

Average mesiodistal teeth width at a dental teaching institute, Karachi, Pakistan

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Abstract

Objective: - To determine the means mesiodistal crown width of incisors, canine, premolars and first molars in patient teeth, reported at Orthodontics Out patient Department, at Karachi Medical Dental College, Pakistan. **Materials and Methods:** It was a cross sectional study of orthodontic patients. With convenience sampling a total of 300 patients (234 girls, and 66 boys) referred to the Department of Orthodontics, Karachi Medical Dental College, were evaluated in this study. The mean age of the patients was 16.5 ± 3.9 years with a range of 10 to 25 years. The Mesiodistal tooth width was measured for central incisor, lateral incisor, canine, first premolar, second premolar and first molar on 300 unsoaped mandibular and maxillary plaster models. Over all 7200 teeth were measured by the help of boleys gauge with precision reading of 0.1. The Mean, and standard deviation of mesiodistal crown width was calculated by the help of SPSS -10 and independent sample t test applied to see the gender dimorphism.

Results: Average mesiodistal teeth widths were determined. There is a difference in mean teeth width on the right and left side in each group of teeth.

Conclusions: Mesiodistal crown width of individual teeth is the basic data required for various analyses, such as mix dentition analysis, and Bolton analyses. These are the essential requirement for proper orthodontic treatment plan. Knowing the Pakistani population average teeth width help to build the our population norms to use for space analysis and bolton analysis.

Key Words: Mesiodistal width, teeth,

INTRODUCTION

Dental crowding is probably the most common reason for which patient seeks care. For the treatment of crowding we calculate mesiodistal diameters of teeth versus the space available. Pioneer investigations on tooth size were conducted by Black¹ in 1902, and Neff² in 1949. There are various factors that contribute to the variability of permanent tooth size; according to Lundstrom³ there is genetic predisposition for the determination of the mesiodistal width of the crown. Moyers⁴ and colleagues at the Center of Human Growth and Development at the University of Michigan established data for the dentition of North American white subjects. Hashim AH⁵ evaluated

mesiodistal crown width in different malocclusion groups (class I, class II, class III) and found no statistical difference between them. Difference in the tooth dimensions could mean either the ability or the inability to use interchangeability diagnostic criteria derived for either population. Studies have been done in American and European population for mixed dentition analysis and on the basis of the presence of permanent erupted teeth, the size of the unerupted teeth can be predicted. But the same thing in our population requires a long method and need radiograph because no such tables or formulas are available for our population. Those table can not be

used in our population as there is no study to show if our crown size has similarity or dissimilarity with them. Therefore, efforts are needed to develop our local data. This study is directed to get some base line data for the future tooth size in our population.

MATERIALS AND METHODS:

The study was a comparative/ **descriptive**, cross sectional study, done at Orthodontic OPD, Karachi Medical and Dental College, in six months. Sample consisted of three hundred orthodontic patients (234 females and 66 males) with both upper and lower plaster cast using non-probability (convenience) sampling. Sample consisted of models of patients with fully erupted permanent incisors, canine premolars and first molars on both sides of the maxillary and mandibular arches with age group between 12 – 25 yrs. Patient with any major dentofacial abnormalities like cleft lip and palate , with the history of any previous orthodontic treatment involving the deciduous, mixed, or permanent dentition in either arch ,with dental abnormality such as hypoplasia or any anomalies such as peg lateral incisors ,presence of restoration other than class I and class V, any fractures or proximal caries determined on bitewing radiographs or on the dental cast and defective cast with porosities were also excluded.

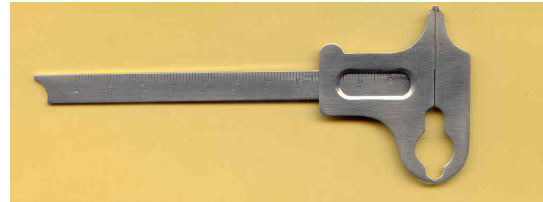
After taking the impression with alginate and making the models with orthodontic plaster. The Teeth width of central incisors, lateral incisors, canines, premolars and first molars were obtained by measuring the greatest distance between contact points on the proximal surfaces. A modified Boley gauge (figure no 1) with a vernier scale to read to nearest to 0.1 was held parallel to the occlusal surface if the tooth appeared to be in normal alignment, other wise the mesiodistal crown diameter was obtained by measuring between the points where contact with the adjacent tooth would normally occur.

DATA ANALYSIS

The data was analyzed with SPSS 10.0 for windows. The mean, and standard deviation

were calculated for the mesiodistal width of each pair of teeth (right and left), and the independent *t*- test was used to test the difference between each pairs of teeth. P value < 0.05 was set to be significant.

Figure 01



RESULTS:

Average mesiodistal teeth width were determined. There is a difference in mean teeth width on the right and left side in each group of teeth.

DISCUSSION:

The Mesiodistal tooth width was measured on 300 unsoaped plaster models. The sample consisted of 66 males and 244 females. Total number of 7200 teeth was measured. The number of females was more in our sample as the data was collected from orthodontic centers and more number of females visited there for the treatment. The sample size was adequate as similar study was done by Hattab FN⁶ on 198 Jordanians (86 male and 112 females). Richardson ER⁷ did similar study on 162 American Negroes.

The average age was 16.5 ± 3.9 years with a range of 10 to 25 years. The patients above this age were excluded due to risk of proximal attrition.

Sample consisted of all malocclusion classes (class I, class II, class III) as Douglas R⁸ found no statistically significant difference in the incidence of tooth size discrepancy in different malocclusion groups.

Mesiodistal crown width was measured by the help of sharpened boleys gauge on cast made by orthodontic hard plaster (stone), the same method was used by, Ballard⁹, Nance¹⁰, Neff,² Hixon and Oldfather¹¹, Moorrees and co-workers^{12, 13} and Barrett and associates¹⁴. The majority of these workers used plaster models poured from alginate impressions of upper and lower arches. A small group poured their

models in dental stone. The consensus is that measurements made from dental casts are more consistent and therefore more accurate than direct measurements taken from the mouth, particularly in the posterior segments where measuring becomes unwieldy.

The sample was collected from Karachi, which is a metropolitan city; residents are from different ethnic variety, which includes mainly Sindhi, Punjabi, Pathans, Baluchi and Muhajirs. So in future similar studies are required on larger scale to evaluate that if there is any significant difference in between these groups.

Difference in mesiodistal crown width in each group of pairs like right and left central incisors right and left lateral incisors right and left canine and premolars has been evaluated. In this study there was significant difference (p<0.05) in _____ in maxillary left quadrant. In maxillary right quadrant _____ significant difference.

In the left mandibular quadrant central Incisor, lateral incisor, canine and first premolar showed significant difference. In the right mandibular quadrant central incisor, lateral incisor, canine, second premolar and first molar shows significant difference.

Margherita Santoro¹⁵ carried out a study to evaluate the mesiodistal crown dimensions and tooth size discrepancy of permanent dentition in the Dominican American population. The mean, range and standard deviation was calculated for the size of the teeth and a coefficient of variation was obtained for the tooth size ratio. A 2-sample *t*-test was used to test for the statistical difference between the means. In general, the values obtained from Dominican American sample closely resembled the previous data available from the African American population. The tooth size ratios obtained were compared with the Bolton ratios. The overall ratio was found to be 91.3 equivalent to the Bolton overall ratio where as the anterior ratio was 78.1 larger than 77.1 Bolton ratio.

Merz¹⁶ investigated to test the hypothesis that a sample of black patients will have larger mesiodistal tooth diameters and larger dental arch perimeters than a corresponding sample of white patients. He found in the study, that the black sample's mean canine, first and second premolars, and first molar mesiodistal diameters were significantly larger than those of the white sample. The dental arches of the black patients were significantly wider and deeper but did not show significantly more crowding. Gender and race differences did exist, but gender differences were controlled by sampling procedures. The black sample also had a larger mean MP-SN angle but this was not accompanied by the increased crowding and the narrower dental arches that had been reported associated with high-angle white samples.

Alwazzan KA¹⁷ examined Four-hundred and six patients (191 males and 215 females) to investigate the variation of mesiodistal crown width and amount of tooth display between right and left maxillary anterior teeth. The result of this survey indicated that right and left maxillary anterior teeth are not always identical. A difference of up to 1 mm in mesiodistal width and the amount of tooth exposure between the right and left maxillary central incisors is considered to be within the range of normal appearance.

McKeown et al¹⁸ compared tooth dimensions in hypodontia patients, their unaffected relatives and a control group measured by a new image analysis system. Tooth dimensions were compared between index patients with severe hypodontia (six or more congenitally missing teeth), their relatives with a full complement of teeth, and a control group. The groups consisted of 12 index cases (seven females and five males), 21 relatives without hypodontia (13 females and eight males), and a control group of 10 males and 10 females with complete dentitions, and no family history of hypodontia. All formed teeth were imaged buccally and occlusally from study models, with a digital camera linked to a computer. The images were acquired and measured using Adobe Photoshop and Image Pro Plus, respectively. Mesiodistal,

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Table I

Difference in teeth size in Males and Females					
Tooth	Males Mean width	Females Mean width	std (mean M+F)	P value	Mean width (M+F)
Uci R <	8.839	8.557	0.549	.001	8.698
Uci L	8.895	8.598	0.9835	.001	8.7465
Uli R >	7.258	6.983	0.5895	.001	7.1205
Uli L	7.158	6.990	0.7055	.091	7.074
Uc R >	7.683	7.559	0.562	.077	7.621
Uc L	7.671	6.990	0.7005	.316	7.3305
Up1 R <	6.818	6.762	0.5415	.480	6.79
Up1 L	6.900	6.749	0.776	.026	6.8245
Up2 R >	6.705	6.518	0.523	.006	6.6115
Up2 L	6.633	6.458	0.5625	.022	6.5455
Um1 R <	10.470	10.258	0.902	.100	10.364
Um1 L	10.356	10.446	0.698	-.090	10.401
Lci R >	5.791	5.405	0.656	.000	5.598
Lci L	5.659	5.431	0.3965	.000	5.545
Lli R >	6.130	5.869	0.458	.000	5.9995
Lli L	6.185	5.810	0.499	.000	5.9975
Lc R <	6.862	6.523	0.502	.000	6.6925
Lc L	6.897	6.521	0.492	.008	6.709
Lp1 R <	6.953	6.816	0.568	.061	6.8845
Lp1 L	6.982	6.793	0.5325	.008	6.8875
Lp2 R <	7.032	6.900	0.5	.047	6.966
Lp2 L	7.073	7	0.5195	.340	7.0365
Lm1 R <	10.547	10.235	0.7815	.008	10.391
Lm1 L	10.561	10.379	0.715	.053	10.47