

Relation of tooth dimension with dental class 1 malocclusion in north Indian population

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Abstract: - Introduction- Dental class I malocclusion is a most common malocclusion found in north India. Cases with crowding in anterior segment and bimaxillary protrusion is also commonly encountered cases in daily orthodontic practice. The role of mesiodistal width in such malocclusion can be a contributing factor for such malocclusion. **Purpose:-**the purpose of the study was to determine the correlation between tooth width and type of malocclusion.

Methods: 150 pretreatment cast of patients were selected and divided into 3 groups. The mesio distal width of each tooth was measured with Vernier caliper and tabulated.

Results: the mesiodistal tooth dimensions of upper and lower anterior tooth were significantly higher in crowded and proclination group than uncrowded group. One-way analysis of variance (ANOVA) was used to compare the mean. Tukey HSD Tests was used for multiple pair wise comparisons of sum of six anterior teeth.

Conclusion: There is a significant difference in mesiodistal width of class I patients with anterior crowding or proclination.

Keyword: - mesiodistal width, proclination, crowding

INTRODUCTION

Differences in tooth size have been associated with different ethnic backgrounds and malocclusions¹. Several methods have been described to evaluate interarch tooth size relationship such as Kesling's diagnostic setup², Neff's anterior coefficient³ and Bolton's ratios⁴ for the six anterior teeth, and the overall ratio for the 12 teeth. The aim of this study was to determine: the mean mesiodistal tooth width, the anterior and overall Bolton ratios, the arch length, and arch width in the different malocclusions in a north Indian sample. Over jet and overbite is jeopardized by tooth size discrepancy⁵. For good occlusion, the upper and lower teeth must be proportional in size. If large upper teeth are combined with small lower teeth, as in a denture setup with mismatched sizes, there is no way to achieve ideal occlusion. Comparison between the mesio-distal widths of teeth with the opposing corresponding tooth on the other side of the dental arch carried out by Ballard⁶

His results indicated that 90% of his sample showed a right left discrepancy in mesio-distal width equal to or exceeding 0.25 mm. His suggested solution was the stripping of proximal surfaces when a lack of balance existed. Lavelle⁷ showed interest in determining if patients with differing malocclusion groups have different norms of Interarch Tooth Size Discrepancy (ITSD). He found that patients with Angle Class III malocclusions tend to have higher ITSD than Class I or II patients. Araujo and Souki⁸ studied 100 patients in each malocclusion and found that Class I and III patients had greater ITSD than Class II patients. They also found that Class III patients had more anterior ITSD than Class I and II patients. However many studies have found no differences in ITSD between malocclusion groups⁹.

MATERIALS AND METHODS

150 pretreatment cast of skeletal class I patients with class I molar relation with no any proximal restoration or dental anomaly in tooth size, shape and number were selected. These sample were divided into 3 groups (50 samples for each group) as follow:-

Group A: - class I patients with normal anterior tooth relationship

Group B: - class I patients with anterior crowding (upper arch / lower arch or both arches)

Group C: - class I patients with bimaxillary protrusion

Tooth width measurement: For each tooth, all mesio-distal measurement was taken thrice with a digital Vernier caliper (Precision 150 digital caliper) accurate to within 0.01 mm. The average of these measurements was taken as the actual value.

The data were subjected to statistical analysis using SPSS (Statistical Package for Social Sciences) version 20.0 statistical analysis software. The descriptive statistics including the mean, standard deviation (SD), minimum, and maximum values were calculated for each of the experimental groups. One-way analysis of variance (ANOVA) was used to compare the mean. Tukey HSD Post Hoc Tests was used for Multiple pair wise Comparisons of sum of six anterior teeth.

RESULTS

This study was done to find the correlation between tooth dimension and class I malocclusion with normal anterior tooth relation, anterior crowding and class I bimaxillary protrusion cases. Mesiodistal widths of all teeth from canine on one side to that on the other side were measured for both maxillary and mandibular arches.

Mesiodistal tooth dimensions:

Table 1 shows the comparison of collective mesiodistal teeth width of 6 anterior teeth in both maxillary and mandibular arches between Group A, B and C, which revealed that the mesiodistal tooth dimensions were significantly higher in crowded (Group B) and proclination group (Group C). Table 2 shows multiple pair wise Comparisons of sum of six anterior teeth in maxillary and mandibular arches between each groups.

Table 1: -One way ANOVA test for comparison of mean values of maxillary and mandibular anterior teeth

Variables	Groups	N	Mean	Std. Dev	Min	Max	P-Value
Sum of max 6 anteriors	Group A	50	45.24	1.343	43	48	<0.001
	Group B	50	48.81	1.152	46	51	
	Group C	50	48.76	1.364	47	52	
	Total	150	47.60	2.112	43	52	
Sum of mand 6 anteriors	Group A	50	35.80	1.369	33	39	<0.001
	Group B	50	38.10	0.895	36	40	
	Group C	50	37.89	0.848	37	40	
	Total	150	37.26	1.483	33	40	

Table 2: -Tukey HSD Post Hoc Tests for Multiple pair wise Comparisons of sum of six anterior and total 12 teeth in maxillary and mandibular arches between groups.

Variable	Pairs	Mean Diff	Sig.
Sum of max 6 anteriors	Group A - Group B	-3.577	<0.001
	Group A - Group C	-3.523	<0.001
	Group B - Group C	0.053	0.986
Sum of mand 6 anteriors	Group A - Group B	-2.303	<0.001
	Group A - Group C	-2.093	<0.001
	Group B - Group C	0.210	0.726

A significant difference was found in sum of mesiodistal width of all 6 anterior teeth between

normal occlusion group (control group) and anterior crowding group; and between normal occlusion group (control group) and bimaxillary protrusion group in both the arches. However no significance was found between crowding group and bimaxillary protrusion group.

Discussion

Malocclusion is a developmental condition. In most instances, malocclusion is caused, not by some pathologic process, but by moderate distortions of normal development¹⁰. Earlier study on arch perimeter in class I malocclusion found that, it was significantly more in class I bimaxillary and crowding cases in both upper and lower arches when compared to normal occlusion¹¹. While studying the relationship between maxillary and mandibular effective lengths and dental crowding in patients with Class II malocclusions it was concluded that decreased maxillary and mandibular effective lengths are an important factor associated with dental crowding in patients with complete Class II malocclusion¹². Agenter¹³ studied the Influence of tooth crown size on malocclusion and suggested that tooth size is not necessarily the foremost cause of malocclusion in a patient, but it should be evaluated. A significant difference in arch width was found in, class I crowded and class III malocclusions with normal occlusions¹⁴. Earlier studies suggested that Mesiodistal tooth size was an important factor in the assessment of crowding or spacing and in orthodontic treatment planning¹⁵. Shigenobua¹⁶ concluded that, the prevalence of dental crowding was highest in the anterior region and was related to the same tooth on each side (right lateral incisor vs. left lateral incisor).

Tooth size arch length discrepancy is a common cause for malocclusion. Present study was designed to find a correlation between tooth size and the malocclusion. We have selected only dental malocclusion patients for the study. Mean mesiodistal width of upper 6 anterior teeth was found to be 45.24 ± 1.343 mm in normal anterior tooth relation patients (controls). While in the crowded anterior (48.81 ± 1.152 mm) patients and bimaxillary protrusion patients (48.76 ± 1.364) this sum of teeth width was higher than the control groups. Similarly in the lower arch normal occlusion patients (35.80 ± 1.369 mm) had lesser width than crowded lower anterior (38.10 ± 0.895 mm) and bimaxillary protrusion patients (37.89 ± 0.848 mm).

Conclusion

A significant difference in anterior 6 tooth dimension was found in both arches of crowding cases and bimaxillary protrusion cases compared to normal occlusion in dental class I malocclusion of north indian population.

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