

## ORIGINAL ARTICLE

# Anatomic crown length and mesio-distal width of maxillary central incisor teeth in Bangladeshi population

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### ABSTRACT

**Background :** Dimensions of teeth have been an excellent tool for determining clinically relevant aspects of dental aesthetics. Especially, the anterior teeth crown height and their mesio-distal widths are very important, because of their strategic anatomical position of being in the centre and in the front of the upper jaw.

**Objectives :** The presented study was aimed to find the nominative data of the average anatomic crown height and mesio-distal width of maxillary central incisors of Bangladeshi population irrespective of age and sex.

**Methods :** This observational study was carried out at Update dental college & Hospital. 110 typical extracted human maxillary central incisor teeth were collected randomly from the Oral Anatomy and Physiology Department of Update dental college and Sapporo dental college.

**Results :** In this study it shows that maxillary central incisors' average crown length is between 7.25 – 11.75 mm and the mean crown length is 10.37(SD±0.90) mm. The average mesio-distal width is between 9.00 – 13.00 mm and the mean mesio-distal width is 8.51 (SD±0.62) mm.

**Conclusions :** Apart from other specific and objective parameters related to dental aesthetics, these values of mesio-distal width and the length of the maxillary central incisors mentioned in this study will serve as guidelines for the diagnosis and treatment planning, especially in restorative dentistry, orthodontics and periodontal surgeries.

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**Introduction :**

It is important for both clinician and ceramist to become familiar with the basic principles of natural oral aesthetics for mastering on dental procedures in anterior dentition. To understand the accurate dimension of the anterior teeth seem to be the most important dental criteria within the aesthetic checklist as they can be easily and physically controlled.<sup>1</sup> Treating patients with missing maxillary anterior teeth, dental practitioners must determine tooth size and shape to achieve an optimal aesthetic result.<sup>2</sup> Tooth size and the amount of tooth exposure with lip at rest, the maxillary anterior teeth are important factors in designing prosthesis. Regarding tooth size, mesiodistal crown width is considered to be more critical than crown length. If the size and shape of a replaced tooth are not in harmony with patient's face and other teeth, psychological and social problems might arise.<sup>3</sup> Mesio-distal tooth width has also an anthropological significance because it provides valuable information on human evolution with its technological and dietary changes.<sup>4</sup> Variation in tooth size is influenced by genetic and environmental factors.<sup>5</sup> Several studies have reported tooth size variation between and within different racial groups. Keene reported racial differences in tooth sizes among the American Negroes and their Caucasian counterparts in caries-free naval recruits.<sup>6</sup> Turner and Richardson also observed significant differences in mesio-distal tooth width in Kenyan and Irish populations. Apart from racial differences, the other factors associated with tooth size variability are gender, environment, hereditary factors, bilateral differences and secular changes.<sup>7,8,9,10</sup>

There have not yet been any studies made on mesio-distal width of maxillary central incisor teeth in Bangladeshi population on extracted teeth. The purpose of present study is to gather knowledge about the anatomy of the maxillary central incisors, which will further help our clinical practice in postodontics, orthodontics, and conservative dentistry.

**Materials & methods:**

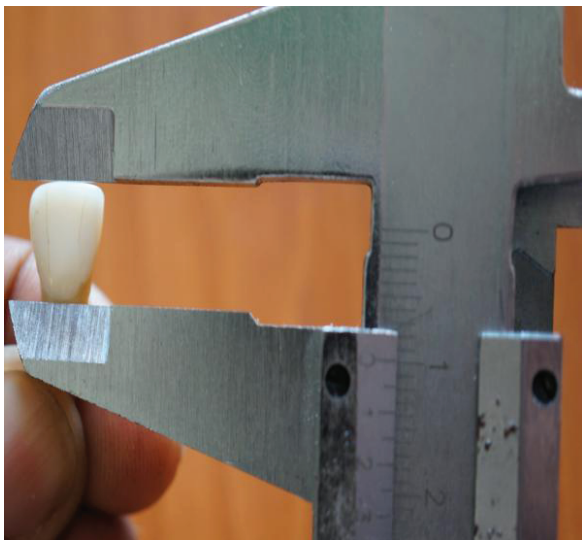
A total of 110 extracted upper central incisor teeth were collected from different hospitals in Dhaka city. Collected teeth were washed with hydrogen peroxide and water. Afterwards they were cleaned with ultrasonic scaler where needed. The selected teeth had typical morphology with mesio-incisal angle being straight and disto-incisal angle being rounded. The collected teeth were shovel shaped and absence of any kind of restoration, attrition, abrasion and erosion. The total crown length and mesio-distal width were measured by using a vernier caliper (fig. 1) to the nearest 0.05 mm. The crown height were measured from the incisal edge to the cervical line (highest point) (fig. 3) and the mesio-distal length (md) was measured between the highest point of the crown crown (fig. 2). All measurement were done three times and the mean value was taken. Measurements were repeated on a random sample at two different time periods to exclude intra examiner error.



**Figure 1 : A vernier caliper**



**Figure 2 : Mesio- distal width measurement by vernier caliper**



**Figure 3: Crown length measurement of upper central incisor**

**Results:**

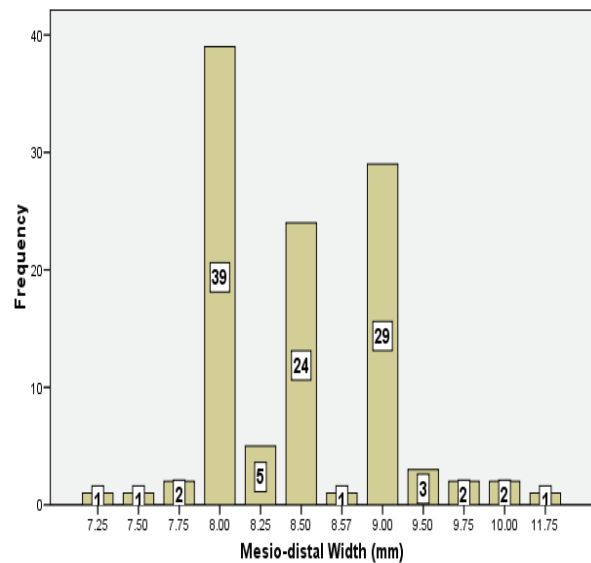
The mean, standard deviation and range of the width and length are presented in (Table 1). The widest crown of maxillary central incisor was 11.75 mm, where as the narrowest one was 7.25 mm.

The longest crown of maxillary central incisor was 13mm followed by the shortest crown was 9mm.

However, the study also shows that the maxillary central incisors' mean crown length is 10.37(SD±0.90) mm and mean mesio-distal width is 8.51 (SD±0.62) mm. (Table 1)

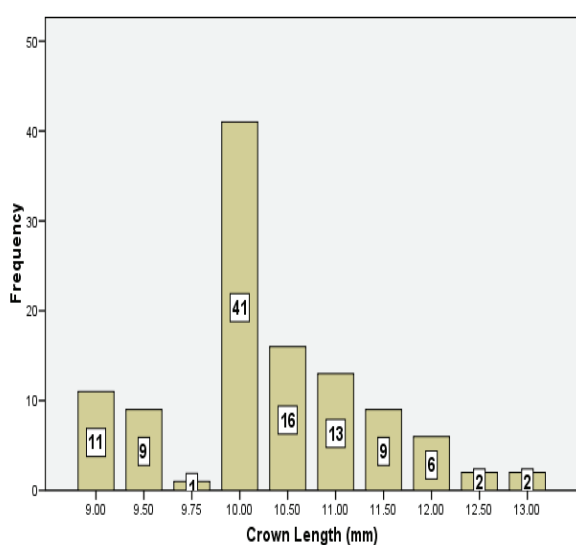
**Table 1: Different measurements of teeth (N=110)**

	Mesio-distal Width (mm)	Crown Length (mm)
Mean (±SD)	8.51 ±0.62	10.37 ±0.90
Minimum	7.25	9.00
Maximum	11.75	13.00



**Figure 4: Mesio-distal width of upper central incisor crown( N=110)**

The bar chart shows that the mesio-distal width of 39 teeth were measured 8 mm , 29 of them showing 9 mm and 24 of them were 8.5mm, where N=110. Here the maximum mesio-distal width frequency is 8mm.



**Figure 5: Crown length of upper central incisor crown( N=110)**

This bar chart showing the length of 20 teeth are 12mm, 16 of them are 12.5mm, 14 of them are 13.5mm, 10 of them are 11.5mm, 10 of them are 11mm in length, where N=110. Here maximum crown length frequency is 12mm.

### Discussion:

Though it would appear more relevant to measure clinical crowns, this experiment was designed to use extracted teeth (maxillary central incisors) and anatomic crown instead. There are several reasons to choose such experiment. First of all, width measurement of the extracted teeth can be extremely precise due to the proximal clearance (due to absence of neighboring teeth); whereas the clinical measurement of teeth and even those are made on the casts can be jeopardized, due to overlapping teeth. This is the actual reason which is why average width of the teeth is approximately 1mm larger compared to clinical measurements.<sup>11</sup> In case of length the measurements were confined apically by the Cement-enamel junction (CEJ), which normally remains within the soft tissue. As a result, the average length of the teeth is approximately 1mm longer than that of the clinical measurement.<sup>11</sup> Moreover; the mouth dominates the face due to its size. Similarly, the central

incisor is the dominating tooth of the smile. As a result, dominance must be considered in maintaining the harmony with personality. Therefore, it seems more appropriate to analyze the mesio-distal width and the length of the central incisors accurately.

Information concerning tooth size in human population is of a great importance to clinical dentistry as well as other sciences such as anthropology and anatomy. This is probably the first study in Bangladesh as no studies have been found so far on extracted teeth.

The findings have greater importance in respect to prosthodontics, conservative dentistry and orthodontic treatment. The average crown length of upper central incisor 10.5mm and mesio-distal width is 8.5.<sup>12,13</sup> In orthodontics, the diagnosis and treatment of malocclusions require accurate knowledge of tooth dimensions as a stable occlusion is often reliant on the correct inter-cuspatation of the teeth. Adequate tooth-size ratios are required to ensure the satisfactory outcome of orthodontic treatment.<sup>14</sup> Mesio-distal diameter of upper and lower jaw teeth is a major factor in coordinating overbite, over jet in centric occlusion.<sup>14</sup> In prosthetic dentistry mesio-distal width is very essential, because if the fabricated crown or artificial teeth in denture is altered than natural one the persons charm, dignity or beauty will be compromised. In most instances artificial teeth that are similar in size to patient's natural teeth are desirable<sup>15</sup>. Furthermore, these guidelines can be applied to lateral incisors and canines to establish plan for periodontal surgery and further diagnostic steps as well.

It has been found in previous different studies that males have greater mesio-distal width of maxillary anterior teeth than those of the females.<sup>16,17,18</sup> In case of exposure of the teeth during smile, the female expose more of the central incisor than males. However, the male expose more from lateral incisors and canines.<sup>19</sup> Accordingly, in recent studies, mesio-distal width of upper central incisor from dental cast in Bangladesh showed 8.54(SD±0.48) male, 8.45(SD±0.58) female.<sup>20</sup> In Bangladeshi population mean mesio-distal width of male was

9.11 and female was 8.73. In other studies mesio-distal width of upper central incisor in different ethnic group such as in North Indian 9.05mm male, 8.62mm female; North American White 8.74mm male, 8.40mm female; Jordanian Negros 8.94mm male, 8.63 mm female; American 9.12mm male, 8.72mm female; Icelanders-8.99mm male, 8.75 mm female.<sup>21</sup>

### Conclusion :

Within some limitations, this research was carried out to investigate the anatomic crown of maxillary central incisors of the Bangladeshi population, especially on extracted teeth with respect to mesio-distal width and length. However, In order to improve the quality of dental care available, there is a great need for data on the mesio-distal crown dimensions of the individual permanent teeth of Bangladeshi population.

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