

## FREQUENCY OF MALOCCLUSION AMONG 12 -15 YEARS OLD SCHOOL CHILDREN IN THREE SECTORS OF KARACHI

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### ABSTRACT

*This study was done to explore the prevalence of malocclusion among 12-15 year old school children and to determine the differences of malocclusion status in gender. A cross sectional study was conducted in which a total of 1200 school children were examined. Out of these 718 students fulfilled the inclusion criteria using a non-randomized purposive sampling technique. The study was conducted during the period of 2009-2011 in Karachi schools (Bahadurabad, Nazimabad and Gulshan-e-Iqbal areas). Each individual was assessed visually with a millimetre ruler for the presence of different occlusal traits (normal occlusion, Class 1, Class 2 division 1, Class 2 division 2 and Class3 malocclusion) overjet (OJ), overbite (OB), crowding, midline diastema and cross bite. Gender dimorphism was analysed using descriptive statistics and Chi-square test by using computer software (SPSS version 16.0). Out of all the occlusive traits, Class 1 malocclusion and overbite was dominant feature in females. The baseline data explained in the present study can be utilized for the future planning of orthodontic treatment needed among the population.*

**Key Words:** Prevalence, Malocclusion, Angles classification, Overjet, Overbite, Crowding, School children.

### INTRODUCTION

The ever increasing need for orthodontic treatment in children has made it crucial to determine and evaluate different types of malocclusions among them,<sup>1</sup> because malocclusion is the second most common dental anomaly after caries.<sup>2</sup> Malocclusion, in turn, can be defined as the malrelationship between arches in any plane or a condition characterised by anomalies in tooth position, number, form and developmental position of teeth beyond normal limits.<sup>3</sup>

The prevalence of malocclusion, has been seen to vary from 11% to 93% in different researches conducted by Vig KW,<sup>4</sup> Willems G,<sup>5</sup> Gelgö IE<sup>6</sup> in Antolia, Massler M<sup>7</sup> in Cicero, Grewe JM<sup>8</sup> in India, Garner et al<sup>9</sup> in Black Americans and Baek et al<sup>10</sup> in Korean subjects.

Such diversity in results may be due to the method adopted to evaluate, describe and classify occlusion. The diagnostic criteria is hence of prime importance in such studies.<sup>11</sup>

There are many methods available to classify occlusion, both quantitatively and qualitatively, whereby qualitative variables define only the presence or absence of a trait. Angle's method is the most popular qualitative epidemiological tool used for assessing malocclusion<sup>12</sup> hence we have adopted the Angle's method of classification, which not only describes malocclusion but also divided into further classes which is practical and easier to use.<sup>5</sup>

Though a couple of studies have been conducted in Pakistan in regard to the occurrence of malocclusion<sup>13,14</sup> but still there is a dire lack of information regarding frequency of different types of malocclusion, particularly in children of this age group.

The purpose of this study was to bridge the knowledge gap regarding prevalence of different types of occlusal traits (Class 1 normal occlusion, Class 1, Class 2 division 1, Class 2 division 2, and Class3 malocclusion), crowding, overjet (OJ), overbite (OB), midline

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diastema, and cross bite in children between the age of 12-15 years and by comparing the same between male and female, which will in turn help in deciding the treatment needs specific to them.

**METHODOLOGY**

No previous orthodontic treatment done, secondary dentition present with no remaining deciduous teeth, first permanent molars erupted and age 12-15 years old was regarded as the inclusion criteria.

The sample consisted of 718 adolescents, 297 (41.4%) boys and 421 (58.6%) girls, with a mean age of 13.37 ± 1.056 (SD) years. The schools selected included public and private schools in order to have subjects from wide socio-economic class. Authorisation was sought and obtained from the schools' administrators and the

parents who agreed to have their children examined gave informed consent.

The study was conducted over the period of 2009-2011. All the clinical examination was done in children's classroom utilising mouth mirror, wooden spatula and a millimetre ruler with illumination provided by natural light. Assessment of the anteroposterior relationship of the dental arches was based on occlusal traits (Angle classification). The occlusion of the first premolars and the canines was used to confirm the anteroposterior relationship in each instance. The cheeks were fully retracted to obtain a direct lateral view of Angles Class 1, Class 2 division 1, Class 2 division 2, and Class 3 malocclusion on each side and visual observation was done through direct and indirect vision to detect Class 1 normal occlusion. The characteristics assessed were

TABLE 1: VARIABLES AND METHOD OF REGISTRATION

S.No	Variable	Method of registration
1.	Sagittal occlusion	Angles classification
2.	Overjet	Normal Overjet: 2mm, More than 3 mm is taken as increased and less than 2mm was taken as decrease
3.	Overbite	It was considered more if it was increased (deep) than 2 mm and decreased if less than 2 mm
4.	Crowding	Overlapping of one tooth with respect to other
5.	Midline Diastema	Space of more than 1mm between central incisors between either arch
6.	Crossbite	If one or more maxillary teeth are placed palatal/lingual to the mandibular teeth.

TABLE 2: AGE DISTRIBUTION

Age	13.37 ± 1.056 (SD)
Age category	12 = 176 (24.5%)
	13 = 242 (33.7%)
	14 = 159 (22.1%)
	15 = 141 (19.6%)

TABLE 3: ANGLES CLASSIFICATION

	Male	%	Female	%	Total	Total %	Chi square	P-value	Significance
AP relation									
TOTAL							10.487	0.033	HS
Normal	17	(2.4%)	38	(5.3%)	55	(7.7%)			
Class 1	186	(25.9%)	244	(34.0%)	430	(59.9%)			
Class 2 div 1	42	(5.8%)	86	(12%)	128	(17.8%)			
Class 2 div 2	14	(1.9%)	18	(2.5%)	32	(4.5%)			
Class 3	38	(5.3%)	35	(4.9%)	73	(10.2%)			

\*P-value 0.033, Chi-square 10.487, HS (Highly Significant)

TABLE 4: OVER JET AND OVERBITE

	Males	%	Females	%	Total	%	Chi SQ	P-Value	Significance
OVERJET							3.709	0.157	NS
Normal =2mm	174	(24.2%)	245	(34.1%)	419	58.4%			
Excessive >3mm	69	(9.6%)	118	(16.4%)	187	26.6%			
Reduced <2mm	54	(7.5%)	58	(8.1%)	112	15.6%			
OVERBITE							8.313	0.016	HS
Normal 2mm	187	(26%)	254	(35.4%)	441	61.4%			
Deep >2mm	59	(8.2%)	61	(8.5%)	157	21.9%			
Reduced <2mm	51	(7.1%)	106	(14.8%)	120	16.7%			

\*P-value 0.016, HS (Highly Significant)

TABLE 5: OVERCROWDING AND DIASTEMA

	Males	%	Females	%	Total	%	Chi SQ	P-Value	Significance
CROWDING							0.213	0.645	NS
Present	167		244	(34%)	411	(57.2%)			
Not present	130	(18.1%)	177	(24.7%)	307	(42.8%)			
DIASTEMA							0.180	0.671	NS
Present	66	(9.2%)	88	(12.3%)	154	(21.4%)			
Not present	231	(32.2%)	333	(46.4%)	564	(78.6%)			

TABLE 6: ANTERIOR AND POSTERIOR CROSS BITE

	Males	%	Females	%	Total	%	Chi SQ	P-Value	Significance
ANTERIOR CROSSBITE							2.022	0.155	NS
Present >1mm	20	(2.8%)	41	5.7%	61	(8.5%)			
Not present	277	(38.6%)	380	52.9%	657	(91.5%)			
POSTERIOR CROSSBITE							0.110	0.740	NS
Present >1mm	12	(1.7%)	15	2.1%	27	(3.8%)			
Not present	285	(39.7%)	406	(56.5%)	691	(96.2%)			

sagittal occlusion, over jet (OJ), overbite (OB), crowding, midline diastema, and cross bite according to the defined parameters mentioned in Table 1.

**RESULTS**

Table 2 shows age distribution and Fig 1 shows gender distribution. Angle's class 1 malocclusion had the highest frequency of 59.9% and statistically significant (0.033) in relation to gender (Table 3).

The normal overbite and overjet values were highest with normal overbite being statistically significant (0.016) in relation to gender (Table 4).

Frequency of Crowding was observed in 411 (57.2%) participants and diastema which was present in 154 (21.4%) participants (Table 5).

Anterior cross bite and posterior crossbite was observed in 61 (8.5%) and 27 (3.8%) participants respectively (Table 6).

**DISCUSSION**

In literature different qualitative and quantitative methods are available for measuring malocclusion but they do not include all occlusal criteria<sup>15,16</sup> thus, an alternative approach was used to register malocclusion

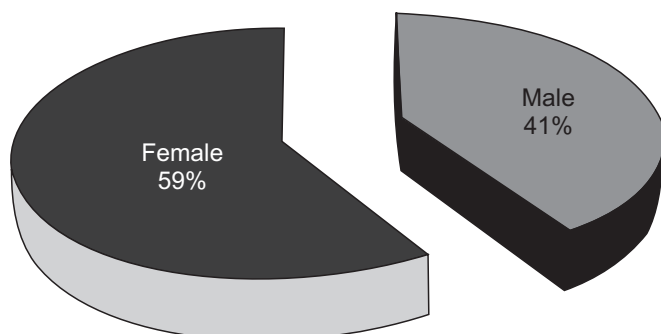


Fig 1: Gender of the participants

by using occlusal characteristics. Angle's classification that is reliable, repeatable<sup>17</sup> and idealistically oriented for a broad population study<sup>12</sup> was used for checking sagittal occlusion.

In this study, out of 718 only 7.7% had normal occlusion, which was comparable to that in American Latinos (6.5%)<sup>15</sup> but higher than the one reported by Gardner<sup>3</sup> (3%) and Iman et al<sup>18</sup> (4.7%) but less than white Americans (35%),<sup>19</sup> Egyptians (34.33%),<sup>20</sup> Iranians (21.1%),<sup>21</sup> Northern Nigeria (12%),<sup>22</sup> Begin city, Nigeria (15%).<sup>23</sup>

Hence the prevalence of malocclusion came out quite high and the most predominant was class 1 malocclusion (59.9%) almost similar to that in Americans (55%)<sup>19</sup> but higher than that found in Egyptians (33.3%)<sup>20</sup> and Iranians (41.8%)<sup>21</sup> and comparatively less than that reported by Gardner (74%)<sup>3</sup> and Iman et al (66.5%).<sup>18</sup>

Class 2 malocclusion in the current study (22.3% in division 1 and 4.5% in division 2) was comparable to Iman et al<sup>18</sup> observation (25.4% in division 1 and 3.5% in division 2) but higher to Gardner's group<sup>3</sup> (18% in division 1 and 2% in division 2).

The incidence of class 3 malocclusion (10.2%) in the present study, came out to be similar to that found in Egyptian (10.6%) but higher to that found in Danish (4.3%)<sup>24</sup> and British subjects (2.9%).<sup>25</sup> Also gender dimorphism was observed in the prevalence of malocclusion in this study ( $p < 0.05$ ) similar to the findings of El-Mangoury and Mostafa<sup>20</sup> in Egypt but contrary to Borzabadi-Farahani et al<sup>21</sup> study on Iranian and Iman et al study on Libyan subject.<sup>18</sup>

Overjet in this study was found to be normal (2mm) in 58.4%. Excessive (>3mm) in 26.6% and reduced in (15.6%) without any significant gender difference ( $p > 0.05$ ). These findings were different to those observed by Proffit et al who reported 29.6% had normal and 45.2 had increased overjet (11)<sup>19</sup> with significant gender difference in similarity to the findings of Gelgor et al (6) ( $p < 0.05$ ).

Overbite greater than 2 mm was observed in only 21.8% of the subjects which was considerably less than that in Libyans<sup>18</sup> and Iranians<sup>21</sup> while overbite was reduced in 16.7% school children which was more than that in Turkish population (7%)<sup>26</sup> and Black Americans (10%).<sup>16</sup> Gender dimorphism was not found similar to the findings of Iman et al in Libyan population.<sup>18</sup>

The prevalence of diastema was found to be 21.4% without any statistically significant gender difference, comparable to the findings of Emmanuel O. Ajayi<sup>23</sup> and Isiekwe<sup>17</sup> who found it to be 19.5% and 17% respectively, but less than the observation of Onyeaso<sup>12</sup> in South Western Nigerian children.

Crowding in present study was 57.2% with no gender dimorphism, the result being analogous to the observations of H. Kaur et al in south Indian population (57.69%)<sup>27</sup> and of Lauc. T in Hvar island, Corroatia (57.1%)<sup>28</sup> but much more than that found in Ibadan, Nigeria (20%).<sup>12</sup>

Anterior crossbite was observed in 8.5 %, alike that found by H. Kaur<sup>27</sup> in south Indian population (8.46%)<sup>12</sup> but twice that was discovered by E. Rajendra et al in Nalgoda school children (4.75%).<sup>2</sup> On the other hand posterior crossbite was recorded in 3.8%, which was similar to E. Rajendra et al study (3.75%)<sup>2</sup> but much less than the observation in; Rio de Janeiro State, Brazil (19.2%),<sup>20</sup> and in Lahore, Pakistan (24%).<sup>21</sup> Both values showed no gender dimorphism similar to the findings in Nalgoda school children.<sup>2</sup>

## CONCLUSIONS

In this study out of all the occlusal traits observed, Class 1 malocclusion was highest in frequency. Class 1 malocclusion with normal overbite was also predominant in females with statistical significant difference. However, other characteristics i.e. crowding, diastema, anterior and posterior cross bites and normal over jet were not statistically significant and females were less in number in these features when compared to males.

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