Differences in Tooth Size Ratio between Male and Female Patients Reporting to OPD of Orthodontic Department LUMHS, Hyderabad/ Jamshoro

1. Qamer-un-Nisa Memon 2. Khalil Ahmed Alizai

1. Assoc. Prof. of Orthodontics, Liaquat University of Medical & Health Sciences, Jamshoro / Hyderabad
2. Sen. Registrar, of Orthodontics, Bolan Medical College Quetta

ABSTRACT

Objectives: This was a cross sectional study aimed to assess differences in tooth size ratio between male and female patients reporting to OPD of orthodontic department L.U.M.H.SHyderabad/ Jamshoro.

Study Design: Cross sectional study.

Place and Duration of Study: This study was conducted at the Dental OPD of Orthodontic Department,Liaquat University of Medical & Health Sciences, Hyderabad/ Jamshoro.

Materials Methods: The study was carried out on 100 (50 male, 50 female) study casts. Criteria for selection of the study casts were pretreatment orthodontic casts with neutral occlusion (Angle Class I) and fully erupted permanent teeth with no dental anomalies. The individual mesiodistal tooth size was measured with a Boley's gauge. The mean and standard deviation were calculated for the size of the teeth and the interarch tooth width ratios both anterior and overall.

Results: The ratios for the tooth size were compared to the original Bolton ratio. The overall ratio was found to be 91.42 almost equivalent to the original Bolton ratio of 91.3, whereas the anterior ratio was found to be 79.02, higher than the 77.1 as calculated by Bolton. The mean values for the overall and anterior ratio for the male and female subjects determined which were not statistically significant.Standard deviations for overall & anterior ratio were larger than the Boltons' value.

Conclusion: There were no significant differences between the mean overall and anterior tooth width ratio of males and females. Even though the values are not significantly high, a careful analysis of interarch tooth size relationship (Bolton's ratio) should be added along with other diagnostic considerations before initiating orthodontic treatment for better finishing and stability.

Key Words: Tooth size discrepancy, Tooth size, Bolton ratios

INTRODUCTION

The task of an orthodontist is to align the teeth and dental arches to improve the masticatory efficacy and facial esthetics.[1] The proportional relationship between the mesio-distal crown dimensions of the upper and lower teeth accepted as an important index by which an orthodontist can determine the possible esthetic and functional limits of treatment, especially with regard to the finishing phase of orthodontic therapy.[2,3,4] The presence of tooth size discrepancy make it difficult to obtain an occlusion with good alignment, ideal overjet, overbite, and a Class-I molar relationship.[5,6]

Tooth size discrepancy means disproportion among the sizes of individual teeth, when this disproportionality is observed than the clinical manifestations may be crowding, spacing, overjet, overbite and improper occlusion.[7] Therefore, it is mandatory to determine the proportionality of the maxillary and mandibular teeth in the same arch and between arches right at the start of treatment.[8]

Treatment planning without consideration of tooth size ratio can compromise the final results, especially in extraction cases if the chosen extraction pattern leads to a clinically significant mandibulo- maxillary tooth size discrepancy. Many investigators measured the tooth sizes in relation to occlusion following Black's investigation in 1902 and Neff 10 in 1949.[9] Pioneer work on tooth sizes was conducted by Dr. Wayne Bolton in 1958, he believed that an optimal occlusion and the achievement of proper occlusalinterdigitation in the finishing stages of orthodontic treatment are not possible without the correct maxillary and mandibular mesiodistal tooth size relationship. He provided the normative data on the mandibular to maxillary tooth size ratios which was widely accepted and it was then named after him as Bolton ratio.[10]

Several studies have been carried out to set the norms for the Bolton ratio on various ethnic groups.[11, 12, 13]

As far as the factors responsible for the determination of the tooth size dimensions, several studies indicate that tooth size ratios show genetic, ethnic, racial and sex differences.[14, 15]

A strong variation is found in the literature regarding relation of tooth size discrepancy and gender. A

polygenic model of inheritance best explains the genetic basis for this variation.[16]

Many studies have been done internationally, however no study has been carried out in Sindh population to set the norms for tooth size ratio. A study on these lines would provide a strong key for orthodontic diagnosis and improve the quality of orthodontic finishing in our population.

MATERIALS AND METHODS

A Cross sectional study was conducted to calculate differences in tooth size ratio between male and female patients reporting to OPD of Orthodontic Department L.U.M.H.S Hyderabad.

Site of study: This study was conducted at the Dental OPD of Orthodontic Department,Liaquat University of Medical & Health Sciences, Hyderabad/ Jamshoro.

Study population: 100 casts of patients,reportingto OPD of Orthodontic Department Liaquat University of Medical & Health Sciences, Hyderabad/ Jamshorofor treatment, were analyzed.

Inclusion Criteria: Patients with Class-1 molar relationship, having permanent dentitions and having fully erupted first Molar in both arches.

Exclusion Criteria: Patients with mesiodistal tooth loss due to carries/trauma, prosthesis/ crowned teeth, extensive tooth fillings and with apparent congenital craniofacial anomalies.

Sampling Technique: Initially a sample of 200 patients consisting of both male and female individuals having Class I occlusion belong to different ethnic groups, living in Hyderabad were selected through a non-probability sampling technique. Through a simple random sampling 100 patients were selected.

Data Collection/ Analysis: Good quality study models of 100 subjects were produced after satisfying the inclusion criteria. A sharpened mechanical Boley's gauge accurate at 0.1mm was used to measure the teeth. Measurements were taken at the highest contact points or at the widest mesiodistal widths of all permanent teeth from right to left first molars of the maxillary arch. The tip of the Boley's gauge was held perpendicular to the long axis of each tooth. The same procedure was done for the mandibular teeth. The measurements were repeated two times after the interval of week to avoid error. All the data was recorded in the proforma.

The mean, standard deviation for the mesiodistal tooth sizes and Bolton ratio was measured. The data was analyzed on SPSS version 16.

Ethical Considerations: The study proposal was reviewed and approved by ethical review committee of Liaquat University of Medical & Health Sciences, Hyderabad/ Jamshoro and permission was granted by the Dean of faculty of Dentistry.

RESULTS

The results of the study reveal that the mean overallinterarch tooth width ratio among males wasslightly higher (91.52 ±3.39) than the females (91.23 ±2.60). Mean overall anterior interarch tooth width ratio among males (79.80 ±3.36) was also found to be slightly higher as compared with females (79.58 ±3.78). (Table I)

Statistical comparisons reveal that the mean difference of overall interarch tooth width ratio of males and females (-.10463) and mean differences of anterior tooth width ratio of males and females (-.19583) of the present study sample were not statistically significant. (Table 2)

Table No.I: Overall and anterior interarch tooth width ratios of the male and female individuals of the present study sample

	Males		Females	
	Overall interarch tooth width ratio	**Anterior interarch tooth width ratio**	**Overall interarch tooth width ratio**	**Anterior interarch tooth width ratio**
N	50	50	50	50
Mean	91.52	79.80	91.23	`79.58
S.D	3.39	3.36	2.60	3.78
Range	7.99	16.9	12.56	15.33
Minimum	86.45	71.73	84.03	73.04
Maximum	94.44	88.63	96.59	88.37

Table No.2 : Comparison of the means ofoverall interarch and anterior tooth width ratio of males and femalesof the study sample

Comparison of means	T	df	Significance (2 tailed)	Mean Difference	95% Confidence interval of the difference	
					Lower	Upper
Overall ratio of females with males	-.264	49	.793	-.10463	-.9060	.6967
Anterior ratio of females with males	-.363	49	.718	-.19583	-1.2854	.8937

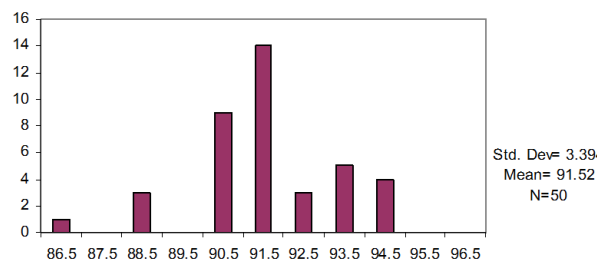**Test value (Overall 91.52&Anterior 79.81)**

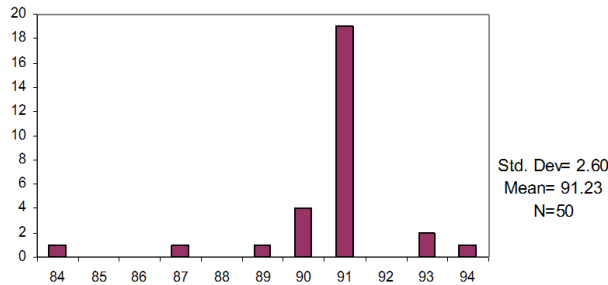**Figure A: Overall tooth width ratios of males of the present study sample**

Figure B: Overall tooth width ratios of females of the present study sample

DISCUSSION

When the overall and anterior ratios of the males were compared to females for the current study sample, female overall ratio was 91.23 SD ±2.6, approximates the Bolton overall ratio of 91.3 S.D±1.91 more closely than males (Table I).This finding strengthens the idea of Smith et al.[17] that the Bolton ratio is only applicable to white females as the Bolton sample was mainly consisted of white females.

The male overall and anterior ratio for the current study sample are found slightly greater than the females (Table I), but the differences are notstatistically significant. These findings are in agreement with Nourallahet al.[18]when studying Syrian subjects and Moshabab[19] when studying Saudi subjects. Further Toshiya et al.[12] found insignificant results in Japanese population regarding gender differences. They speculated that gender differences in tooth size ratios may be population specific. However these findings are in contrast to Behnam M et al.[20] and Santoro et al.[21] as they found high variability in male and female subjects.

CONCLUSION

There are no significant differences between the mean overall and anterior tooth width ratio of male and female for the current study sample.

The current study finding suggest that even though the values are not significantly high, a careful analysis of interarch tooth size relationship (Bolton's ratio) should be added along with other diagnostic considerations before initiating orthodontic treatment for better finishing and stability.

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Address for corresponding author:
Dr. Qamer-un-Nisa Memon
Associate Professor,
Head of Orthodontics Department ,
Liaquat University of Medical & Health Sciences,
Jamshoro / Hyderabad.
Cell No: 0300-3064922,
E-mail: nisa_memon@hotmail.com
Postal Address: 6-Defence,
Main Thandi Sarak, Hyderabad.