

Correlation Between Tooth Size Discrepancy and Malocclusions in Chhattisgarh Population Sample

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Abstract: One of the main tasks of an orthodontist is to obtain a functionally balanced occlusion between the upper and lower dental arches. For an ideal occlusion, the mesiodistal crown diameters of the teeth in both arches should correspond. The mesiodistal tooth sizes of the maxillary and mandibular arches must have an ideal relationship to obtain an excellent occlusion at the completion of orthodontic treatment. This study was done to observe the difference in dimension of teeth among class I and class II malocclusion and comparing them with the ideal values given. Mesiodistal and buccolingual crown dimensions were measured on study casts by using digital sliding calliper in 2 groups. Group 1 had 150 subjects with class I malocclusion, while Group 2 had 150 with class II malocclusion. Independent t test was conducted to evaluate the difference between the dimensions of teeth of the two groups. Statistical analysis was done on SPSS version 16, and p value was considered significant at 0.05. The difference between the groups showed a greater tooth dimension in the class II malocclusion group of population compared to the class I group. Conclusion of this study suggests that Mesiodistal and buccolingual crown dimensions were characteristically larger in the class II malocclusion group.

Key Words: — *Mesiodistal crown, mandibular arches, buccolingual crown, malocclusion.*

I. INTRODUCTION

Malocclusion has been a major concern for most countries¹ since the rising problem seems to be affecting more and more individuals, leading them to seek orthodontic correction. Various factors have been related to malocclusion, but one thing long standing regarding its aetiology is its relationship with growth and development². Various researches have tried to prove that it is originally the environmental trigger before birth that induces developmental issues like malocclusion³.

For the malocclusions that are not developmental, an association between the change in position of teeth and arch dimensions has been considered to be the causative factor⁴. The size of the teeth is a characteristic developed during the developmental process⁵. Its role as a causative agent in malocclusion is critical and has been researched upon by scientists. Orthodontic problems like Tooth-Size-Arch- Size discrepancies (TSASDs) are most commonly related to tooth sizes⁶.

The purpose of this investigation was to compare the mesio-distal and bucco-lingual crown dimensions of incisors and molars and compare them with 2 groups i.e group 1 with Class I malocclusion and group 2 with class II malocclusion.

1.1 Aims and Objectives-

The aim was to determine whether people with bigger tooth crown diameters are at greater risk of having malocclusions

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assessed as tooth-size arch-size discrepancies.

1.2 Materials and Methods

Materials included for the study-

- Patient study cast
- Digital calliper

1.3 Inclusion Criteria

- Patient with all incisors and molars present.
- Fully erupted incisors and molars.
- Patient with class I and class II malocclusion
- Good quality models of the normal occlusion and pre-treatment models of the malocclusion groups.
- No mesiodistal or occlusal tooth abrasion.
- No residual crown or crown-bridge restoration.
- Absence of tooth anomalies regarding form, structure, and development.

1.4 Exclusion Criteria

- Congenitally missing tooth.
- Partially erupted teeth.
- Poorly defined study cast.
- Traumatic/fractured tooth

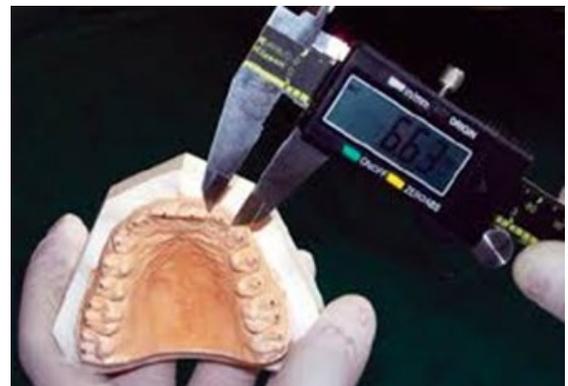
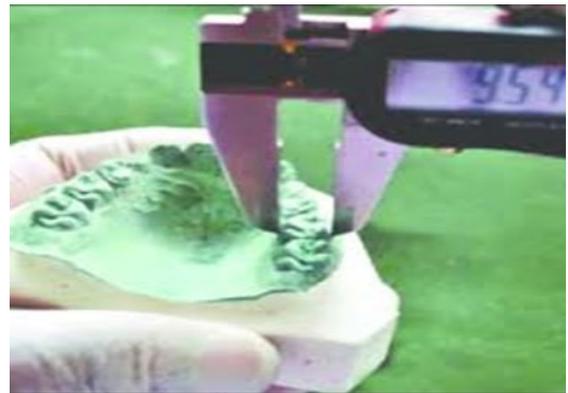
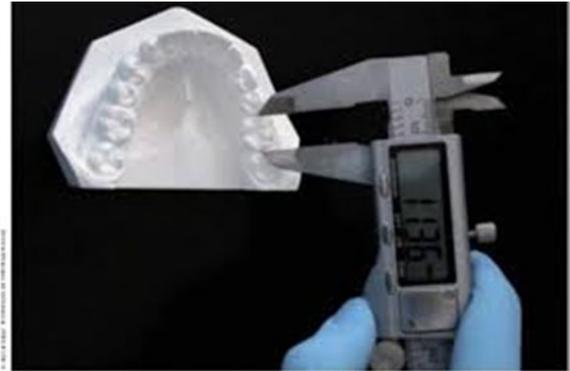
II. METHODOLOGY

The cross-sectional study was conducted at Triveni dental college Bilaspur, Chhattisgarh, and used non-probability consecutive sampling, picking up a total of 300 patients. They were evaluated and their tooth sizes were noted down. Of the total, 150 had class I malocclusions whereas Remaining 150 subjects class II malocclusion.

The measurements of tooth sizes were done on cast models of the subjects with the help of calibrated sliding calipers. The measurements were done systematically starting from the central incisor followed by lateral incisors and to the 1st molar and second molar. Mesiodistal and buccolingual measurements of each tooth were recorded in a proforma along with the general details of the subject and their allotted group. Mesiodistal measurements were recorded from the point of maximum convexity at the mesial surface of the clinical crown to the point of maximum convexity at the distal surface of the clinical crown. Similarly, the buccolingual was

also measured from the points of highest convexity on each surface.

Statistical analysis was done using SPSS version 16 and p value was considered significant at 0.05. Student's t test was applied for each tooth to see if there was a difference between the measurements of each tooth within each group.



III. RESULTS

The data was tabulated in Microsoft Excel and analysed with SPSS V.24. Independent t test was used for the comparisons

between the groups. The p value ≤ 0.05 was considered as statistically significant at 95% confidence interval.

Table.1. Comparison of the parameters between Class I and Wheeler's normal values

Parameters		N	Mean	SD	95% CI	p value
Mesio-distal width of molars	Class I	150	10.96	0.40	0.40-0.53	<0.001
	Wheeler	150	10.50	0.00		
Bucco-lingual width of molars	Class I	150	11.51	1.16	0.33-0.70	<0.001
	Wheeler	150	11.00	0.00		
Mesio-distal width of incisors	Class I	150	8.32	0.53	0.49-0.66	<0.001
	Wheeler	150	7.75	0.00		
Bucco-lingual width of incisors	Class I	150	9.85	0.87	3.21-3.49	<0.001
	Wheeler	150	6.50	0.00		

All the parameters are found to be greater in Class I on comparison to the Wheeler's normal values. The differences in the parameters between the groups are statistically significant.

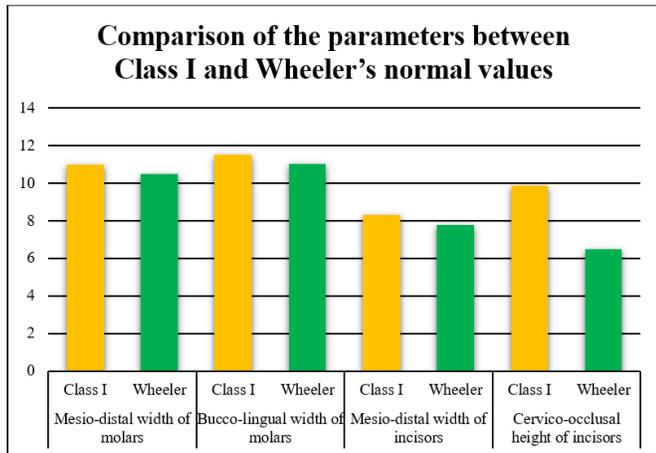


Table.2. Comparison of the parameters between Class II and Wheeler's normal values

Parameters		N	Mean	SD	95% CI	p value
Mesio-distal width of molars	Class II	150	11.28	0.63	0.68-0.88	<0.001
	Wheeler	150	10.50	0.00		
Bucco-lingual width of molars	Class II	150	12.30	0.98	1.14-1.45	<0.001
	Wheeler	150	11.00	0.00		
Mesio-distal width of incisors	Class II	150	9.00	0.85	1.11-1.39	<0.001
	Wheeler	150	7.75	0.00		
Bucco-lingual width of incisors	Class II	150	10.31	1.16	3.62-3.99	<0.001
	Wheeler	150	6.50	0.00		

All the parameters are found to be greater in Class II on comparison to the Wheeler's normal values. The differences in the parameters between the groups are statistically significant.

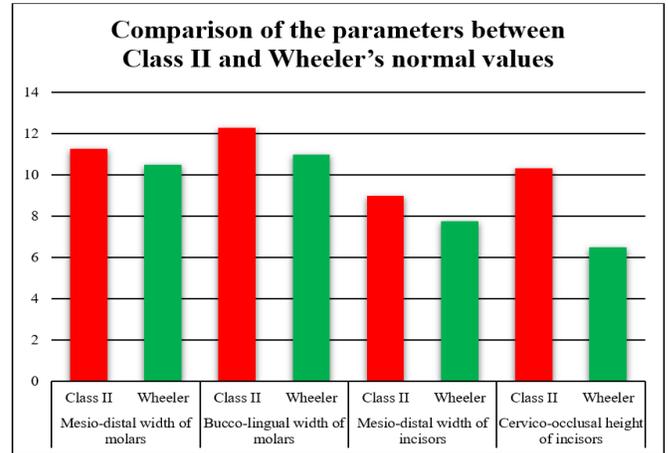
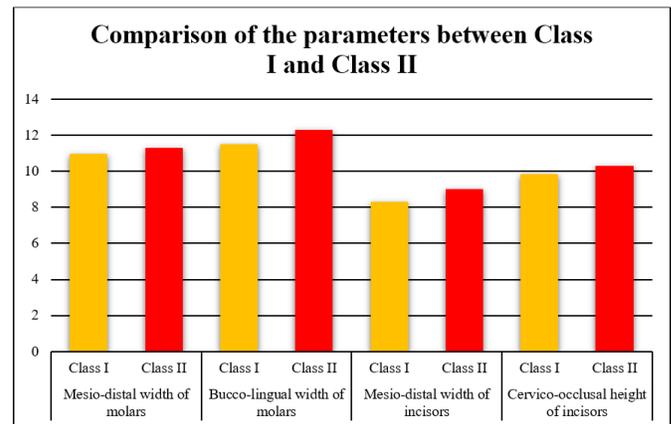


Table.3. Comparison of the parameters between Class I and Class II

Parameters		N	Mean	SD	95% CI	p value
Mesio-distal width of molars	Class I	150	10.96	0.40	0.19-0.44	<0.001
	Class II	150	11.28	0.63		
Bucco-lingual width of molars	Class I	150	11.51	1.16	0.53-1.02	<0.001
	Class II	150	12.30	0.98		
Mesio-distal width of incisors	Class I	150	8.32	0.53	0.51-0.83	<0.001
	Class II	150	9.00	0.85		
Bucco-lingual width of incisors	Class I	150	9.85	0.87	0.22-0.69	<0.001
	Class II	150	10.31	1.16		

All the parameters are found to be greater in Class II on comparison to the Class I. The differences in the parameters between the groups are statistically significant.



IV. DISCUSSION

In orthodontics, the diagnosis and treatment of malocclusions require accurate knowledge of tooth dimensions as a stable occlusion is often reliant on the correct intercuspation of the teeth (Andrews, 1972). Correct space analysis is essential if an optimal occlusion is to be achieved during orthodontic

treatment (Bishara and Staley, 1984) and the goal of an ideal static and functional occlusion are to be reached (Andrews, 1972; Roth, 1972). Several studies have reported tooth size variation between and within different racial groups. Keene (1971, 1979) reported racial differences in tooth sizes among the American Negroes and their Caucasian counterparts in caries-free naval recruits. Turner and Richardson (1989) also observed significant differences in mesio-distal tooth width in Kenyan and Irish populations. In another related study Bishara *et al.* (1989) compared the mesio-distal and bucco-lingual crown dimensions of the permanent teeth in three populations from Egypt, Mexico and the United States. The results from this study indicated statistically significant differences in the mesio-distal dimension between the three populations. Apart from racial differences, the other factors associated with tooth size variability are gender (Ghose and Baghdady, 1979; Lysell and Myrberg, 1982; Bishara *et al.*, 1989), hereditary factors (Townsend and Brown, 1978), bilateral differences (Ballard, 1944; Lundstrom, 1964), environment (Guagliando, 1982) and secular changes (Harper, 1994). In Nigerian populations' however, little information is available on tooth size dimensions (Mack, 1981).

The result of this study suggests increase in tooth size arch size discrepancy (TSASD) in class II malocclusion as compared with class I malocclusion.

V. CONCLUSION

The causes of dental malocclusion are obscure in most children. We investigated the influence of tooth size as 1 contributing factor. The purpose was to determine whether people with larger tooth crown dimensions are at greater risk for TSASD. Conclusion drawn from this study is that all the parameters are found to be greater in Class II on comparison to the Class I. The differences in the parameters between the groups are also statistically significant.

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