



## Pattern of Malocclusion in Iraqi Patients Seeking Orthodontic Treatment

**Dr. Nadia B. Al-Ansari, B.D.S., M.Sc.**

### Abstract

**Background:** Malocclusion problems and orthodontic treatment demand is increasing over recent years. In most of the patients, malocclusion carry significant psychological stigma to them and may cause many serious dental esthetic and functional problems. Thus, it is mandatory to assess the epidemiological figures on the pattern of malocclusion to plan and determine the resources needed for planning the appropriate orthodontic treatment. This study aimed to assess the pattern and distribution of malocclusion based on Angle's classification system among Iraqi orthodontic patients.

**Materials and methods:** This study included 474 patients (230 males, 244 females) between the age 13 to 20 years attending the undergraduate Department of Orthodontics at Al-Rafidain University College. Occlusal variables examined were molar relationship, crowding, spacing, buccally displaced canines, deep bite, open bite, anterior crossbite, and posterior crossbite. A descriptive statistics was used to analyze the data and the relationship was studied utilizing "Chi square test ( $p < 0.05$ ) and Fisher's exact probability test".

**Results:** The frequency of "Angle class I, II and III malocclusion" of first molars was 89.66%, 8.22%, and 2.1% respectively. However, no significant differences were found between the sexes in the prevalence of different types of malocclusion except for Class III malocclusion. The percentages of other occlusal traits were crowding 72.23%, spacing 9.88%, deep bite 0.6%, open bite 0.6%, buccally displaced canines 6.82%, anterior crossbite 4%, and posterior crossbite was reported in 3.06%.

**Conclusion:** The Angle's Class I malocclusion with crowding was the most prevalent, followed by Class II malocclusion while the least predominant was Class III malocclusion.

**Keywords:** Prevalence, Angle's classification, pattern of malocclusion.

### Introduction

Malocclusion can be defined as a mal-relationship between the arches in any of the planes or a tooth position anomalies beyond the accepted limits<sup>(1)</sup>. Where the teeth are in abnormal condition in relationship to the basal bone of the alveolar process, to the adjacent teeth and/or to the opposing

teeth<sup>(2)</sup>. Amongst the problems of dental public health globally, WHO reports pointed out that malocclusion are third in the ranking priorities just exceeded by dental cavity and periodontal problems<sup>(3)</sup>.

However, recently more attention was dragged to this issue with the

reduction of dental caries in children and adolescents <sup>(4)</sup>. The impact of malocclusion is documented to be great on both personal and society basis <sup>(5)</sup>. As, the well- alignment of teeth do not only contributes to the health of the oral cavity and stomatognathic system, but their disturbances can lead to psychological and social complications <sup>(6)</sup>.

In up-to-date era, the orthodontic treatment needs are growing as patients have become more apprehensive about their esthetics. Thus, assessing records epidemiologically with regard to malocclusion pattern and its distribution to organize the important means for orthodontic management is important <sup>(7)</sup>. The frequency and pattern of malocclusion had been amalgamated in the National Health worldwide to gather valued data to design treatment amenities in orthodontic field <sup>(8-11)</sup>.

We conducted this study to define the prevalence of malocclusion characteristics based on "Angle's classification of molar relationship" and to give numerical data regarding the pattern of dentofacial features in Iraqi orthodontic patients with the gender distribution of occlusal difference. These valuable information will be useful in comparing with those of others in forthcoming. Furthermore, it will be helpful in arranging treatment necessities in specialized orthodontic centers.

## Materials and methods

This "retrospective cross-sectional study" was done in Iraq/ Baghdad at Al-Rafidain University College. The sample consisted of 474 patients belonging to different areas of Iraq (230 males and 244 females) falling in the age group of 13-20 years, were examined in the outpatient orthodontic clinic in the period from October 2013 to October 2016. A pre-study patient's

approval was assigned. The selection criteria was patients with full permanent dentition, no previous history of orthodontic correction of teeth, no history of any systemic disease, craniofacial deformities/syndrome, trauma or any surgical procedure that could affect occlusion. Oral examinations were accomplished by a single trained examiner in the Dental Out Patient Clinic.

Examination was performed on dental chairs, under good illumination by using dental mirror, probe and a metal ruler or a millimeter graded vernier to measure the crowding, spacing, and overbite to the nearest whole millimeter. In order to offer direct lateral view of the "dental occlusion", patient's cheeks were fully retracted. Diagnostic criteria included the sex, age, type of malocclusion classified according to "Angle's" proposed method <sup>(12)</sup>. In which the sagittal molar relationship based on the buccal groove of the mandibular first molar in relation to the mesiobuccal cusp of the maxillary first molar during maximum intercuspation were classified as :

**Class I (neutral occlusion):** The maxilla and the mandible have a normal sagittal relationship. In which the mesiobuccal cusp of the first maxillary permanent molar occludes in the mesiobuccal groove of the first lower permanent molar. However, they showed one or more of the following characteristics: crowding, spacing, rotation, deepbite, open bite, crossbite.

**Class II (Distocclusion):** The mandible is retruded in relation to the maxilla. In which, there is a distal occlusion of the mesiobuccal groove of the first permanent molar to the

mesiobuccal cusp of the upper first permanent molar.

**“Class III (mesiooclusion)”:** In which the mandible is protruded in relation to the maxilla. The mesiobuccal groove of the lower first permanent molar occludes mesial to the mesiobuccal cusp of the upper first permanent molar.

Localized teeth problem such as crowding, spacing, canine displacement, anterior open bite, increased overbite were included and recorded in the study using the records and dental casts of the patients.

Crowding in the incisor region was documented when dental arch deficiency of 2 mm or more exists to accommodate all four incisors in normal alignment, and spacing considered when there is a dental arch excess in the incisor region between the right and left canines of 2 mm or more<sup>(4,13)</sup>.

When the maxillary or the mandibular canine displaced bodily from the ideal arch line by more than 1mm in a buccal direction it was registered under ‘buccal canine displacement’<sup>(13)</sup>.

Overbite value between 0 to 3mm was considered normal, while values greater than 3mm was recorded as deep bite, when lack of vertical overlap between the opposing incisors was detected (less than 0) it was registered as an open bite<sup>(14)</sup>.

Crossbite which represents an irregularity in the transverse direction was also assessed and documented with regard to it’s position in the dental arch, being posterior or anterior.

The collected data was descriptively analyzed to assess the malocclusion prevailing frequencies and percentages. The association between the malocclusion and gender was tested using Chi-square, and Fisher test. All the aforementioned

analysis was performed using SPSS version 21.

## Result

The entire sample enrolled in this study were 474, among them 48.5% were male patients and 51.5% were female patients. However, no significant differences were found among both gender as shown in Table 1.

The distribution of malocclusion pattern is presented in table 2 which demonstrates that Angle’s Class I malocclusion was the most predominant (89.6%), Class II malocclusion was found in 8.22% of the patients and class III was recorded in 2.1%. Non- significant gender difference was noted, except for the class III malocclusion individuals which was most prevalent in males ( $P < 0.05$ ).

Table 3 represent the distribution of other localized occlusal traits. Crowding of the anterior teeth were reported to have 72.23%, while spacing was registered in 9.88%. Increased over bite and open bite were equally detected in 4 (0.8 %) patients of the sample only. Respondents with buccally displaced canines were seen in 6.82%.

Anterior crossbite existed in 4% of the subjects, and posterior crossbite was demonstrated in 3.06%.

## Discussion

As this study was based on subjects seeking orthodontic treatment and not targeted towards the general population the prevalence of normal occlusion was excluded from our study. The study was performed on patients with full set of permanent teeth, and not targeted towards mixed dentition subjects patient because according to Baume et al .<sup>(15)</sup> the mixed dentition

stage has a dynamic nature and many occlusion problems during this stage are self-correcting with time.

Regarding the sex distribution, despite the number of females in the current study was marginally higher than males. However, no significant statistical differences were found. This indicates a similarity in the level of awareness and interest between both sexes. However, these observations are contrasting the

study of "Syono et al" <sup>(16)</sup> where females were concerned about their appearance to a greater extent, and showed higher attitude for correcting their dental irregularities.

Though Angle's classification has certain limitations in which it does not include vertical and/or transversal discrepancies but still it is a commonly recognized method which is proven to be dependable, repeatable and has successfully minimizes the examiner subjectivity <sup>(17)</sup>. Thus, it was used in the current study as a base to classify the different types of malocclusion.

The Class I molar relationship type was most prevalent and frequently observed in Iraqi patients in orthodontic clinics, but with no significant gender differences. The next common malocclusion observed was Class II malocclusion, similarly with no significant sex variances, followed by Class III. These results coincide with the Aniket et al's study <sup>(14)</sup>, and with many other previous studies<sup>(18,19,20)</sup>. However, it contradicts the results of Hameed et al. <sup>(21)</sup>, Ijaz A<sup>(22)</sup>, and Erum et.al.<sup>(23)</sup>, who demonstrated Angle's Class II as the predominant pattern of malocclusion. This variation could be explained by with the fact that different population group and size was selected in the current study. The least prevalent sagittal relationship found was Angle's Class III (2.1%) which is almost the same as reported by Haynes

(2.5%) <sup>(24)</sup>. However, higher rates were registered by Proffit et al (5.7%) <sup>(25)</sup>, and Nazir R et al. <sup>(26)</sup> (7.68%). Despite a significant gender difference was found among class III malocclusion patients but it still needs further studies with larger sample size to confirm.

The most frequent localized teeth anomalies found was the crowding which reflects the high prevalence of the teeth size- arch length discrepancy among the study respondents. This result complied with the findings of Aniket et al.<sup>(14)</sup>, Gelgor et al.<sup>(27)</sup>, and Thilander et al. <sup>(28)</sup>, who stated that crowding is one of the most commonly observed anomaly. Also, such observation may indicates that crowding problems is one the most strong motivational factors influencing the Iraqi patients to seek orthodontic treatment as it obviously affects their esthetic appearance.

The prevalence of spacing found in the current study (9.88%) which is nearly the same as reported by Al-Huwaizi (9.9%) in 2002<sup>(29)</sup>, but it is noticeably less than those described by Thilander et al. (25.9%) <sup>(28)</sup>. This dissimilarity could be due to differences in the sample size, and subjects' selection criteria as his study included a randomly selected patients that attended the Dental Health Service.

The least prevalent occlusal traits found was among the vertical anomalies including deep bite and open bite cases which was found only in 0.8% of the cases. These rates are much lesser than those reported by Garbin et al (3.41%) <sup>(4)</sup>, and Al-Huwaizi (2.2%) in 2005<sup>(30)</sup>. This difference is most probably due to the different sample size and criteria used in these previous studies.

In the present study 29 (6.8 %) respondents with buccally displaced canines were found. This prevalence was almost the same as reported by Al-

Huwaizi (6.5%)<sup>(31)</sup>. However higher rates were recorded by Hayder et al (9.72%)<sup>(32)</sup>, Ghaib (8.36%)<sup>(33)</sup>, "Al-Chalabi" (4.6%)<sup>(34)</sup>, and Aziz (10.8%)<sup>(35)</sup>, which can be explained by the difference in both sample size and subjects selection.

In our study, crossbite occurrence was nearly similarly dispersed in the "anterior" and "posterior segments". These rates are coincide with those reported by Kinaan (4.38%) in 1986<sup>(36)</sup>. Nevertheless, its prevalence was less than those reported by Farah (10.9%)<sup>(37)</sup>, Willem's study (15%)<sup>(38)</sup>, and Oshagh et al (19%)<sup>(39)</sup>. Such findings indicates that Iraqi patients need to be more motivated to increase their awareness about the importance of their proper occlusal function.

## Conclusion

Our study revealed that the Class I malocclusion associated with crowding problems is the most prevalent and frequently observed problem among Iraqi patients seeking orthodontic treatment followed by Class II malocclusion, while the least demonstrated was Class III malocclusion. These findings provides valuable information that could help to prepare all the required manpower and resources to successfully cover all the treatment necessities in the Iraqi Dental specialized centers.

## Limitations

This study is a cross-sectional hospital built survey thus, it may not reveal the dominance of malocclusion of the whole Iraqi population. Further studies that repeated on regular episodes are essential to give specific assessments of the orthodontic treatment needs in Iraqi population.

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Table 1: Sample distribution according to gender

Gender	No.	%	Binomial test
Males	230	48.5	0.550 (NS)
Females	244	51.5	
Total	474	100	

Table 2: Distribution of malocclusion pattern

Categories		Descriptive	Gender			Gender differences	
			Males	Females	Total	Chi-square	Sig.
CLASS I	with	NO.	204	221	425	0.451	0.502 (NS)
		%	48	52	89.66		
		% of Total	43.03	46.62			
	without	NO.	26	23	49		
		%	53.06	46.93	10.34		
		% of total	5.49	4.85			
CLASS II	with	NO	17	22	39	0.414	0.520 (NS)
		%	43.58	56.41	8.23		
		% of total	3.59	4.64			
	without	No.	213	222	435		
		%	48.96	51.03	91.77		
		% of total	44.94	46.84			
CLASS III	with	No.	8	2	10	Fisher test=5.985	0.017 (S)
		%	80	20	2.1		
		% of total	1.68	0.42			
	without	No.	222	243	464		
		%	47.84	52.37	97.89		
		% of total	46.84	51.26			

Table (3): Distribution of Other occlusal traits present

Variables	Categories	Gender						Total		
		Males			Females					
		NO.	%	% Total	NO.	%	% Total	NO.	%	% Total Sample No.
crowding	with	156	50.8	36.70	151	49.18	35.52	307	72.23	64.76
	without	296	69.64	62.44	274	64.47	57.80	118	27.76	24.89
spacing	with	17	40.47	4.00	25	59.52	5.88	42	9.88	88.60
	without	187	48.82	44.00	196	51.17	46.12	383	90.11	80.80
Deep bite	with	3	75	0.70	1	25	0.23	4	0.9	0.8
	without	422	99.29	89.02	424	99.76	89.45	421	99.05	88.81
Open bite	with	2	50	0.47	2	50	0.47	4	0.9	0.8
	without	423	99.52	89.24	423	99.52	89.24	421	99.05	88.81
Buccally displaced canine	With	14	48.27	3.29	15	51.72	3.52	29	6.82	6.11
	Without	190	47.97	44.71	206	52.02	48.47	396	93.17	83.54
Anterior cross bite	With	7	41.17	1.64	10	58.82	2.35	17	4.00	35.86
	Without	197	48.28	46.35	211	51.71	49.64	408	96.00	86.07
Posterior cross bite	With	5	38.46	1.18	8	61.53	1.88	13	3.06	27.42
	Without	199	48.30	46.82	213	51.69	50.12	412	96.94	86.91