

PREVALENCE OF MALOCCLUSION AND ITS RELATION WITH CROWDING AND SPACING

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ABSTRACT

Study was carried out to determine the prevalence of malocclusion and its relation with crowding and spacing in orthodontically referred patients in a Karachi sample.

1082 patients were examined (362 males and 720 females) over the period of three years. Malocclusion was categorized according to Angles classification. Study model of each subject was used to assess crowding & spacing in both maxillary and mandibular dentition. Chi Square test was used to find relationship of crowding & spacing with different categories of malocclusion.

Class II division 1 was most prevalent type of malocclusion (32%). Relation of maxillary & mandibular crowding or spacing with different categories of malocclusion was found to be statistically significant ($p < 0.05$). Mild maxillary crowding, mild mandibular crowding & mild mandibular spacing were most common finding in all malocclusion categories. Except for Class III malocclusion category, where moderate maxillary spacing was more prevalent, mild maxillary spacing was most frequently observed in remaining categories.

Class II was most prevalent category of malocclusion. Relationship of crowding & spacing with different malocclusion categories was statistically significant.

These results do not necessarily reflect the trend of entire Pakistani population as study was conducted in southern Pakistani population.

Key Words: Angles Classification, Malocclusion, Prevalence, Crowding, Spacing.

INTRODUCTION

Edward Angle in 1899 coined the term malocclusion referring to teeth that were twisted or unevenly arranged. According to him normal occlusion is when mesiobuccal cusp of maxillary first permanent molar

occludes with mesiobuccal groove of the mandibular first permanent molar and both maxillary and mandibular teeth are arranged in line of occlusion.¹ In 1987 WHO included the term malocclusion under the heading of Handicapping Dento Facial anomaly which they defined as any anomaly causing deformity or hindrances with function of a person. Treatment of these anomalies is required if deformity or functional defect causes any interference in emotional or physical well-being of patients.² Malocclusion is variation from ideal occlusion that may be considered aesthetically unpleasing but it is neither normal nor unhealthy.^{3,4} It is imperative not to associate presence of malocclusion with the need for treatment. Need for treatment must be evaluated in accordance with aesthetics, dental health & functional demands of a patient.⁵ Numerous studies have been carried out in the past to determine prevalence of various types of malocclusion in different populations.⁶⁻³⁸ Comparing results of previous studies which were conducted in a population of similar origin is

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not possible as they may show significant variation. Duration of study, variation in sample size, period during which samples were collected & differences of opinion between examiners in establishing boundaries of normality are some factors that can affect results of any study.³⁹

The objectives of this study were:

- 1 To determine prevalence of different types of malocclusions in orthodontically referred patients.
- 2 To determine relation of maxillary & mandibular crowding or spacing with different malocclusion categories.

METHODOLOGY

A cross-sectional study was carried out from January 2011 to March 2014 on patients who were referred to orthodontic department. All patients had permanent dentition. None of the subjects had extractions of permanent teeth, previous orthodontic treatment, congenital malformations like Cleft lip or/and palate. In addition to the clinical examination, study casts in centric occlusion were evaluated for assessment of crowding or spacing in every patient. Subjects examined for malocclusion were placed in one of the categories mentioned in Table 1. Each subject assessed for crowding or spacing was placed in one of the categories mentioned in to Table 2. Chi-square test was used to find relationship of crowding & spacing with different malocclusion categories. P value less than 0.05% was considered statistically significant. Data tabulation and analysis was processed using statistical program for social sciences (SPSS) version 20 software.

RESULTS

Out of 1082 patients examined, 362 (33.5%) were males and 720 (66.5%) were females. Mean age of sample was 21years with standard deviation of + 3.3 years.

MALOCCLUSION

Class II malocclusion was most prevalent malocclusion category present in 636 patients (58.8%) which included all its types (Table 3). Among different types of Class II malocclusion, Class II Division 1 was most prevalent malocclusion observed in 346 patients (32%). Class III malocclusion was least commonly observed, found only in 132 patients (12.2%). Chi - Square test revealed that relation of maxillary and mandibular crowding or spacing with different malocclusion categories was statistically significant (P<0.05).

DENTAL ARCH CROWDING

51.6% of subjects had maxillary crowding (Table 4) while 59.9% had mandibular crowding (Table 5). Mild

TABLE 1: ANGLES CLASSIFICATION OF MALOCCLUSION⁴⁶

- 1 Class I Category: Class I molar relationship in centric occlusion, overjet up to 2-4 mm.
- 2 Class II Category: Class II molar relationship in centric occlusion
 - i Class II division 1: Class II molar relationship in centric occlusion; overjet more than 4 mm with proclined maxillary incisors.
 - ii Class II, division 2: Class II molar relationship in centric occlusion; overbite more than 4 mm with retroclined two or more maxillary incisors.
 - iii Class II subdivisions: Molar classification is different on the right and left side. On one side molar classification is Class I and the other side is Class II.
- 3 Class III Category: Class III molar relationship in centric occlusion; negative overjet in all anterior teeth.
 - i Class III subdivisions: Molar classification is different on the right and left side. On one side molar classification is Class I and the other side is Class III.

TABLE 2: CROWDING / SPACING CATEGORIES²⁹

- 1 Normal: Crowding / Spacing = 0-1mm
- 2 Mild: Crowding / Spacing = 2-3 mm
- 3 Moderate: Crowding / Spacing = 4-6 mm
- 4 Severe: Crowding / Spacing = > 7 mm

TABLE 3: DISTRIBUTION OF MALOCCLUSION IN STUDIED POPULATION

Malocclusion Categories		n (%)
Class I Malocclusion Category		314 (29.0%)
Class II Malocclusion Category	Class II Division 1	346 (32.0%)
	Class II Division 2	56 (5.2%)
	Subdivision II Right	130 (12.0%)
	Subdivision II Left	104 (9.6%)
	Total	636 (58.8%)
Class III Malocclusion Category	Class III	84 (7.8%)
	Subdivision III Right	20 (1.8%)
	Subdivision III Left	28 (2.6%)
	Total	132 (12.2%)

maxillary & mandibular crowding was most common finding in all malocclusion categories.

DENTAL ARCH SPACING

30.1% of subjects had maxillary spacing (Table 4) while 22.4% had manbibular spacing (Table 5). Mild

TABLE 4: CROSS TABULATION OF MAXILLARY CROWDING & SPACING WITH DIFFERENT MALOCCLUSION CATEGORIES

Malocclusion Categories	Normal	Crowding			Spacing			Total	Chi-Square P value
		Mild	Moderate	Severe	Mild	Moderate	Severe		
Class I category	58 (18.5%)	68 (21.7%)	46 (14.6%)	30 (9.6%)	60 (19.1%)	46 (14.6%)	6 (1.9%)	314	0.001
			144 (45.9%)		112 (35.7%)				
Class II category	118 (18.6%)	154 (24.2%)	136 (21.3%)	48 (7.5%)	108 (16.9%)	60 (9.4%)	12 (1.8%)	636	
			338 (53.1%)		180 (28.3%)				
Class II category	22 (16.7%)	44 (33.3%)	20 (15.1%)	12 (9.0%)	14 (10.6%)	18 (13.6%)	2 (1.5%)	132	
			76 (57.6%)		34 (25.8%)				
Total	198 (18.3%)	266 (24.6%)	202 (18.7%)	90 (8.3%)	182 (16.8%)	124 (11.5%)	20 (1.8%)	1082	
			558 (51.6%)		326 (30.1%)				

TABLE 5: CROSS TABULATION OF MANDIBULAR CROWDING & SPACING WITH DIFFERENT MALOCCLUSION CATEGORIES

Malocclusion Categories	Normal	Crowding			Spacing			Total	Chi-Square P value
		Mild	Moderate	Severe	Mild	Moderate	Severe		
Class I category	57 (17.2%)	70 (22.3%)	64 (20.3%)	42 (13.3%)	44 (14%)	40 (12.7%)	0 (0%)	314	0.001
			176 (56.1%)		84 (26.8%)				
Class II category	112 (17.6%)	196 (30.8%)	134 (21%)	56 (8.9%)	84 (13.2%)	46 (7.2%)	8 (1.2%)	636	
			386 (60.7%)		138 (21.7%)				
Class II category	26 (19.7%)	46 (34.9%)	28 (21.2%)	12 (9.0%)	12 (9%)	6 (4.5%)	2 (1.5%)	132	
			86 (65.2%)		20 (15.2%)				
Total	192 (17.7%)	312 (28.8%)	226 (20.8%)	110 (10.1%)	140 (12.9%)	92 (8.5%)	10 (0.91%)	1082	
			648 (59.9%)		242 (22.4%)				

maxillary spacing was most common finding in all malocclusion categories except for Class III category, where moderate spacing was more common. Mild mandibular spacing was most frequently observed in all malocclusion categories.

DISCUSSION

Epidemiological surveys conducted on regular basis may give significant information about changes in pattern and prevalence of malocclusion which can be helpful in planning & provision of treatment. Angles classification had been topic of multiple discussions in literatures^{57,58} as it does not involve vertical and transverse abnormalities, but it is still globally accepted system that reduces subjectivity. According to

our results, Class II malocclusion was most prevalent category of malocclusion & Class II division 1 was most prevalent type of malocclusion. These results are in agreement with previous studies conducted in Pakistan by Gul-e-Erum⁴⁰, Sakrani⁴¹ and Shah⁴² but studies conducted by Shahzad⁴³ and Afzal⁴⁴ reported Class I malocclusion as most common type of malocclusion present in sample of Pakistani population. Results of different studies conducted in population of similar origin, to determine prevalence of malocclusion, may show great variability.³⁹ However, Soh⁴⁵ reported that in Asian men Class II malocclusion is more frequent than Class I & III malocclusion.

Results of current study showed that Class II subdivision (21.6%) is more prevalent than Class II division

2 (5.2%), which is in agreement with various studies conducted around the globe.⁴⁸⁻⁵² Higher frequency of Class II subdivision right side (12%) than left side (9.6%) observed in current study is also consistent with studies conducted by Aslam⁵³ and Hussain.⁵⁴

Class I malocclusions was observed as second most prevalent category of malocclusion (29%). These results are in agreement with previous studies conducted in Pakistan.⁴⁰⁻⁴² Sayin³⁹ reported Class I malocclusion as most prevalent malocclusion in orthodontically referred Turkish patients. Onyeaso⁵⁶ also reported Class I malocclusion as most prevalent type of malocclusion in Nigerian patients.

Class III malocclusion was least common type of malocclusion seen in current study. El-Mangoury⁵⁵ reported that Class III malocclusions are most common in Oriental populations. Yang⁴⁸ reported that over the period of time, percentage of Class III malocclusion is increasing & that of Class I is decreasing in orthodontic patients visiting National University Hospital in Seoul.

Relationship of crowding & spacing with different malocclusion categories in Pakistani population is not very well documented. It may provide important information about the characteristics of malocclusions and can be useful in developing treatment strategies. In current study, 51.6% of subjects had maxillary crowding while 59.9% had mandibular crowding. Mild maxillary & mandibular crowding was the most common finding in all malocclusion categories. Study conducted by Gul-e-Erum⁴⁰ in sample of Pakistani population reported that mild maxillary crowding was the most common finding in all malocclusion categories while mild mandibular crowding was most frequently recorded in all malocclusion categories except for Class I category, where moderate and severe crowding were equally prevalent. Nanjannawar⁴⁷ stated that in sample of Indian patients 40% of subjects had maxillary crowding while 50.4% had mandibular crowding. She also reported that mild maxillary crowding was most commonly seen in all malocclusion categories except for Class I category, where severe crowding was more common while in mandible mild crowding was most frequently observed. Sayin³⁹ reported that moderate maxillary and mild mandibular crowding were most commonly recorded in all malocclusion categories in orthodontically referred Turkish population.

In current study, 30.1% of subjects had maxillary spacing while 22.4% had mandibular spacing. Mild maxillary spacing was most frequently observed in all malocclusion categories except for class III category where moderate spacing was more common. Mild mandibular spacing was most frequently recorded in all malocclusion categories. Gul-e-Erum⁴⁰ reported that mild maxillary spacing was most frequently recorded in all malocclusion categories except for Class II category; where mild, moderate and severe spacing had equal prevalence. She also reported that mild mandibular spacing was most commonly observed in all malocclusion categories except for Class I category;

where mild, moderate and severe spacing had equal prevalence. Nanjannawar⁴⁷ reported that maxillary spacing was observed in 50.4% of subjects while 18.4% had mandibular spacing. Results of her study showed that mild mandibular spacing was most common finding in all malocclusion categories but in maxillary arch, severe spacing was recorded most frequently in Class I category, mild spacing was most frequently observed in Class II category, while in Class III category both mild and moderate spacing were equally prevalent.

CONCLUSION

Class II was most prevalent category while Class II Division 1 was most prevalent type of malocclusion.

Relationship of crowding and spacing with different malocclusion categories was found to be statistically significant ($p < 0.05$)

Mild maxillary and mandibular crowding and mild mandibular spacing was most frequent finding in all malocclusion categories. Except for Class III malocclusion, mild maxillary spacing was most frequently recorded in remaining categories of malocclusion.

This study was conducted in southern Pakistani population and these results do not necessarily reflect the trend of entire Pakistani population.

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