



**COMPARATIVE EVALUATION OF MAXILLARY AND MANDIBULAR ANTERIOR  
TEETH WIDTH WITH THE LENGTH OF INDEX AND LITTLE FINGER IN NORTH  
INDIAN POPULATION**

**Sabzar Abdullah<sup>1</sup> and Pranshu Varshney\*<sup>3</sup>, Masood H. Khan<sup>2</sup> and <sup>4</sup>Dr. Afzal Ahmad**

<sup>1</sup>Assistant Professor, Department of Prosthodontics, Dr. ZA Dental College, AMU, Aligarh.

<sup>2</sup>Assistant Professor, Department of Oral Pathology and Microbiology, Dr. Z.A. Dental College, AMU, Aligarh.

<sup>3</sup>Resident, Dr. Z.A. Dental College, A.M.U., Aligarh.

<sup>4</sup>Resident, Dr. Z.A. Dental College, A.M.U., Aligarh.

**\*Corresponding Author: Dr. Pranshu Varshney**

Resident, Dr ZA Dental College, AMU, Aligarh.

Article Received on 22/12/2017

Article Revised on 11/01/2018

Article Accepted on 01/02/2018

**ABSTRACT**

The various factors such as size, colour, morphology and arrangement of the anterior teeth play a very important role in achieving satisfactory aesthetics in complete denture. Various ways by which we can select the size of the anterior teeth are inter-alar distance, inter-canthal distance, bi-zygomatic width, intercanine width. But there is no reliable method for selection of anterior teeth. To evaluate and compare the width of the maxillary and mandibular anterior teeth with the length of the index and little fingers, total of 100 people were taken for this study. They are grouped into four, Group I, 15–20 years; Group II, 20–30 years; Group III, 30–40 years; Group IV, 40–50 years. Irreversible hydrocolloid impressions of the maxillary and mandibular arch were made and poured with dental stone. The widths of the maxillary and mandibular anterior teeth were measured with an adaptable ruler. The length of the index and little fingers were measured using a vernier caliper. There is significant correlation between the maxillary and mandibular anterior teeth with the index and little finger length. **Conclusion:** The maxillary anterior teeth width can be calculated with the formula ( $1.131 \times \text{index finger length} - 11.969$ ), mandibular anterior teeth width can be calculated with the formula ( $1.005 \times \text{little finger length} - 2.228$ ).

**KEYWORDS:** Anterior teeth width; Index finger; Little finger.

**INTRODUCTION**

Aesthetics is first and foremost consideration for patients seeking prosthodontic treatment. The aesthetic restoration has an important psychological effect on the edentulous patient. The development of new dental materials and techniques in this field has led to a greater number of treatment choices that increase the likelihood of a favourable outcome. So in this regard, the size and form of the maxillary anterior teeth plays an important role not only in dental aesthetics, but also in facial aesthetics. The goal is to achieve the maxillary anterior teeth position in optimal dento-labial relations which is in harmony with the overall facial appearance. Edentulous patients who are receiving their first complete dentures often expect them to appear similar to what they had their natural teeth.<sup>[1]</sup>

Thus, the correct selection of the prosthetic teeth becomes very important to achieve a pleasant esthetic outcome. If there are some natural teeth present in the oral cavity, it becomes easier to choose artificial teeth that blend with the natural dentition rather than to choose teeth for the edentulous patient with no pre-extraction

records available. When anterior teeth are selected for completely edentulous cases, the mesio-distal width of the maxillary central incisors is critical because they are the most prominent teeth in the arch when viewed from the frontal aspect.<sup>[2]</sup> Various guidelines have been suggested for determining the size of anterior teeth but different school of thoughts have been reported regarding their significance. The maxillary anterior teeth should be in harmony with surrounding oral environment in terms of size, form, and colour. To appear attractive, the maxillary anterior teeth must be in proportion to facial morphology. Three methods are commonly used today for selecting the width of the 6 maxillary anterior teeth: The first is Berry's biometric ratio method, which is based on the 1:16 maxillary central incisor width to bi-zygomatic width ratio introduced in 1905.<sup>[3]</sup> The Trubyte Tooth Indicator is based on the biometric ratio, and can be used for estimating the width, length, and outline and profile forms of the maxillary anterior teeth. Secondly, inter alar width measurement is also used as a method to determine denture tooth. Thirdly, the distance between the relaxed corners of the mouth represents an

appropriate width for the 6 maxillary anterior teeth (canine to canine).<sup>[4,5]</sup>

In 1914, Williams found a relationship between the size of faces and the size of teeth. Pound determined face width by measuring the distance from zygoma to zygoma. The length is determined from hairline to gnathion. These measurements are divided by 16 indicate the length and width of the maxillary central incisor.<sup>[6,7]</sup> Several anatomic measurements have been proposed to aid in determining the correct size of the anterior teeth like inter-commissural width, bizygomatic width, interalar width, and inter-pupillary distance. However, there is little scientific data in the dental literature to use as a guide for defining the proper size and shape of anterior teeth. The selection of maxillary anterior teeth for complete dentures has posed a problem in clinical practice and a controversy about the best method to employ still exists. Hence this study was conducted to evaluate and compare the width of the maxillary and mandibular anterior teeth with the length of the index and little fingers in North Indian Population.<sup>[8]</sup>

**MATERIALS AND METHODS**

The patients reported to the Department of Prosthodontics, Z.A. Dental College, Aligarh participated in this study. A total of 100 peoples were taken for this study. They are grouped into four, Group I, 15–20 years; Group II, 20–30 years; Group III, 30–40 years; Group IV, 40–50 years. The inclusion criteria were [A] no missing maxillary or mandibular anterior teeth [B] no gingival or periodontal conditions problems in the anterior teeth [C] no inter-dental spacing or crowding; [D] no anterior restoration; and [E] no history of orthodontic treatment.



**Figure 1: Vernier Caliper**

The exclusion criteria were (1) dental malocclusion (2) supra-erupted teeth (3) altered passive eruption (4) developmental anomalies (5) anodontia (6) apparent loss of tooth structure due to attrition, fracture, caries, or restorations. Irreversible hydrocolloid (Zelgan plus–Dentsply India) impressions of the maxillary and mandibular arches were made in perforated stock trays and poured with dental stone (Kalstone–Kalabhai, India). The width of the anterior teeth was measured from the maximum distance between the mesial and distal contact points of the tooth on a line perpendicular to the long axis using an adaptable ruler. To measure the length of the index and little finger a new acrylic measuring device was prepared. Putty impression of index finger was made

and poured with dental stone. A mold was prepared. The cast was stabilized in it. Autopolymerizing acrylic resin was added in the mold space. A slot was created using carborundum disc. The length of the little and index finger were measured from the tip of the finger to the lower border of the line using vernier caliper with a precision of 0.01 mm. Each parameter was measured three times and the average value was recorded.



**Figure 2: Index finger length**



**Figure 3: Little finger length**

**RESULTS**

For this study 100 maxillary and mandibular casts were measured to evaluate the width of the maxillary and mandibular casts. Table 1 showed the difference between the index finger length with maxillary anterior teeth width in percentage. Table 2 difference between index finger length with mandibular anterior teeth in percentage. The values were analysed using regression analysis.

**Table 1: Difference between index finger length and maxillary anterior teeth in percentage.**

$x > 1$	6	15 %
$1 \leq x \leq 2$	4	10 %
$2 \leq x \leq 3$	21	53 %
$3 \leq x \leq 4$	9	22 %

**Table 2: Difference between index finger length and mandibular anterior teeth in percentage.**

$x > 1$	3	7 %
$1 \leq x \leq 2$	6	15 %
$2 \leq x \leq 3$	26	65 %
$3 \leq x \leq 4$	5	13 %

The correlation value ( $r$ )  $-1 < r < +1$  for maxillary anterior teeth is 0.962. The actual value of the total maxillary anterior width was highly correlated to the index finger length with a value of 0.962. The correlation value for mandibular anterior teeth is 0.981. The actual value of the total mandibular anterior width was highly correlated to the index finger length with a value of 0.981. Level of significance is 0.01. Hence the maxillary anterior teeth width can be calculated with the formula  $(1.131 \times \text{index finger length} - 11.969)$ , mandibular anterior teeth width can be calculated with the formula  $(1.005 \times \text{little finger length} - 2.228)$ .

## DISCUSSION

One of the most confusing and difficult aspects of complete denture prosthodontics is the selection of appropriately sized maxillary anterior denture teeth. Many attempts have been made to quantify the selection of anterior teeth for complete dentures, but little consensus on an effective method has been reached. One of the critical aspects of esthetic dentistry is creating geometric or mathematical proportion to relate the successive width of anterior teeth. Golden proportion, golden percentage, recurring esthetic dental care theories introduced in the field.<sup>[9]</sup> Lombardi was the first to suggest the application of golden proportion in dentistry. Golden proportion and RED are unsuitable methods to relate the successive width of the maxillary anterior teeth in natural dentition. Kern found that 93 % of nasal-width was equal to or within 0.5 mm of the four maxillary incisors.<sup>[10][11]</sup> The inter alar nasal width is a reliable guide for selecting the mould of anterior teeth and that the incisive papilla provides a stable anatomical landmark for arranging the labial surfaces of the central incisors at 10 mm anterior the posterior border of the papilla. The width of the nose, when measured in digital photograph can be utilized as a guide for the selection of the maxillary anterior teeth width. Cesario and Latta found that a ratio of 6.6 existed between the inter-pupillary distance and the central incisor width in white men and women, and also in black-women.<sup>[12][13]</sup> Latta et al. concluded that the relationships among the width of the mouth, the inter alar width, the bizygomatic width, and the inter-pupillary distance might be used as references if applied in combination, although racial and gender differences were detected when anatomic measurements were evaluated individually.<sup>[14]</sup> Intercanthal distance should be used only as reference value in estimations of central incisor width. Final tooth selection for edentulous subjects should be made in accordance with facial form. The use of the right hamular notch to left hamular notch measurement plus 10 mm provides a useful method for determining the width of the 6 maxillary anterior teeth for complete denture patients with medium and large cast sizes.<sup>[15][16]</sup>

In this present study 100 people maxillary and mandibular anterior teeth were measured in the casts using vernier caliper. The results showed that there is significant correlation between the maxillary and

mandibular anterior teeth with the index and little finger length. The maxillary anterior teeth width can be calculated with the formula  $(1.131 \times \text{index finger length} - 11.969)$ , mandibular anterior teeth width can be calculated with the formula  $(1.005 \times \text{little finger length} - 2.228)$ .

## CONCLUSION

Within the limitations of the study I concluded that there is significant correlation between the maxillary and mandibular anterior teeth with the index and little finger length. The maxillary anterior teeth width can be calculated with the formula  $(1.131 \times \text{index finger length} - 11.969)$ , mandibular anterior teeth width can be calculated with the formula  $(1.005 \times \text{little finger length} - 2.228)$ .

## REFERENCES

1. Krajicek DD Natural appearance for the individual denture patient. *J Prosthet Dent*, 1960; 10: 205–214.
2. Hasanreisoglu U, Berksun S, Aras K, Arslan I An analysis of maxillary anterior teeth: facial and dental proportions. *J Prosthet Dent*, 2005; 94: 530–538.
3. Sellen PN, Jaggar DC, Harrison A Methods used to select artificial anterior teeth for the edentulous patient: a historical overview. *Int J Prosthodont*, 1999; 12: 51–58.
4. Wazzn KA The relationship between intercanthal dimension and the width of maxillary anterior teeth. *J Prosthet Dent*, 2001; 86: 608–612.
5. Hoffman W, Bomberg TJ, Hatch RA Interalar width as a guide in denture tooth selection. *J Prosthet Dent*, 1986; 55: 219–221.
6. Heatwell CM, Rahn AO Syllabus of complete dentures, 4th edn. Lippincott William & Wilkins, Philadelphia, 1986; 313–314.
7. Mavroskoufis F, Ritchie GM Variation in size and form between left and right maxillary central incisor teeth. *J Prosthet Dent*, 1980; 43: 254–257.
8. Lavelle CL Maxillary and mandibular tooth size in different racial groups and in different occlusal categories. *Am J Orthod*, 1972; 61: 29–39.
9. Sanin C, Savara BS Permanent mesiodistal crown size. *Am J Orthod*, 1971; 59: 488–500.
10. Varjao FM, Nogueira SS Intercommissural width in 4 racial groups as a guide for the selection of maxillary anterior teeth in complete dentures. *Int J Prosthodont*, 2005; 18: 513–515.
11. Ricketts RM The biologic significance of the divine proportion and fibonacci series. *Am J Orthod*, 1982; 81: 351–370.
12. Marquardt SR Dr. Stephen R. Marquardt on the golden decagon and human facial beauty. Interview by Dr. Gottlieb. *J Clin Orthod*, 2002; 36: 339–347.
13. Gurel G The science and art of porcelain laminate veneers. Quintessence, London, 2003; 83–86.
14. Berry FH Is the theory of temperatures the foundation of the study of prosthetic art. *Dent Mag.*, 1905; 1: 405

15. Baker PS Tooth selection. In: Rahn AO, Ivanhoe JR, Plummer KD (eds) Textbook of complete dentures, 6th edn. People's Medical Publishing House, Shelton, 2009; 188.
16. Lieb N, Silverman SI, Garfinkel L An analysis of soft tissue contours of the lips in relation to the maxillary cuspids. J Prosthet Dent, 1967; 18: 292.