



## COMPARATIVE EVALUATION OF BOLTON'S RATIO BETWEEN MALES AND FEMALES OF JAIPUR POPULATION.

### Dental Science

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### ABSTRACT

Comparative evaluation of Bolton's ratio between males and females of Jaipur population.

**Subtitle:** gender variation in Bolton's ratio.

**Objective:** This study was designed to find the gender variations in Bolton's ratio in Jaipur population.

**Materials and methods:** The study included two groups consisted of 150 male and 150 females' casts. The measurement of mesiodistal dimensions of upper and lower tooth width was done using a digital caliper. Student's t-test was used to analyze the data with level of significance  $p < 0.05$ . Statistical analysis was done using SPSS for windows software (version 21).

**Results:** The overall ratio in males was 91.060 and in females were 90.996. The anterior ratio in males was 77.068 and in females were 76.468. There was no statistically significant difference between the groups.

**Conclusion:** The Bolton's overall and anterior ratio was similar for both males and females.

### KEYWORDS

Bolton's ratio, caliper, anterior and overall ratio.

### INTRODUCTION

The term orthodontics derived from the Greek word 'orthos' which means correct, straight or normal, and 'dontos' represents teeth. Orthodontics is a branch of dentistry which is concerned with correcting or improving the position of teeth and correcting any malocclusion and enhancing patient's facial esthetics.

The shape and size of upper anterior teeth has important for dentofacial esthetics. [1] The ratio of maxillary and mandibular tooth sizes represents an important aspect in the diagnosis and treatment planning of orthodontic patients. Any discrepancy in the tooth size ratio guides the treatment plan between extraction and nonextraction or only reproximation. A good post treatment occlusion depends on an appropriate relationship upper and lower dentition.

According to Bolton's the overall ratio is 91.3% with 1.91% standard deviation (SD) and the anterior ratio is 77.2% with 1.65% standard deviation. [2]

In a subsequent paper, Bolton provides the clinical application of his tooth size ratio. Bolton's considered more than 1SD of his origin sample as a guideline to correct intermaxillary tooth discrepancy. He proposed proximal stripping for reduction of tooth material and restorative techniques to increase tooth size. [3]

In orthodontics; treatment plan is decided by considering certain standard digits or numbers, which were derived and standardized by research conducted on specific populations. Hence it is not wise to apply the same parameters for other people because of ethnic variations. The Bolton's analysis was determined by studies on foreign populations. [4, 5] Hence it is not necessary that it will be suitable for Indian population also. India is a big country; it has a mixed population of different regional and ethnic origins.

Some studies compared Bolton's anterior and overall ratio in male and female and reported non-significant differences between males and females [6- 9] whereas Smith et al. found significant differences between males and females Bolton's anterior and overall ratio. [10] No study conducted on Jaipur population to evaluate the gender differences for Bolton's ratio. Hence this study was carried out to assess the effect of gender on Bolton's anterior and overall ratio in Jaipur population.

### MATERIALS AND METHODS

The sample for this pilot study consisted of study models of 300

subjects including 150 males and 150 females with all fully erupted maxillary and mandibular teeth except third molars. Subjects with periodontal disease, gross restorations and tooth anomalies were not included in the study. The subjects were the students, patients and their attendants who visited the Jaipur dental college and hospital. All subjects belonged to Jaipur by birth.

Perforated metal stock trays, rubber bowls, curved metal spatula, straight metal spatula, alginate impression material, dental stone, dental plaster, base formers, sand paper were used for making the impressions and preparing the casts.

The mesiodistal dimensions of tooth were measured using a digital caliper (Figure 1) which can measure smallest dimension up to 0.01 mm. The maximum distance between the mesial and distal contact points was used to measure the size of teeth.

Following formula was used to calculate anterior ratio and overall ratio.

$$\text{Anterior ratio} = \frac{\text{Sum of mandibular 6}}{\text{Sum of maxillary 6}} \times 100$$

According to Bolton the normal anterior ratio is 77.2% with 1.65% SD. The data are classified as normal for Bolton's ratio within  $\pm 1$  SD (77.2  $\pm$  1).

If the ratio is  $> 1$  SD i.e., more than 78.2% it indicates anterior mandibular discrepancy (excess).

If the resultant ratio is  $< 1$  SD i.e., less than 78.2% it indicates anterior maxillary discrepancy (excess).

The overall ratio will be calculated using the following formula.

$$\text{Overall ratio} = \frac{\text{Sum of mandibular 12}}{\text{Sum of maxillary 12}} \times 100$$

According to Bolton the overall ratio is 91.3% with 1.91% SD. The data are classified as normal for Bolton's ratio within  $\pm 1$  SD (91.3  $\pm$  1).

If the overall ratio is  $> 1$  SD i.e., more than 92.3% it indicates overall mandibular discrepancy (excess).

If the resultant ratio is  $< 1$  SD i.e., less than 90.3% it indicates overall maxillary discrepancy (excess). [2, 3]

The data obtained were tabulated and subjected to statistical analysis using Student's t-test with level of significance p less than 0.05. Statistical analysis was done using SPSS for windows software (version 21).

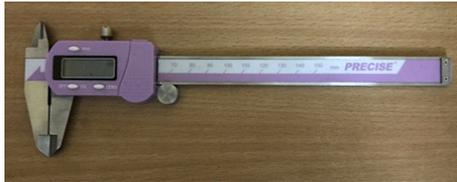


Figure 1: Digital caliper

**RESULTS**

The mean and SD for anterior and overall ratio for males was 77.068 ± 2.648 and 91.060 ± 1.652 respectively. In females the anterior ratio was 76.468 ± 2.344 and overall ratio was 90.996 ± 1.579. Statistically non-significant difference (p >0.05) was found for both overall and anterior ratio between the two groups (Table 1, Graph 1).

Table 1: Bolton's anterior and overall ratio in males and females

Bolton's Ratio	Male		Female		P value
	Mean	SD	Mean	SD	
Anterior ratio	77.068	2.648	76.468	2.344	0.062
Overall ratio	91.236	1.785	91.193	1.802	0.490

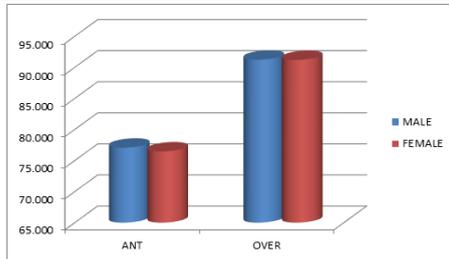


Table 1: Bolton's anterior and overall ratio in males and females

**DISCUSSION**

The sample for Bolton's study included 55 models with excellent occlusion in which 44 were orthodontically treated and 11 untreated. In Bolton's study sex composition of subjects were not specified. [6, 11, 12] In our study sample has 300 models (150 male and 150 females) with optimum occlusion hence a direct comparison made between males and females statistically.

Most of the previous studies obtained their sample from an orthodontic population. [12- 14] In a few studies, the samples comprised a normal population chosen from schoolchildren (11). Our study chose sample from general population from Jaipur.

Previously many studies have been done to find differences between males and females. Bishara *et al.* (1989) reported that male's teeth were greater in size females; but he did not measured the tooth size discrepancy ratios. [15] The differences in tooth size may causes the gender differences in tooth size discrepancy. [16]

In our study the anterior and overall ratio was greater in males as compared to females but this difference was minimal and non-significant (p >0.05). Our results are similar to findings of the previous studies in which no significant differences were noticed between male and female (p > 0.05). [6,-8, 17, 18] The findings of our study are in disagreement with previous studies in which the difference between male and female anterior and overall ratio was significant. In those studies males have greater anterior and overall ratio as compared to females [10, 19, and 20] whereas few studies reported statistically significant gender differences only in anterior ratio. [21, 22]

**CONCLUSION**

No gender differences were reported in both anterior and overall ratio in Jaipur population.

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