

Comparison between bizygomatic width and nail size as a guide in teeth selection

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ABSTRACT

Background: Esthetic appearance of the maxillary anterior teeth to large extent influences facial esthetics. In case of partially or completely edentulous dentition or implant-supported prosthesis determining length of the maxillary central incisors is quite challenging due to consideration of esthetic factors such as available interocclusal space and amount of the tooth that should be visible and that which should not be. **Aim:** The aim of the study was to evaluation of correlation between bizygomatic width and nail size as a guide in teeth selection. **Materials and Methods:** Twenty subjects were selected for the study. Measurement of cervical incisal height of maxillary central incisors. Mesiodistal dimension of maxillary central incisors was measured at its greatest diameter with divider and ruler. Length and width of maxillary central incisor assessed using Berry's and H pound formula for teeth selection were used as standard reference values. **Results:** The mean of length of the index finger length in 0.99 and index finger width is 0.95. The mean of length and width of ring finger is 1.02 and 1.05, respectively. Table 1 shows correlation between index fingernail width and mesiodistal dimension of maxillary central incisors with $P = 0.0479$ which is statistically significant. Table 2 shows correlation between ring fingernail width and mesiodistal dimension of maxillary central incisors with $P = 0.6941$ which is statistically insignificant. **Conclusion:** In anthropometric system of teeth selection, various anatomical entities such as maxillomandibular relations, contour of the residual ridge, vertical distance between the ridges, lips etc. which are used as guides to select teeth, fingernail size can also be used as a guide for teeth selection. Furthermore, variation in correlation between nail size and bizygomatic width among various populations can be assessed. From our point of view, to achieve high degree of accuracy, large sample size of participant from different ethnic group can be recruited into the study.

KEY WORDS: Anterior teeth selection, Bizygomatic width, Index finger, Measurements, Ring finger

INTRODUCTION

In complete denture rehabilitation, correct choice and placement of artificial teeth play an important role. During anterior teeth selection, color, size, and form appropriate for the patient should be determined.^[1] In color selection parameters that have to be considered include age, gender, color of the skin, eyes, and hair.^[2] Many clinical and statistical parameters have been proposed to aid in determining size of artificial teeth. In some studies, it has been demonstrated that, statistically, the size of some parts of the face has a proportional relationship to the dimensions of the upper central incisors or with the six anterior teeth.^[3] Information obtained from photographs at a

time when the patient had natural teeth are used to select appropriate form that matches patient profile can be chosen. Esthetic appearance of the maxillary anterior teeth to large extent influences facial esthetics.^[4] To aid in the selection of the anterior teeth, several anatomic measurements have been proposed, which include berry biometric ratio, projected in 1906, which state that a biometric ratio of 1:16 can be used to describe the relationship between width of the maxillary central incisor to the bizygomatic width.^[5] Also intercanthal distance, intercommissural width, and palatal width as well as interalar width, bizygomatic width, interpupillary, nail size by Cigrande in 1913 in which the outline form of the fingernail was used to select the outline form of the upper central incisor tooth.^[6,7] According to Williams, the incisors mimic the form of an upside-down face, indicating three classes of teeth, namely Class I (square), Class II (triangular), and Class III (oval).^[8]

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According to Mc. Arthur, natural teeth of patients are the best guides and records of these should be obtained whenever possible. In the presence of pre-extraction such as casts, radiographs, facial photographs, and previous dentures makes teeth selection process easy for the practitioners. However, in the absence of when there are no pre-extraction records, the size of the denture tooth has to be determined by various guides.^[9] In case of partially or completely edentulous dentition or implant-supported prosthesis determining length of the maxillary central incisors is quite challenging due to consideration of esthetic factors such as available interocclusal space and amount of the tooth that should be visible and that which should not be.^[10,11] To the best of our knowledge, no attempt has been made to establish correlation between fingernail size and bizygomatic width as a guide in teeth selection. Hence, in this study, we made an attempt to determine the relationship between facial measurements and width and length of maxillary anterior teeth. These findings may be helpful in establishing the relationship between these facial measurements and maxillary anterior teeth and can be compared with the findings for other races and ethnic groups.

MATERIALS AND METHODS

Twenty subjects were selected for the study. The subjects were included in the study based on fulfilling the following criteria.

1. Age group of the patients was between 20 years and 25 years so that facial growth is especially completed
2. Class I occlusion
3. Absence of anterior dental restorations
4. Absence of crowding or spacing of maxillary anterior teeth
5. Absence of developmental anomalies
6. Absence of attrition in maxillary anterior teeth
7. No history of orofacial surgery
8. No pathological migration, traumatic occlusion of anterior teeth, and periodontal involvement.

The following sequences of measurements were recorded on examination of the subjects.

Measurement of Cervical Incisal Height of Maxillary Central Incisors

The distance from the gingival zenith point to the incisal edge of the maxillary right central incisor was measured with the divider and ruler. To avoid bias, care was taken to measure accurately by repeating the readings twice and the average value was recorded for all measurements.

Measurement of Mesiodistal Width of Maxillary Central Incisors

Mesiodistal dimension of maxillary central incisors was measured at its greatest diameter with divider and

ruler. Length and width of maxillary central incisor assessed using Berry's and H pound formula for teeth selection were used as standard reference values.

Berry's formula = Bizygomatic width/16

H pound formula = Length of the face/16.

Measurement of Length and Width of Index and Ring Fingernail

Length of index and ring fingernail was measured from cuticle to free edge of nail plate. Adhesive tape was placed over fingernail and the distance between cuticle to free edge of nail plate was marked and the measurement was made using ruler. Similarly width of index and ring fingernail was measured at its greatest diameter. The analyses of these data have been tabulated. Data were statistically significant analyzed using SPSS software. The statistical analysis was done using two sample paired *t*-test.

RESULTS

The mean of length of the index finger length in 0.99 and index finger width is 0.95. The mean of length and width of ring finger is 1.02 and 1.05, respectively. Table 1 shows correlation between index fingernail width and mesiodistal dimension of maxillary central incisors with $P = 0.0479$ which is statistically significant. Table 2 shows correlation between ring fingernail width and mesiodistal dimension of

Table 1: Correlation between index fingernail width and mesiodistal dimension of maxillary central incisors

Group	Group One	Group Two
Mean	1.138	1.063
SD	0.151	0.151
SEM	0.053	0.053
N	8	8

Table 2: Correlation between ring fingernail width and mesiodistal dimension of maxillary central incisors

Group	Group One	Group Two
Mean	1.040	0.560
SD	0.230	0.371
SEM	0.103	0.166
N	5	5

maxillary central Incisors with $P = 0.6941$ which is statistically insignificant. Table 3 shows correlation between index fingernail length and cervicoincisal dimension of maxillary central incisors with $P = 0.0396$ which is statistically significant. Table 4 shows correlation between ring fingernail length and cervicoincisal dimension of maxillary central incisors with $P = 0.9181$ which is statistically insignificant.

DISCUSSION

Beauty gives a high degree of pleasure to mind and also suggests that object of delight approximates to one's conception of ideal. Beauty is also associated with harmony and harmony proportions. Beauty cannot be measured but harmony can be measured with golden proportions.^[12] Golden proportion concept was first mentioned by Lombardi and later developed by Levin which states that the ratio of shorter section to longer section of line is equal to ratio of longer section to whole line. This gives AC/AB the value 0.618, termed golden number denotes by Phi. Golden proportion of face states that nasal height (A) is related to the maxillary height (B) as 1.000:0.618. The sum of the nasal height and maxillary height (A+B) related to mandibular height (C) as 1.000:0.618. However, in esthetic dentistry, divine proportion considers teeth size, shape interarch relationship and intraarch relationship.^[13] Gomes *et al.*, in his study reported that with respect to perception in the dental arch, the central incisors are the most dominant anterior teeth because they can be seen

Table 3: Correlation between index fingernail length and cervicoincisal dimension of maxillary central incisors

Group	Group One	Group Two
Mean	1.050	1.083
SD	0.152	0.133
SEM	0.062	0.054
N	6	6

Table 4: Correlation between ring fingernail length and cervicoincisal dimension of maxillary central incisors

Group	Group One	Group Two
Mean	1.040	1.060
SD	0.230	0.358
SEM	0.103	0.160
N	5	5

in their full size. Hence, while fabricating prosthesis for the maxillary anterior segment, it is essential to estimate the exact size of the maxillary central incisor. Henry pound suggested that the bizygomatic width divided by 16, the distance from the hairline to the lower edge of the bone of the chin, also divided by 16 provides the width and length of the maxillary central incisors, respectively.^[14] To the best of our knowledge, Cigrande in 1913 used the outline form of the fingernail to select the outline form of the upper central incisor, but there was no adequate literature which used nail dimensions in anterior teeth selection. The mean mesiodistal central incisor width in this study (7.03 mm) when compared with previous studies conducted on plaster casts (8.59 mm), extracted teeth (9.00 mm), showed lower values.^[15] However, in a study by Ellakwa *et al.*, it was reported that from the results of *t*-test there is a statistically significant difference when $P < 0.05$. For the length, *t*-test value (1.913) and $P = 0.059$, since *P*-value is slightly more than 0.05 length of the central incisor on the cast can be determined from the facial length. About the width, the *t*-test value is 0.792 and $P = 0.431$, since *P*-value is too much far from the value (0.05), it indicates that the width of the central incisor cannot be determined depending on the facial width.^[16]

In this study, on examination of two sets of identical twins nail plate size, it was found that values were more or less similar. Hence, this makes anterior teeth selection easier in identical twins. Nail plate size dimensions measured by one operator does not correlate with other operators, this is due to different location selected by the operator to position the divider. This manually error could be eliminated with more standardized method of measurements. Time constraints and the exclusion criteria restricted the number of volunteers who could be recruited into the study. This study was done on population between the age group 20 and 25 years, it will be interesting if the study is conducted on other different age group of population.

CONCLUSION

In anthropometric system of teeth selection various anatomical entities such as maxillomandibular relations, contour of the residual ridge, vertical distance between the ridges, lips etc. which are used as guides to select teeth, fingernail size can also be used as a guide for teeth selection. Furthermore, variation in correlation between nail size and bizygomatic width among various populations can be assessed. From our point of view, to achieve high degree of accuracy, large sample size of participant from different ethnic group can be recruited into the study.

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