

# Comparison of the Mesio-Distal Widths of the Maxillary and Mandibular Central Incisors Between Cleft Lip and Palate and Non Cleft Lip and Palate Individuals

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## ABSTRACT

**Objective:** To compare the mesiodistal widths of the maxillary and mandibular central incisors of cleft lip and palate individuals with non-cleft individuals, in a local population.

**Methodology:** A total of 80 casts (40 of cleft patients and 40 normal) were selected by the department of orthodontics from January, 2021 to February, 2022, dividing them into 4 groups by consecutive non-probability technique. The mesiodistal width of the maxillary and mandibular central incisors was measured with vernier caliper. Independent t test was applied to compare the mesiodistal width of maxillary and mandibular central incisors between normal and cleft patients. Descriptive statistics were calculated for all four groups.

**Results:** The mean MD width for the maxillary central incisors was  $6.58 \pm 1.16$ mm and  $7.67 \pm 1.18$ mm for the CLP and control group respectively. The mean MD width for the mandibular central incisors was  $4.22 \pm 0.91$  mm and  $4.67 \pm 0.9$  mm for the CLP and control group respectively. The student t test showed a significant difference in the MD width of both the maxillary and mandibular central incisors between the CLP and control group.

**Conclusion:** Patients suffering from cleft lip and palate are associated with diminutive central incisors in both jaws.

**Keywords:** Cleft lip and palate, tooth abnormalities, tooth size discrepancy.

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## Introduction

Tooth size formation depends on many factors, both genetic and environmental. However, genetic influences have been reported as important factors in determining tooth dimensions.<sup>1, 2</sup> The environmental factors for tooth formation is nutritional deficiency, infection during tooth development, and hormonal imbalances.<sup>3, 4</sup>

Cleft lip and palate deformity constitute a huge portion of dentofacial anomalies and prevailed up to 1 in 5000 birth.<sup>5</sup> This is associated with a number of abnormal facial and oral characteristics, such as distorted and cleft lips, alveolus, and nose. Teeth are developed in dental arches during development.<sup>6</sup> In cleft lip and palate (CLP)

patients, permanent tooth shape may be affected in the area of cleft.<sup>7</sup> There is a localized peak of disproportionately high asymmetry centered on the upper lateral incisor but extending to both the central incisor and canine.<sup>6</sup> Furthermore, tooth size is affected more than normal in people with cleft lip and palate, even in areas outside the cleft. Still tooth size reductions are more pronounced in the maxillary central region.<sup>8, 9</sup>

A contrary view suggests that tooth size is predetermined genetically, so it has nothing to do with craniofacial growth. Tooth size does not increase with age, as does bony growth, and so should not be affected by environmental factors.<sup>10</sup>

Because tooth size differences may prevent clinicians from achieving proper overbite and over jet, it should be taken into account during treatment planning, especially for cleft lip and palate patients, in order to have an aesthetically and functionally stable occlusion at the end of treatment.<sup>11</sup>

The objective of this study was to compare the mesio-distal widths of the maxillary and mandibular central incisors of cleft lip and palate individuals with the mesio-distal widths of the maxillary and mandibular central incisors of non cleft individuals, in a local population to verify if tooth size is indeed affected in these individuals.

## Methodology

Sixty dental casts were selected from the Orthodontics Department, Armed Forces Institute of Dentistry, Rawalpindi, from January 1<sup>st</sup>, 2021 to 20<sup>th</sup>, 2022. Only casts with fully erupted central incisors were selected. Patients with syndromes other than cleft lip and palate were excluded. Teeth which were grossly deformed like peg shaped, gross calcification defects or having any restoration that might affect the mesiodistal width of the teeth were excluded from the study.

The sample was taken using an arbitrary technique. Paired dental casts of 80 patients were examined, dividing them it into 4 groups by consecutive non-probability technique. Group 1 consisted of 40 maxillary dental casts of cleft lip and palate individuals. Group 2 consisted of 40 mandibular dental casts of the cleft lip and palate individuals. Group 3 consisted of 40 maxillary dental casts of the control group individuals. Group 4 consisted of 40 mandibular dental casts of the control group individuals.

Measurements of the mesio-distal widths were done using a digital caliper accurate to 0.01 mm. Since rotations are common in CLP patients, Mesio-distal (MD) width was taken as the longest distance between the morphologic mesial contact point to the morphologic distal contact point of the maxillary as well as the mandibular central incisors. In order to evaluate intraexaminer reliability, 20 dental casts were randomly selected and remeasured one month after the first measurements by the same examiner.

Statistical analysis on SPSS version 24. A paired t-test was used to assess intra examiner reliability. Descriptive statistics were calculated for all four groups. Independent t-test was used to compare the MD widths of the central

incisors of the maxillary and mandibular arch between the study and control groups.

## Results

The males, 21(52.50%) were more than females, 19(47.50%) in CLP group and was equal in control group. (Table I). Statistically significant differences were found in both upper ( $p < 0.001$ ) and lower central incisor width ( $p = 0.032$ ) between the cleft and control group. The mesiodistal width was smaller in CLP than control group. (Table II)

**Figure 1** shows non-significant difference for mesiodistal width mandibular central incisor between cleft and control group when stratified by gender. **Figure 2** shows that the difference in the mesiodistal width of the maxillary central incisor between the cleft and control group was significant in both males ( $p = 0.019$ ) and females ( $p < 0.001$ ).

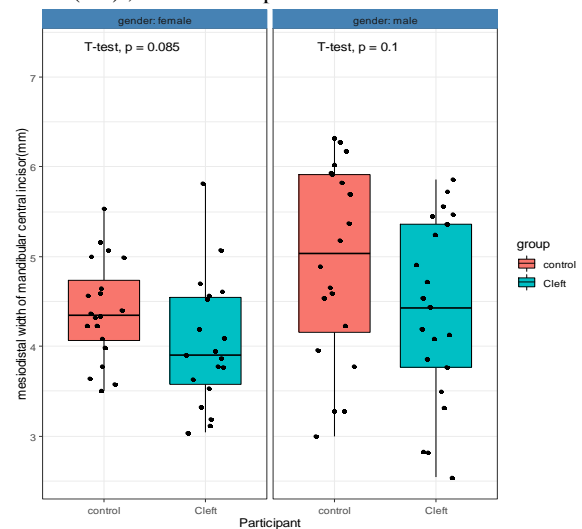
**Table I: Gender distribution of the study**

Characteristic	Cleft, N = 40	control, N = 40
Female	19 (47.50)	20 (50.00)
Male	21 (52.50)	20 (50.00)

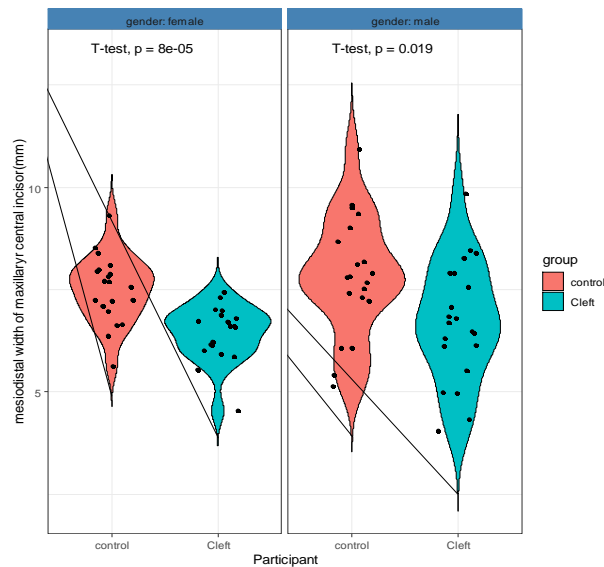
**Table II: Comparison of mesiodistal width of maxillary and mandibular central incisor between cleft and control group**

Characteristic	Overall, N = 80*	Cleft, N = 40*	control, N = 40*	p-value**
Maxillary central incisor	7.13 (1.29)	6.58 (1.16)	7.67 (1.18)	<0.001
Mandibular central incisor	4.45 (0.92)	4.22 (0.90)	4.67 (0.90)	0.032

\*Mean (SD) , \*\*Two Sample t-test



**Figure 1. Comparison of mesiodistal width of mandibular central incisor between cleft and control group.**



**Figure 2. Comparison of mesiodistal width of maxillary central incisor between cleft and control group.**

## Discussion

Our findings showed that small teeth size are found in CLP patients as compared to normal individuals, and this difference was significant. We reject the null hypothesis that there is no difference in mesiodistal width of central incisors in both arches between the CLP and control group.

A digital vernier caliper with least count of 0.01 mm was used for measuring the mesiodistal widths of central incisors in both arches in order to reduce the chances of human error. A similar methodology was used in the previous study.<sup>12</sup>

We stratified our analysis on a gender basis to control confounder. Sexual dimorphism for mesiodistal width of teeth is little bit controversial topic. Some authors reported that males have larger teeth than females or vice versa, while other found no such difference.<sup>13-15</sup>

Rawashdehat et al.<sup>16</sup> studied the mesiodistal width of teeth in CLP versus controls on 47 CLP cases and 74 controls, and the tooth sizes in CLP were significantly smaller than in the control group. These results are consistent with our findings.

Another study was conducted on the Turkish population by Akcam et al.<sup>12</sup>, who used 72 CLP and 53 normal cases to compare tooth crown sizes between CLP and normal class I cases. They reported a significantly reduced size of teeth in CLP compared to normal.

A meta-analysis was conducted by Antonarakis et al.<sup>17</sup> searching major databases in 2013 and finally including four studies in their quantitative analysis. They included studies on non-syndromic CLP cases. Their findings showed that the mesiodistal width of the anterior teeth were smaller as compared to the general population. These results support our findings.

This study has limitations, like performed on a smaller sample size and based on a single center. The strength of this study is that, to our knowledge, this is the first kind of study on this topic.

## Conclusion

Patients suffering from cleft lip and palate are associated with diminutive central incisors in both jaws. This should be taken into consideration while providing care to orthodontic patients to achieve optimal finishing.

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