FREQUENCY OF TOOTH SIZE DISCREPANCY WITH CLASS I & II DENTAL MALOCCLUSION GROUPS IN PATIENTS SEEN AT BUMDC DENTAL OPD

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ABSTRACT

Present study was aimed to investigate the frequency of anterior tooth size discrepancy in Angle's class I and class II malocclusion groups seen at Bahria University, Karachi.

Male and female subjects were randomly selected and assigned to two dental malocclusion groups according to Angle's classification class I, and II. Total number of subjects were 108 (55casts of Angle's Class I and 53 casts of Class II malocclusion). Sampling technique was non-probability, purposive type with anterior permanent teeth erupted in the upper and lower arches. The width of each tooth was measured from its mesial contact point to its distal contact point at its greatest interproximal distance. Bolton's anterior (canine to the canine) ratios were calculated.

Gender distribution was 29 males and 78 female with mean anterior ratio of class I (mean =2.33) and class II (mean = 2.51) On comparison of anterior ratio no significant difference was found between class I and class II malocclusion groups which was indicated by the p value (p = 0.565).

The use of the actual millimeters of correction for the tooth size ratios could help orthodontists avoid underestimating the prevalence of clinically significant tooth size discrepancy

Key Words: *Tooth size discrepancy; Bolton's ratio; malocclusion.*

INTRODUCTION

The etiology of malocclusion can be generally categorized under either hereditary, environmental, or a combination of both factors. Exploring the cause of malocclusion, it is significant for selecting the most appropriate treatment approach as well as the most appropriate retention device.[1]

Tooth sizes are calculated by taking the mesio-distal widths of the maxillary and mandibular teeth and are used to establish space discrepancy for an arch.[2] To ensure proper occlusion, overbite and overjet, precise dimensions must exist between maxillary and mandibular teeth. Amongst orthodontists, opinions vary widely concerning the frequency of significant tooth size discrepancy and the need to measure it in clinical practice.[3] Crowding and spacing are considered the most common manifestations of malocclusion[4] and can occur as a result of either a deficiency of the space required for tooth alignment or an excess of available space.[4] Disproportion in the sizes of teeth between the maxillary and mandibular arches is common. Tooth size discrepancy is often limited to a single tooth such as a peg lateral, but it may be present in more teeth as well. A careful evaluation of the amount of space for the final restoration of such teeth is crucial. The presence of an abnormally large tooth in any arch may affect extraction decisions.[5-8] Tooth size analysis was presented by Bolton in 1958.[2] He calculated the specific ratios of the mesio distal widths that must exist between the maxillary and mandibular anterior segments as well as for the whole arch from right 1st molar to left 1st molar for harmonization of maxillary and mandibular teeth.[2] The ratio for anterior segment was derived to be 77.2±0.22 and 91.3±0.26 for the whole arch. The analysis is done by measuring the mesio distal width of each permanent tooth. Then the ratios of the added width of the maxillary to the mandibular anterior teeth and the total mesio-distal width of all maxillary to mandibular teeth are compared with Bolton's given ratios.

A difference greater than 2 SD of the normal ratios is clinically significant.[6,9,10] Among patients undergoing orthodontic treatment, the occurrence of an overall Total space discrepancy (TSD) has varied from 4%– 11%.[11] Anterior total size discrepancies (TSDs), however, have prevalence between 17% and 31% among orthodontic patients.[12] The anterior tooth size ratio was higher for Hispanics (80.5%) than for Black people (79.3%). in spite of these results, Othman and Harradine[13] noted that the inclination to larger overall tooth size ratios in Black populations is not likely to be clinically relevant. Important discrepancies in the overall and anterior tooth size ratios have been found in Japanese, Iranian-Azari, Spanish, and Brazilian subjects.[14-17] therefore there was a need for calculation of bolton's ratio for our population. Locally work has been done to calculate these values. We aim to find out if there was a variation of bolton's discrepancy occurrence in patients with different malocclusions. The objective of this study was to determine the relationship between Anterior Tooth size discrepancy with dental Class I and Class II malocclusion groups in patients seen at BUMDC dental outpatient department.

METHODOLOGY

The data for this study was obtained from the records of the Bahria University Medical & Dental College, Department of Orthodontics. The sample selection procedure was based on the presence of permanent dentition defined by the presence of all teeth at least from first molar to first molar, anterior permanent teeth erupted in the upper and lower arches; good-quality study casts; absence of tooth deformity; no record of restoration or stripping of incisor and canine teeth. The male and female subjects were randomly selected and assigned to two dental malocclusion groups according to the Angle classification classes I, and II. Total number of subjects were 108 (55casts of Angle's Class I and 53 casts of Class II malocclusion). Sampling Technique was Non-Probability, purposive type. anterior permanent teeth erupted in the upper and lower arches; good-quality study casts; absence of tooth deformity; no record of restoration or stripping of incisor and canine teeth. Patients exhibiting, fractures of teeth or ectopically erupted teeth, anomalies of tooth size, anomalies of tooth number (e.g. hyperdontia, hypodontia, cases of fusion of teeth), history of previous orthodontic treatment, craniofacial syndrome or anomalies were excluded. A stainless steel Boley Gauge vernier caliper was used to measure the mesiodistal width to the nearest 0.1 mm. The width of each tooth was measured from its mesial contact point to its distal contact point at its greatest interproximal distance. Bolton anterior (canine to the canine) ratios were calculated with the following formulae:

$$\frac{\text{Sum mandibular "6"}}{\text{sum maxillary "6"}} \times 100 = \text{anterior ratio (\%)}$$

Data was analyzed using SPSS- version 21. Mean (X) and standard deviation (SD), values were calculated for each measurement. To compare the means of anterior ratio in both malocclusion groups independent test was applied.

RESULTS

Out of 108 subjects, there were 55 casts of angle class 1 and 53 casts of angle class II dental malocclusion. The gender distribution among subjects was not equal showing 29 males and 78 female patients. The mean anterior ratio of class I (mean =2.33) and class II (mean = 2.51) are shown in Table 1. When comparison was done of anterior ratios between the two malocclusion groups, there was no significant difference found between class I and class II malocclusion groups which was indicated by the p value (p = 0.565).

TABLE 1: COMPARISON OF MEANS OF ANTERIOR RATIO IN CLASS I AND II MALOCCLUSION GROUPS (N=108)

Ant Ratio In mm			
Dental class	Mean	n	Std: Deviation
1	2-3327	55	1.65530
2	2.5179	53	1.67467
Total:	2.4236	108	1.65964

P value = 0.565

TABLE 2: MEAN ANTERIOR RATIO IN MALES AND FEMALES

Anterior ratio in mm			
Gender	Mean	n	Std. deviation
Male	3.0003	29	2.20831
Female	2.2274	78	1.36515
Total	2.4236	108	1.65964

DISCUSSION

Definition of discrepancy in tooth size is the lack of harmony between the mesiodistal widths of individual teeth or groups of teeth when related to their functional counterparts of the opposing arch. Any difference will result in either spacing in one arch, crowding in an arch or a compromise in functional relationships. To attain good occlusion with the correct overbite and overjet, the maxillary and mandibular teeth must be proportional in size to each other.[18]

Al Khateeb and Abu Alhaija19 found no statistically significant differences in Bolton's ratios between the different malocclusions. Their sample consisted of 140 orthodontic models of school children aged between 13-15 years of Jordanian origin. Their result was similar to this study where there was no significant difference seen between Class I and II malocclusion groups on comparison.

Fattahi et al[20] assessed inter arch tooth size discrepancy among different malocclusion groups. The study was conducted using pre treatment models of 200 patients with equal gender distribution and from four malocclusion groups. The mean overall ratios in order were Class III >Class I >Class II Div 2 >Class II Div 1. The mean anterior ratio for the Class III sample was significantly greater than that for Class II subjects but showed no significant difference from the Class I subjects. The posterior and overall ratio of the Class III malocclusion group was statistically significantly greater than the other malocclusion groups (p<0.05).

Whereas in Current study, 108 patients without equal gender distribution and from two malocclusions were taken..The mean anterior ratio showed no significant difference when compared to each other with p value 0.56.

Crosby and Alexander[21] also compared the tooth size ratios among different malocclusion groups, as in this study. They found that there were no significant differences among Class I, Class II division 1, Class II division 2, and Class II surgery groups. This study also found no significant difference between these groups. In this study we compared the tooth size ratios among Angle's class I and class II malocclusion groups and found no significant difference in mean anterior ratios of the two malocclusion groups. Crosby and Alexander 21 did not include class III malocclusion group, as in the current study. They tried to verify the presence of a tooth size discrepancy in 109 patients, and compared the average of the anterior and overall Bolton indices but did not find any statistically significant difference in the incidence of the tooth size discrepancy among the groups (Class I, Class II divisions 1 and 2, and surgical Class II. Our findings were similar to their results with respect to the absence of statistically significant differences when comparing Class I and Class II malocclusion groups.

Several studies were published describing the importance of a correct tooth size proportion between the upper and lower arches. Afzal et al[22] studied Bolton's ratios in 3 malocclusion groups in 55 Pakistani patients. While Class III group had the largest ratio followed by Class II and then by Class I, however like the results of this study, their differences were not statistically significant.

Tooth size discrepancies are considered an important variable, especially in the anterior segment. Araujo and Souki[23] studied 300 subjects who were allocated to three malocclusion groups based on their skeletal malocclusion with each group containing 100 individuals. The classification was done on the basis of ANB angle and Sassouni analysis. Significantly higher anterior mean ratios were found in Class III groups as compared to Class I and Class II groups. Tooth size discrepancy was found to be more prevalent in Class I and Class III groups.

In this study we also compared the tooth size ratios among Angle's class I and class II malocclusion groups and found no significant difference in mean anterior ratios of the two malocclusion groups, however the classification was not done on the basis of cephalometric analysis. It was done on basis of dental malocclusion assessed clinically in 108 subjects. The presence of a tooth size discrepancy [TSD] prevents the achievement of an ideal occlusion. Laino et al[24] found no relation between inter and intra arch tooth size discrepancy and malocclusion groups. Their sample comprised of 94 pre treatment models of orthodontic patients.

Hashim 25 did not find any difference in Bolton's ratios between different malocclusion groups. His sample comprised of 55 orthodontic patients of different malocclusion groups. Alkofide and Hashim[26] studied the intermaxillary tooth size discrepancy in Saudi population. The sample consisted of 240 subjects, 60 cases in each malocclusion group. A significant difference was observed only for anterior ratios in class III groups, unlike this study in which Class III malocclusion was not assessed.

In some situations, tooth size discrepancy is over looked at the time of starting the treatment .It could result in poor contacts, spacing, crowding, and an abnormal overjet and overbite at the finishing stage of the treatment. Several authors[22] proposed new methods to study tooth size discrepancies. However, these suggestions need to be tested in clinical studies and, for now, the Bolton analysis prevails as an effective clinical tool for assessing various relationships of upper to lower dentitions. The high prevalence of anterior tooth size discrepancy (TSDs) in Irish orthodontic population[27] suggests that a tooth size analysis should be conducted at the treatment planning stage. Where significant TSDs are detected, this is normally accommodated by the reduction or augmentation of tooth tissue.

Genetic influences have been considered important in the determination of tooth dimensions, and the first reports were related to clinical observations within families. Studies on twins, however, helped in understanding the genetic contribution of tooth size in that a greater tooth size correlation was found in monozygotic twins.[27]

CONCLUSION

No significant differences in anterior ratio were found among the class I and Class II malocclusion groups. The use of the actual millimeters of correction for the tooth size ratios could help orthodontists avoid underestimating the prevalence of clinically significant tooth size discrepancy.

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