Original Article

COMPARISON OF INTER-CANINE AND INTER-MOLAR WIDTHS IN ANGLE'S CLASS I, II AND III MALOCCLUSIONS; STUDY OF LOCAL POPULATION OF LAHORE

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ABSTRACT:

Objective: To assess the inter-canine and inter-molar widths amongst Angle's class I, II, and III Malocclusion groups.

Material and Methods: This study was carried out at Children's Hospital and Institute of Child Health Lahore. Fifty patients within the age range of 10-15 years were selected for study with all three classes of Malocclusion. Arch width measurements were made using dental casts of patients, and the findings were noted in specially designed Performa. Data was analyzed using SPSS 20.

Results: Mean maxillary inter-molar widths were 45.2mm, 46 mm, 46.02mm, 46.8mm, and 44.1 mm for class I, class II div 1, class II div 2, class II sub-div and class III groups respectively. Mean values for mandibular inter-molar widths were 42.7 mm, 44.09 mm, 44.6 mm, 43.5 mm, and 44.07 mm for class I, class II div 1, class II div 2, class II sub-div and class III groups respectively. Statistically insignificant differences were seen for the inter-molar widths of maxilla and mandible among the Malocclusion groups. Mean maxillary inter-canine widths were 31.8 mm, 32.6 mm, 33.0 mm, 32.0 mm and 30.7 mm for class I, class II div 1, class II div 2, class II sub-div and class III groups respectively. Mean mandibular inter-canine widths were found to be 25.00 mm, 26.7 mm, 27.7 mm, 26.5 mm and 26.0 mm for class I, class II div 1, class II div 2, class II sub-div and class III groups respectively. Significant difference was observed in the inter-canine widths of maxilla and mandible in Angle's Malocclusion.

Conclusion: Inter-canine width was found to be least in class I and widest in class II div 2.

Key Words: Malocclusion, Orthodontist, Molar

INTRODUCTION:

Arch width refers to the measured distance between the canines, bicuspids, and the first molars. The inter-canine, inter premolar, and intermolar distance may be cited as the arch width.[1] Dental arches attain full dimension at the eruption of canines and molars. The factors affecting the dimensions of dental arches include genetics, bone growth, tooth eruption, tooth inclination, muscular forces, and muscular functions, environmental factors also included.

Individual variations occur at inter-canine width and intermolar width.[2]

When the jaws get closed, and teeth of two arches come close in a relationship which is not aligned in an appropriate way, this is called Malocclusion. The orthodontist who introduced this term was Edward Angle.[3] The mesiodistal relation of teeth, dental arches, and jaws were used as basis of his classification. He classified Malocclusion into three classes mainly. The dentition should fit on the occlusal line, which is a curve running over central fossae of molars and cingulum of the canines and incisors in the upper arch and in lower arch the curve running from buccal cusps of the posterior teeth and incisal edges of the anterior teeth. Changes in position of this curve leads to different types of Malocclusion.

The abnormal relationship between two teeth or a number of teeth is termed as interact

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Malocclusion. These Malocclusions can occur in sagittal, vertical and transverse plane.[4] Misalignment along the transverse plane is one of the most common reasons of Malocclusion, and this can be assessed by arch width.[5]

A study was led by Uysal et al in which he compared the widths of dental and alveolar arches in class I and class III malocclusion and the values of mandibular inter-canine, intermolar and alveolar widths were found to be considerably larger than class I.[6] Huth et al piloted a study in which he linked the arch widths of both divisions of class II malocclusion and class I and the results they got showed that maxillary arch widths for class II div 2 were smaller than normal occlusion and larger than class II div 1 group. Mandibular inter-molar widths were similar in both divisions of Class II, and both are smaller than normal occlusion.[7]

Mahmod et al showed in a study in which he compared values of class II div I Malocclusion with those with normal occlusion, and the values for both intermolar and inter-canine widths were found to be greater in former.[8] In other studies, the comparison was done between class II div 2 mal-occlusion and subjects with normal occlusion and values of former were greater as compared to normal subjects. Inter-premolar width showed insignificant difference between the two groups.[9,10]

Mushtaq et al. carried out the comparison of inter-canine and intermolar width in all types of Angle Malocclusions. They found inter-canine width highest in class II div two and mandibular inter-molar width highest in-class III.[5] This study was planned to assess the inter-canine and inter-molar widths amongst Angle's Class I, II and III malocclusion groups.

Therefore, early observation of pattern of occlusion development is crucial for timely interventions.

MATERIAL AND METHODS:

This was a cross-sectional study. Sampling was carried out by using a non-probability purposive sampling technique. A total of 50 samples were selected over a period of 3 months from October 2014 to December 2014 by following inclusion and exclusion criteria. We included good quality casts showing only mild crowding (1-4mm) in either or both maxillary and mandibular arches, all permanent teeth present from right 1st molar to left 1st molar. Cases having any dental anomaly, any extraction, large restorations that could change the mesiodistal and buccolingual dimensions of the teeth, subjects with previous orthodontic treatment, attrition of occlusal surfaces of the teeth, prosthetic replacements, severely crowded/ spaced arches, craniofacial anomalies, trauma, impactions, asymmetric arches, congenitally missing teeth and periodontally compromised dentition were all excluded. All casts were evaluated, and inter-canine and intermolar widths were noted using a vernier caliper. Maxillary and mandibular inter-canine widths were, and maxillary and mandibular intermolar widths were measured by measuring distance between mesiobuccal cusp tips of right and left permanent 1st molars. Data was analyzed using SPSS 20. For categorical variables, frequency and percentages were measured while for numerical variables mean, standard deviation and range were measured. An ANOVA test was applied. p-value lesser than 0.05 was significant.

RESULTS:

The mean age was 12.3 ± 1.522 years. Males were 22 (44%), and females were 28 (56%) with male to female ratio 0.786:1. There were 13 (26%) Class I cases, 14 (28%) class II div 1 case, 7 (14%) class II div 2 cases, 2 (4%) class II sub-div, and 14 (28%) class III cases. ANOVA shows that a significant difference exists in the inter-canine width (p-value 0.028) among five classes of Malocclusion. (Table-1).

Analysis of variance shows a highly significant value in inter-canine width in the mandible (p-value 0.000). (Table-2).

ANOVA shows that statistically, an insignificant difference exists in the intermolar width of the maxilla (p-value

0.323) among five classes of Malocclusion. (Table-3).

Statistically insignificant difference (p-value 0.440) exists in the inter-molar width of the mandible for the five classes of Malocclusion. (Table-4).
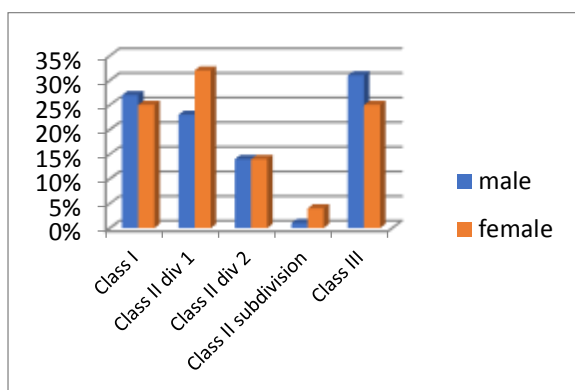
Graph-1: Frequency of different types of Malocclusion among males and females

Table-1: Comparison of inter-canine width in different classes of Malocclusion in the maxilla.

Types of malocclusion	No. of cases	Mean	St. Deviation	Min.	Max.
Class I	13	31.793	1.1701	30.00	34.50
Class II div. 1	14	32.620	2.6591	29.47	39.00
Class II div. 2	7	32.964	1.2405	31.00	34.90
Class II subdivision	2	32.000	1.1313	31.40	33.00
Class III	14	30.721	0.9752	29.30	32.20
Total	50	31.905	1.8416	29.30	39

Table-2: Comparison of inter-canine width in different classes of Malocclusion in the mandible.

Types of malocclusion	No. of cases	Mean	St. Deviation	Min.	Max.
Class I	13	24.900	0.5196	24.20	26.30
Class II div. 1	14	26.748	1.4049	25.21	30.00
Class II div. 2	7	27.729	0.5529	27.00	28.50
Class II subdivision	2	26.500	0.7071	26.00	27.00
Class III	14	26.025	0.9423	25.10	29.00
Total	50	26.192	1.3241	24.20	30.00

Table-3: Comparison of inter-molar width in different classes of Malocclusion in maxilla.

Types of malocclusion	No. of cases	Mean	St. Deviation	Min.	Max.
Class I	13	45.239	2.2149	43.50	52.20
Class II div. 1	14	45.939	3.3825	41.92	51.00
Class II div. 2	7	46.021	3.5383	44.00	54.00
Class II subdivision	2	46.750	4.5962	43.50	50.00
Class III	14	44.121	0.6554	43.00	45.30
Total	50	45.292	2.6438	41.92	54.00

Table-4: Comparison of intermolar width in mandibular classes of Malocclusion.

Types of malocclusion	No. of cases	Mean	St. Deviation	Min.	Max.
Class I	13	42.654	2.0891	41.10	48.90
Class II div. 1	14	44.094	3.4499	40.85	51.00
Class II div. 2	7	44.648	2.8491	43.09	51.00
Class II subdivision	2	43.450	2.1920	41.90	45.00
Class III	14	44.075	1.4714	43.20	49.00
Total	50	43.766	2.5288	40.85	51.00

DISCUSSION:

The current study was performed to see inter-canine and intermolar widths of different types of Malocclusion, and comparison was done amongst the findings for different classes. We took 50 casts of patients with ages ranging from 10-15 years. Results showed statistically significant values in the inter-canine widths of maxilla and mandible (p=0.028 and 0.000, respectively). Our results are close to the study carried out by Ahmed et al.[2]

The mean value of maxillary Inter-canine width for Angle's class I malocclusion in our study was found to be 31.793±1.17 while Azeem et al[11] found the inter-canine width for normal occlusion orthodontic patients was reported 35.21±3.31 mm. The difference in the value of inter-canine width for the normal

occlusion may be because of the difference in the ages of the patients included in the study. The mean age for our study was 12.3±1.522 years while the mean age in the study conducted by Azeem et al was 19.11±3.13 years.[11]

In the present study, for mandible, inter-canine width for class I malocclusion was 24.9±0.519 and intermolar width was 42.65±2.089. Rabbani, et al.[12] found the inter-canine width for mandibular class I malocclusion in males 25.9±2.6 and 25.6±1.7 in females. They found mandibular intermolar width for class I in males 45.2±2.8 and 42.7±2.5 in females. the results are comparable to our study.

Azlan et al, 2019[13] reported the average maxilla intermolar widths for males and females 49.36mm and 46.75mm respectively, while the average mandibular intermolar widths for males and females were 43.17mm and 40.5mm. Our study showed the maxillary intermolar width 45.239±2.215 and mandibular intermolar width 42.654±2.089. These values are lesser than the normal arch values described by Azlan et al showing that there is difference in maxillary and mandibular intermolar width of normal arch dimensions and Class I dimensions.

In our study, comparison of inter-canine width for five different classes of Malocclusion in the maxilla showed statistically significant value by ANOVA (p-value 0.028). Gurjar and Purohit,[14] showed the results similar to our study and described the statistically significant value for the inter-canine width for all five classes of malocclusion by applying ANOVA. Similarly, comparison of inter-canine width for the Angle's malocclusion classes of mandible was found to be significant (p-value 0.000) just like reported by Gurjar and Purohit, 2018.[14]

In the present study, inter-canine width in maxilla for Class II div 1 was 32.620±2.659 which is comparable to 33.1±2.0 reported by Patel, et al.[15] For mandible, we found inter-canine width for class II div 1 26.74±1.4 while Patel, et al[15] 2015 reported inter-canine

width 25.6±1.8 which is comparable to our results.

The results of our study were compared to a study conducted by Mushtaq et al.[5] They concluded that there is no statistical significant differences in the intermolar and inter-canine widths among the five malocclusion groups while we found the significant result for inter-canine width of both maxilla and mandible among five malocclusion groups while intermolar widths in this study were found insignificant for both arches.

Qamar and Ahmad.[10] described that mandibular intermolar width was larger in class II div 2 but no significant differences were documented for maxillary Inter-canine widths in contrast to our study as we found the statistically significant results for maxillary inter-canine widths.

Hashim et al[16] concluded that class III malocclusion showed wider arch dimensions than that in Class I and Class II while in our study class II div 2 showed wider dimensions for both maxillary and mandibular inter-canine and intermolar widths among all five malocclusion classes.

CONCLUSION:

Statistically, insignificant data difference was found between values for the intermolar widths of maxilla and mandible among different classes of Malocclusion while values for the mean inter-canine widths of maxilla and mandible in class I, class II div 1, class II div 2, class II sub-div and class III group patients were found to be statistically significant. Therefore, these values need consideration in treatment planning.

AUTHOR'S CONTRIBUTION:
SA: Conception of idea and supervision
RS: Study design
ZA: Data collection
SW: Data analysis
VJ: Drafting of article
AT: Critically review

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