzadeh (2003)[3]	Neishabur (North East of Iran)	12-15	13.17	54	23.2	9.2

## Discussion

One of the most important aspects of the field of dental malocclusion studies is comparing the results of different investigations, although the recruiting different methods of evaluation, indices, and other variables have made it difficult. Despite the fact that Angle classification has limitations and does not cover the vertical and horizontal abnormalities, it has been widely accepted, and the Repeatability and also comparability with other studies are of its advantages <sup>11</sup>.

The prevalence of normal occlusion in this study was 13.2%. In different districts of Iran different results have been reported ranged from 4% in Tabriz (in North West of Iran) <sup>5</sup> to 22.9% in Isfahan (northern to Yazd in geographical center of Iran) <sup>6</sup>. The prevalence of class I malocclusion was 50.7% in this study. The obtained prevalence of normal occlusion and class I malocclusions in the current study were fewer than those of white American children <sup>12</sup>. According to present findings Iranian children had fewer class I malocclusion compared to Danish children <sup>13</sup>. However in different geographic districts of Iran reported prevalence of class I malocclusion range from 41.8 (Isfahan) [6] to 69.7 (Kerman) <sup>8</sup>. The wide range of prevalence of class I malocclusion and normal occlusion in various districts of Iran probably is more pertained to different criteria for

classification of subjects rather than true considerable difference.

Class II malocclusions were found in 19.5% of cases (14.5% division 1 and 5% division 2) in this study which is higher than that of white Americans <sup>12</sup>, Lebanese <sup>14</sup>, and black Africans <sup>15</sup>, but lower than western Europeans <sup>13, 16-18</sup>. The reported prevalence of class II malocclusion in Turks <sup>19</sup> and Egyptians <sup>20</sup> are comparable to the results of current study. Comparing the results of various studies in Iran, it can be found that there is a wide range from 18% to 33.7% for prevalence of class II malocclusion which highest prevalence of class II malocclusion pertains to North-East of Iran (Mashhad) and lowest prevalence is belonged to Kerman, the major city in South-East of Iran.

Class III malocclusion formed 16.6% of cases which is significantly more than the majority of previous reports. The prevalence of class III malocclusion is various among different populations: 1-4% in Caucasians <sup>12, 13, 16, 17</sup>, 4.6-8% in Africans and African Americans <sup>15, 21</sup>, 4-13% in Japanese <sup>22</sup> and 4-14% among Chinese <sup>23, 24</sup>. Results of studies in Iran demonstrate a prevalence range of 4.46% <sup>9</sup> to 17.1% <sup>5</sup> for class III malocclusion. In various districts of Iran the only comparable results to our findings belonged to Tehran (15.2%) <sup>4</sup> and Tabriz

(17.1%) . It seems that the highest prevalence of class III malocclusion, in Iran, is owned by Tabriz and Yazd.

The prevalence of positive, negative overjet and also edge to edge relationship in the current study was 74.4, 12.4, and 13.1 percent respectively, while Ramezanzadeh and Hosseiny<sup>3</sup> in their study done in Neishabour (North East of Iran) reported that 71% of cases had normal overjet, 16.2% had an overjet of 4-6mm, 4.1% had 7mm or more overjet, and also 2.3% and 6.4% had reversed and edge-to-edge horizontal relationships. Borzabadi-Farahani et al.<sup>6</sup> in their study conducted in Isfahan also found 4.4% of cases to have reverse overjet. Regarding the higher prevalence of class III malocclusion in Yazd (this study) and class II in Neishabour<sup>3</sup> and Isfahan<sup>6</sup>, the higher prevalence of reversed and edge-to-edge horizontal incisal relationships in this study seems reasonable.

The prevalence of posterior cross bite in our study was 10.5% which is comparable to the results of Ravanmehr and Rashidi- Birgani in Tehran (10.8%) [4] and Borzabadi- Frahani et al.<sup>6</sup> in Isfahan (12.4%). Posterior cross bite has been found in 9.8% of cases in Turkish subjects<sup>19</sup> and 16.6% in Swedish children<sup>25</sup>.

Normal, increased, reduced, edge to edge and anterior open bite were found in 47, 24, 11.9, 13.1 and 4% of cases respectively. The prevalence of anterior open bite according to our findings is higher than that of reported in Isfahan (1.6%)<sup>6</sup> but higher than reported prevalence of anterior open bite for Neishabour (7.3%)<sup>3</sup> and Tehran (6.6%)<sup>4</sup>.

Crowding which has been reported by Borzabadi-Farahani<sup>6</sup> to be the most common dental anomaly in the maxillary and mandibular arches (75.2 and 73.4 respectively), was found in 40.5% of cases in our study (35.6% of cases with anterior crowding and 4.9% with posterior crowding).

## Conclusion

The prevalence of normal occlusion, class I, class II division 1, class II division 2, and class III malocclusions in this study was 13.2, 50.7, 14.5, 5, and 16.6% respectively. 74.4% of cases had normal overjet and normal overbite was observed in 47% of subjects. Prevalence of crowding and posterior crossbite was

40.5% and 10.5% respectively. Results of different studies in various geographic districts of Iran showed the following ranges for malocclusion types in Iran; 4-22.9% normal occlusion, 41.8- 69.7% class I malocclusion, 18- 33.7% class II malocclusion and 4.46-17.1% for class III malocclusion . Class I malocclusion was the most common occlusal relationship in all of investigations carried out on Iranian population.

The authors declare that there is no conflict of interests regarding the publication of this article.

## Clinical significances

Determining malocclusion prevalence in each population is prerequisite of making macro policy in health care systems; this study provided information about prevalence of malocclusion in Yazd province and made a comparison between former investigations carried out in various geographic districts of Iran to give reader overall knowledge about prevalence of malocclusion in Iran.

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