COMPARISON OF INTER PREMOLAR, MOLAR WIDTHS AND ARCH DEPTH AMONG DIFFERENT MALOCCLUSIONS

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ABSTRACT

The objective of the study was to compare the differences in inter first premolar, molar width and arch depth in different malocclusions. One hundred and twelve dental cast of the patients with no history of orthodontic treatment, teeth extraction and age not less than 14 years were selected from the record available in the Khyber College of Dentistry, Peshawar from October, 2013 to August, 2014. Inter first premolar, first molar width and arch depth were then measured with the help of digital vernier calliper and the data were then analyzed with the help of SPSS. Significant differences were found in arch widths between different malocclusions i.e. inter first premolar and molar width in Angle's class I vs class II, inter first molar width in class II and III, and arch depth in class I vs class III. From the present study it was concluded that in Angle's Class III Palate was shallowest and Maxillary inter first premolar and molar width is the largest in Class III than in Class I and Class II, while the narrowest arch was in Class II.

Key Words: *Malocclusion, dental arch, bicuspid, molar and palate.*

INTRODUCTION

Improving patient esthetics is primary objective of orthodontic treatment. This requires a thorough diagnosis involving investigations of the face in all three dimensions both clinically and radiographically. Intra and extra oral measurement is a routine procedure during orthodontic diagnosis.[1] Information regarding arch dimensions in human populations is important in different dental specialities including orthodontics. It is important to clarify and understand the relationship between craniofacial structures and arch dimensions.[2] The anatomical features of craniofacial structures, dental arch widths, and dental arch forms, have been evaluated in literature.[3,4,5] Ricketts reported strong correlation between facial type and dental arch width.[6]

Dental arch dimensions include arch length, width and depth have profound implications in orthodontic diagnosis and treatment planning; affecting the space available, dental aesthetics, and stability of the dentition. These considerations, in addition to antero-posterior movements of the dentition determine the requirements for extraction or non extraction treatment planing.[7] Size and shape of the dental arches could be affected by many factors such as heredity, growth of the bone, eruption and inclination of the teeth, racial background and environmental factors such as muscle forces and function.[8] Arch width has been a subject of interest among investigators; studying the growth of dental arches. Changes in arch dimensions and their possible correlation with age, sex, orthodontic treatment and extractions of permanent teeth have also been investigated.[9]

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Different measurements and ratios of arch dimensions have been used to analyze dental arch form. Two easily obtained linear measurements, arch width and length have been used to provide estimation of dental arch form, arch area, arch index, and length of arc of dental arcade.[10,11] It is also of interest to anthropologists and other students of human oral biology. With the help of arch length and width measurements an orthodontist can predict the functional and aesthetic outcome of a particular case. Furthermore the results of the current investigation are of great value to the anthropologist as well as to the orthodontist in understanding the dimensional arch criteria. For the orthodontist, this can also assist in orthodontic arch wire selection. It would also be helpful to the prosthodontist in the selection of the correct shape and size of stock impression trays for fixed and removable prostheses for three groups of malocclusions.[12]

The aim of the current study was to compare inter first premolar, molar width and arch depth in various malocclusion groups in patients seen at the Department of Orthodontics of Khyber College of Dentistry, Peshawar.

METHODOLOGY

One hundred and twelve dental casts were selected from the records of patients available at Khyber College of Dentistry, Peshawar, there were 40 Angle's class I, 40 class II and 32 class III cases. Inclusion criteria were no history of any Orthodontic treatment or extraction except third molars and age above 14 years. While the exclusion criteria was, cleft lip and palate patients, syndromic patients, inappropriate or damaged dental casts and teeth with signs of attrition. The arch dimensions to be measured were inter first premolar, first molar width and arch depth (Fig 1). Cusp tips were taken as the landmarks. Inter first premolar width was measured as transverse distance between the buccal cusp tips of the first permanent premolars in both upper and lower dental arches. Inter first molar width was measured as transverse distance between the mesiobuccal cusp tips of the first permanent molars in corresponding dental arch.

Arch depth was measured as a perpendicular line drawn from the anterior point between two central incisors to the line drawn from the distal contacts of the first permanent molars in both upper and lower dental arches. These variables were measured with the help of a vernier caliper (mitu-toyo; Kawasaki, Kanakawa, Japan). For statistical analysis SPSS version 20 was used to test the significance of the values measured.

RESULTS

Records of one hundred and twelve patients were selected on the basis of inclusion and exclusion criteria with the mean age of 18.4 years. The sample of Angle's class I comprised of 40 cases with 18 male and 22 female. The class II group consisted of 40 cases with 16 male and 24 female and total 32 cases of class III with 23 male and 9 female. The mean values of inter first premolar width, inter first molar width and arch width can be seen in Table 1.

However upon comparing the different malocclusions, i.e. Angle Class I and Class II malocclusion groups,

TABLE 1: PROVIDES DETAIL OF MEAN ARCH WIDTHS OF ALL ANGLE'S MALOCCLUSIONS GROUPS

Angle's class	Maxilla			Mandible		
	Inter 1st Premolar Width ± S.D	Inter 1st molar width ± S.D.	Arch depth ± S.D.	Inter 1st Premolar width ± S.D	Inter 1st molar width ± S.D.	Arch depth ± S.D.
Class I	41.19 ± 2.951	51.88 ±2.905	38.16±2.737	33.76 ± 2.595	44.31 ±3.015	31.49±2.290
Class II	39.88 ± 2.896	49.95 ± 3.164	37.38±3.093	33.73 ±3.237	44.18 ±3.194	31.47±2.318
Class III	41.31 ± 4.049	52.00 ± 4.650	36.72±2.870	34.56 ±2.436	44.90 ±3.343	30.62±2.429

TABLE 2: SHOWS THE COMPARISON BETWEEN INDIVIDUAL ANGLE MALOCCLUSION GROUPS

Comparison	Maxilla(p-value)			Mandible (p-value)		
	Inter 1st Premolar Width ± S.D	Inter 1st molar width ± S.D.	Arch depth ± S.D.	Inter 1st Premolar width ± S.D	Inter 1st molar width ± S.D.	Arch depth ± S.D.
Class I vs II	0.049**	0.006**	0.238	0.961	0.850	0.977
Class II vs III	0.084	0.029**	0.358	0.231	0.360	0.134
Class I vs III	0.880	0.887	0.034**	0.185	0.442	0.125

Test of significance: Independent sample T test.   ** Level of significance P ≤ 0.05.
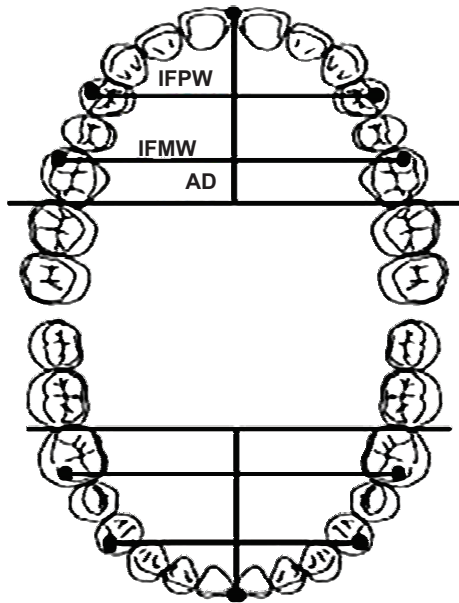
Fig 1: Shows the inter first premolar width (IFPW), inter first molar width(IFMW) and arch depth (AD).

significant differences were found in the maxillary inter first premolar and molar width as in Table 2. While between class II and class III significant differences were found in the maxillary inter first molar width as shown in table.[2] On comparison of the arch dimensions of Class I and Class III significant difference was found in maxillary arch depth while the rest of the arch dimension showed no statistically significant differences as in Table 2.

DISCUSSION

Changes that take place in the dental arch with age of the patient are important for the clinician for designing and planning the treatment plan and studying these changes will help the clinician to understand and explain it to the patients. In one study by Bishara et al, it was concluded that the changes occur in the arch dimension upto 13 years in maxilla and 8 years in mandible.[13] Another study showed that after 14 years arch width were relatively constant. So the cases that were selected in present study were all above 14 years as after this age no increase was observed in arch dimension and arch width were.[14]

In this study inter first premolar and first molar width when compared among Angle's malocclusion group were smaller in Angle's class II followed by class I and then by class III as reported by lux CJ et al but other investigator found no significant difference.[13,15,16] A study done by stately et al found that the arch width in normal occlusion was larger than class II and concluded that maxillary arch is narrower in class II compared to the other malocclusion groups in accordance with the present study.[17,18,19] Al Khateeb and Abu Alhaija

also reported narrow maxilla in agreement with the present study.[20] The narrow maxillary arch width of class II attributed to obstructive sleep apnea and mouth breathing, habits and abnormal sleep functions as reported by many investigators.[21,22,23]

No significant differences were found among the mandibular arch dimensions among the angle classes when compared individually and this was in agreement with study by Bishara et al, and other investigators.[13,24] The comparison of class I and class III showed only significant difference in arch depth which means that the class III had a shallower palate compared to class I. This finding was in agreement with the study by Johnson et al who reported that crowded class I have a deep palate compared to the class III but in contrast to Al-Sayagh's study who found deep palate in Angle's class II div I.[25,26,27] The inter premolar and molar width upon comparison of class I and class III showed no difference in contrast to the study by Braun et al.[28]

CONCLUSION

From the present study following can be concluded:

1) Maxillary intermolar width in Angle's class III was found larger than class I and class II.

2) Angle's class II showed the narrowest transverse arch dimension contributing to the maxillary narrow arch

3) Palates were shallow in Angle's class III compared to class I.

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2	**Shahab Adil:**	Title and design selection, analysis of data. Review of the article.
3	**Kawish Syed:**	Discussion and review.
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