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A comparative Study of Arch Widths between Class I Crowded with Normal Occlusions

Dr. Rashed Md. Golam Rabbani[1*], Dr. M wazed Ali[2], Dr. Esrak jahan [3], Dr. Nadimul Hasan[4], Prof. Dr. Md. Zakir Hossain[5]

AFFILIATION

1. **Dr. Rashed Md. Golam Rabbani**
   BDS. FCPS, Assistant professor
   Dept. of Orthodontics
   Mymensing Medical College, Mymensing, Bangladesh
2. **Dr. M wazed Ali**
   Assistant professor, Dental Unit.
   Chittagong medical college.
3. **Dr. Esrak jahan Consultant,**
   Faridpur medical college hospital.
4. **Dr. Nadimul Hasan,**
   Associate professor. NICRH
5. **Prof. Dr. Md. Zakir Hossain**
   Head Dept. Orthodontics
   Dhaka Dental College and Hospital, Dhaka.

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*** Corresponding Author**
Dr. Rashed Md. Golam Rabbani
BDS. FCPS, Assistant professor
Dept. of Orthodontics
Mymensing Medical College, Mymensing, Bangladesh
Cell: 01717974562
E-mail: rashed_rabbani@yahoo.com

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ABSTRACT

Objectives: To test the hypothesis that there is no difference between adults with Class I crowded (CICR) and Class I normal (CIN) occlusions with respect to width of the maxillary and mandibular arches and gender comparisons

Study Design: Cross sectional study.

Place of study: Department of Orthodontics & Dentofacial Orthopedics of Dhaka Dental College &Hospital, Dhaka.

Period of study: Two years after approve of the protocol.

Sample selection: In this study, 52 pairs of study models were selected from the patients and students of the Orthodontics and Dentofacial Orthopedics Department of Dhaka Dental Collage and Hospital and were divided into two groups, 27 pair of dental casts with normal occlusion, 25 pair of dental casts with Class I crowded malocclusion including equal males and female samples.

Results: The result of this study evaluated two study groups (Normal occlusion and Class I crowded).

Between different arch dimension maxillary arch widths were found to have significantly smaller in Class I crowded malocclusion compared with Normal Class I occlusion.

Conclusion: In conclusion, the hypothesis was partially rejected by the finding of the study.

KEY WORDS:

Occlusion, crowding, Maxilla. Mandible.

INTRODUCTION

Investigators have historically described the dental arches in simple geometric term such as ellipse, parabola, and segments of circles joined to straight line or modified spheres. The proposed ideal arrangement of the teeth was described geometrically by Angle as the line of occlusion.[1-3]

Angle's postulate that the upper first molars are the key to occlusion and that the upper and lower molars should be related so that the mesiobuccal cusp of the upper molar occludes in the buccal grove of the lower molar .If this molar relationship existed and the teeth are arrange on a smoothly curving line of occlusion then normal occlusion would result. Normal occlusion and Class I malocclusion share the same molar relationship but differ in the arrangement of the teeth relative to the line of occlusion.[4-5]

Normal occlusion is commonly defined as "an occlusion within the accepted deviation of the ideal". This definition gives no clear limit to the range of normal occlusion However an occlusion, which satisfies the requirements of function, and aesthetic even though there may be minor irregularities of

individual teeth may be accepted as normal occlusion. Criteria in normal occlusion are described below The mandibular teeth are set one inclined plane in advance of the maxillary teeth (because the mandibular incisors are narrower than the maxillary incisor). The maxillary teeth are set half a cusp buccal to the mandibular teeth. The mesio-buccal cusp of the upper first permanent molars occludes with the anterior buccal groove of the lower first permanent molar. The upper permanent canines occlude in the embrasure between the lower permanent canine and first premolar. The lower incisors edges occlude with the middle third of the palatal surface of the upper incisors. This should produce normal overbite and over jet.[6-8]

Crowding of the teeth the most common type of malocclusion at present, undoubtedly is related in part to the continuing reduction in jaw and tooth size in human evolutionary development ,but that cannot be a major factor in increased crowding of quite recent years. Increased out breeding can explain at least part of the increase in crowding in recent centuries[23].

There are many definition of Class III malocclusion. The most common is “an occlusion in which the buccal groove of the mandibular first molar occludes mesial to the mesiobuccal cusp of the maxillary permanent first molar”. A Class III malocclusion may also be classified simply as an anterior crossbite. Clinically a skeletal Class III malocclusion denotes a straight or concave profile. This facial dysplasia can be classified into mandibular prognathism, maxillary retrognathism, or a combination of both depending on the variation of the anteroposterior jaw relationships.[8-10]

Mills[16-17] compared the arch width of crowded and well-aligned Class I occlusion in young American white men .Howe et al[13-14] compared the arch widths of 54 CIN subjects with 50 subjects having gross dental crowding (no Angle class was given). Radnzic [14-15] compared the maxillary and mandibular intermolar widths in 60 British and 60 Pakistani boys aged 13 to 15 years . Chang et al[15-17] compared the arch widths of 74 males and females with crowded arches (CR) and 89 Chinese males and females with good alignment

In Bangladesh, no such studies been made to evaluate them in our context. Our efforts were confined to isolated case management and prevalence. A precision in determining possible differences in the dental arches width of Bangladeshi people between Class I crowded and Class III malocclusion compared with normal occlusion may be an important aid in further understanding of dentoalveolar characteristics of these conditions, as well as improving their management.

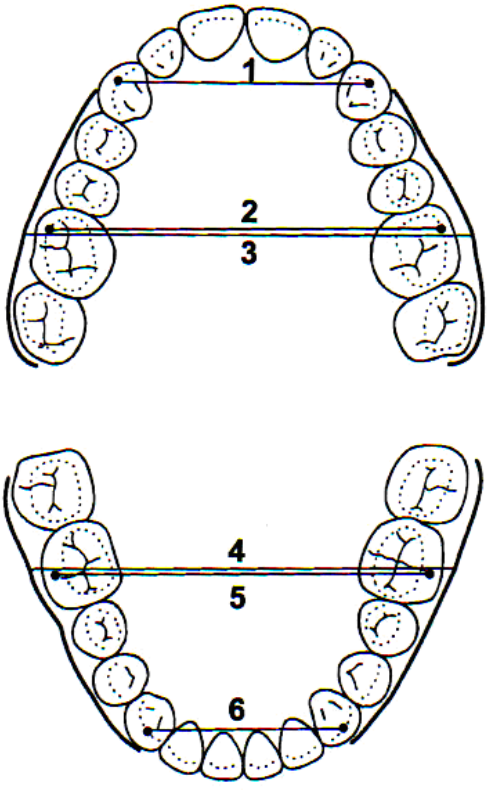
MATERIAL & METHOD:

It was a cross sectional study that was conducted department of orthodontics & Dentofacial orthopedics of Dhaka Dental College & Hospital from period of June to December 2012. In this study, 52 pairs of study models were selected from the patients and students of the orthodontics & Dentofacial Orthopedics Department of Dhaka Dental Collage &Hospital and were divided into two groups. Each group consisted of equal males &female Samples. The first group consisted of Class I malocclusions (Class I skeletal base) with severe dental crowding (more than 5mm space deficiency) and second group had class I normal occlusion.

Study model with following criteria were enrolled into this study: For Class I crowding bilateral Class I canine and molar relationships. 2.3 mm and greater mandibular crowding. No anterior and posterior open bite.. No previous orthodontics treatment. For class I normal. Bilateral class I molar and canine relationship. 1.5mm or less crowding and no more than 2.4mmof spacing in the mandibular arch.

The measurements were conducted on maxillary and mandibular dental cast of 52 Bangladeshi subjects of both sexes. 25of them were class I crowd and 26 subjects were normal occlusion group. Comparison made on inter canine inter first premolar, inter molar and alveolar widths of both dental arches.

Dental casts measurement were performed by a digital dial caliper to the nearest 0.01mm. All measurements of all subjects were carried out again four weeks later by same operator to evaluate measurements error. Almost all the measurements were same, where differed, average was taken. After collection of data the obtained data was checked, verified& edited. These were entered in a personal computer using the SPSS (statical package for social science) software. Entered data were cleaned, edited and appropriate statistical tests were done depending on the distribution of data.All data analyzed through standard statistical methods by using SPSS / STATA 10 software.



RESULTS:

This study was a cross sectional study conducted among the dental casts of 52 patients and students of the department of Orthodontics and Dentofacial Orthopedics, Dhaka dental College and Hospital. The occlusion of these subjects was class I crowded and Class I normal occlusion. The statistical tests to be used for analysis of data were 't' test and 'f' test. In this analytical test the level of significance p value <0.005 was considered.

Table: Comparison of maxillary measurements between Normal occlusions and Class I crowding male and female

Different arch width	Normal occlusions		Class I crowded	
	Male n=13 Mean±SD	Female n=14 Mean±SD	Male n=13 Mean±SD	Female n=12 Mean±SD
Maxillary intercanine width	35.9±2.0	34.2±2.3	34.2±3.8	32.8±2.2
Maxillary interpremolar width	43.4±1.8	41.4±2.4	42.4±2.7	37.74±2.4*
Maxillary intermolar width	54.4±2.5	51.6±2.8	52.8±3.2	47.7±4.3*
Maxillary alveolar width	59.8±2.5	57.2±2.5	57.2±3.6	54.2±2.2*

*p<0.005 NS other not significant ,Table shows maxillary inter premolar, inter molar and alveolar width were significantly smaller in female than male in crowded group.

Comparison of maxillary measurements between Normal occlusions, Class I crowded.

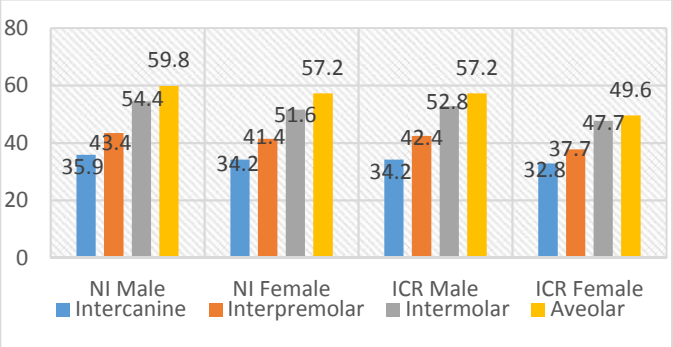
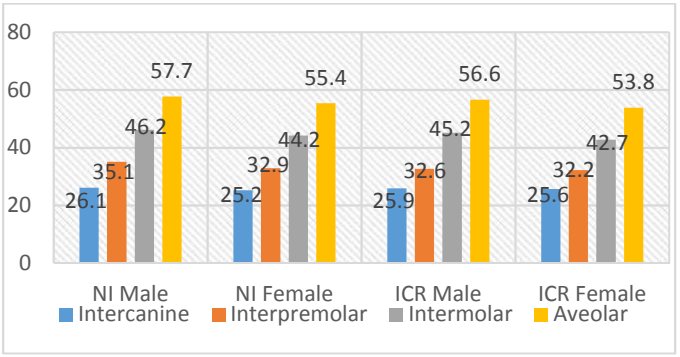


Table: Comparison of mandibular measurements between Normal occlusions, Class I crowded male and female

Different arch width	Normal occlusions		Class I crowded	
	Male n=13 Mean±SD	Female n=14 Mean±SD	Male n=13 Mean±SD	Female n=12 Mean±SD
Mandibular intercanine width	26.1±1.4	25.2±1.3	25.9±2.6	25.6±1.7
Mandibular interpremolar width	35.1±1.9	32.9±3.1	32.6±4.1	32.2±1.9
Mandibular intermolar width	46.2±2.4	44.2±2.9*	45.2±2.8	42.7±2.5*
Mandibular alveolar width	57.7±2.4	55.4±2.9*	56.6±2.8	53.8±2.6*

*p<0.005 NS other not significant, Table shows mandibular intermolar and alveolar width were significantly smaller in female than male.

Comparison of mandibular measurements between Normal occlusions and Class I crowded malocclusion among male and female



DISCUSSION:

This cross sectional study was conducted in the department of orthodontics and Dentofacial Orthopedics at Dhaka Dental Collage and Hospital. This study was carried out to compare the arch width of Bangladeshi subjects with class I crowded and normal occlusion. The subjects of the study were selected on the basis of inclusion and exclusion criteria. This study consisted of using 52 pairs of casts with permanent dentition divided into two groups 27 pairs of dental casts with normal occlusion (13 male and 14 females), 25 pairs of dental casts with Class I crowded (13 male and 12 female). The comparison was made between the intercanine, interpremolar, intermolar and alveolar width of both dental arches. The casts were selected from archives of Dhaka Dental college & hospital. The minimum age of the subjects chosen for this study based on evidence reporting no significant change in the first molar and canine arch widths after age 13 in females and 16 in male.[17-20] The result of this study reveled that in the maxilla no significant difference were found in inter canine arch width in all two groups. The inter premolar, intermolar and alveolar arch width in class I crowded group were significantly smaller than Class I normal occlusion.

In the mandible it was found that inter molar and alveolar width were smaller in Class I crowded group than normal occlusion. In the mandible it was reveled that male had a significantly larger inter molar and alveolar arch width than female in all two groups. Comparison of maxillary and mandibular measurements with in the class among male it was reveled that maxillary and mandibular intermolar width were significantly smaller in Class I crowded male. Within the class among the female it was found that maxillary inter molar, alveolar and mandibular intermolar width were significantly smaller in Class I crowded female than Class I normal female. The finding of this study agreed with those of Mills.[20-21] He compared the arch widths of crowded and well aligned Class I occlusion in young American white men. He found significantly smaller maxillary and mandibular interpremolar arch width in crowded group than well alignd Class I occlusion. But we found

only maxillary interpremolar arch width are significantly smaller in class I crowded group than class I normal occlusion. This may be due to racial variation. Radnzic[22-23] compared the maxillary and mandibular intermolar width in 60 Pakistani boys and found maxillary intermolar width were significantly smaller in the crowded group than in the normal occlusion. The result of our study agreed with this. Chang et al[24-25] compared the arch width of 74 males and females with crowded arches and 89 chines male female with good alignment. They reported maxillary inter canine width of both groups were similar in male larger in crowded female. The result of our study disagreed with this . Our study showed maxillary inter canine width of both groups had no significant differences in male and female. They also found maxillary and mandibular inter molar arch width were smaller in the crowded group in both gender, our study agreed with this. A few studies conducted in Bangladesh on arch width by Rahman M.M 2007; Jahan H; 2010 in the Department of orthodontics and Dentofacial Orthopedics.[12-13] Dhaka Dental College and Hospital, Dhaka. The result of my study coincide with their study. They also found maxillary and mandibular intermolar arch width significantly smaller in Class I crowded group than normal occlusion.

Howe et al[26-27] compared the arch width of Class I normal subjects with subjects having gross dental crowding (no Angle class was given). Maxillary and mandibular canine and molar alveolar arch width were significantly larger in the Class I normal occlusion in both gender. The result of our study disagreed with the study by How et al. Our result showed no significant differences in maxillary and mandibular inter canine width in both gender.

CONCLUSION & RECOMMENDATION:

The result of this study evaluated under two study groups (normal occlusion and class I crowded).

Among different arch dimension, maxillary arch widths were found to have significantly smaller in class I crowded compared with normal occlusion.

In conclusion, the hypothesis was partially rejected by the findings of this study. It may be suggested that Orthodontist who is aware of these differences in arch dimension will be beneficial to diagnose and treatment planning of orthodontic cases more accurately.

As the size of the sample of this study was very small so recommendation is put forward for future researcher to do additional depth research consisting of large sample group for greater acceptability of the study.

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