

A STUDY ON THE SELECTION OF MAXILLARY ANTERIOR TEETH SIZE IN MANIPURI POPULATION

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ABSTRACT

Aim: Facial esthetics of human beings is highly dependent on the anterior teeth. When a person becomes edentulous, selection of the artificial teeth turns to be a great responsible job for the prosthodontist. The association of various measurements of the face and maxillary anterior teeth varies from race to race. Hence this study was performed to find the association between dimensions of various facial landmarks and the size of anterior teeth in Manipuri population. Certain guidelines were gained from the facial landmarks which could serve as a guide in anterior tooth size selection.

Materials & Method: One hundred twenty subjects who met the selection criteria were included in the study. Measurements of facial landmarks were done on the subjects and measurements of intra oral landmarks were done on the dental cast using a calibrated vernier caliper. Data were statistically analyzed using SPSS version 17 software. Data were assessed by using t-test.

Results: The mean values for intra oral landmarks in males and females were respectively : combined width of the maxillary central incisors = 17.10 mm (male) & 16.17 mm (female); intercanine distance = 35.53 mm (male) & 33.46 mm (female) and combined six maxillary anterior teeth = 52.69 mm (male) & 52.20 mm (female). The mean values of the facial landmarks in males and females were respectively: intercommisural distance = 51.15 mm (males) & 50.01 mm (females); philtrum width = 14.33 mm (males) & 11.61 mm (females) and interalar width = 38.17mm (males) & 31.90mm (females). T-test was used to determine whether correlation exists between measurements

Conclusion: The study revealed that certain facial landmarks could be correlated to the size of maxillary anterior teeth and thus could serve as a guideline during the size selection of anterior teeth. Since the findings could be different on ethnic differences of the subjects undertaken, the findings of this study could serve the purpose in Manipuri population.

Key words: Inter Canine width, Interphiltrum width, Inter commissure width, Facial esthetics.

Introduction

Facial aesthetics of human beings is mainly related to the maxillary anterior teeth. The maxillary anterior teeth are considered to be the key teeth with respect to the esthetic appearance of the face.¹ The maxillary incisors occupy a strategic position and act as a very good guide for selection of proper mold. Nonexistence of pre-extraction records creates one of the major obstacles in clinical prosthodontics as clinician does not have any guide for the selection of maxillary anterior teeth. Various methods can be utilized to measure their dimensions, including the size of the zygoma, face and chin. The size of the teeth is mainly governed by various facial dimensions (e.g. length and width) which also determine the masculinity and femininity of individuals.^{2,3} Once the breadth of the maxillary central incisors which will harmonize esthetically with the edentulous face is known, the selection of other artificial teeth of the maxillary arch becomes easier.

When a person becomes edentulous, selection of artificial teeth becomes a great responsible job for the prosthodontist. Since the present trend demands an ethnic based norm, the particular study was undertaken on the Manipuri population to fulfil the need for anterior teeth selection in Manipuri patients. The study was undertaken according to the accepted guidelines for determining the size of maxillary anterior teeth.

Materials & Method

One hundred twenty dentulous adults of both sexes (80 males and 40 females) were selected from different colleges of Manipur with the following criteria-

- Age group of 18-25 years
- Normal class I molar relationship with almost acceptable facial profile
- No history of caries, extraction, orthodontic treatment, TMJ disorders and periodontal diseases

Dental impressions for each subject were made and the casts were formed. The following measurements were carried out on the casts-

1. Measurement of combined mesiodistal width of both the maxillary incisors on the dental cast of each individual by measuring at the distal contact areas using a vernier calliper.
2. Measurement of the maxillary intercanine width on the dental cast for each subject by measuring between the cusp tips of maxillary canines using the vernier calliper [Figure 1]



Figure 1: Measurement of the maxillary intercanine width on the dental cast.

The following facial landmark measurements were recorded-

1. Philtrum width: The distance between the two most prominent points of the philtrum was measured using a vernier calliper.
2. Interalar width: It was recorded by measuring the separation between ala of the nose after making marks at the outer surface at greatest convexity of alar of the nose.
3. Measurement of the inter-commissural width was done between the corners (commissures) of the mouth. [Figure 2]



Figure 2: Measurement of the inter-commissural width.

The data thus gathered from the above measurements were tabulated and statistical analysis of that was carried out.

Statistical Analysis

The statistical analyses used for the study included mean, standard deviation (SD) and standard error (SE), and t-test. The following formulae were used :-

$$\bar{X} = \frac{\sum X}{N}$$

(Mean)

$$SD = \sqrt{\frac{\sum (x - \bar{x})^2}{N - 1}}$$

(Standard Deviation)

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}}}$$

(Student t Test)

$$SE_x = \frac{s}{\sqrt{n}}$$

(Standard Error)

Results

Following results were obtained-

The mean combined mesiodistal breadth of both maxillary central incisors was 17.10mm in males and 16.17mm in females. The mean intercanine distance of the maxillary cast was 35.53mm in males while in females it was 33.46mm. The mean value of the combined six maxillary anterior teeth in males was 52.69mm and 52.20mm was in females. The mean value of the intercommissural distance was 51.15mm in males and 50.01mm in females. The mean value of philtrum width was 14.33mm in males and 11.61mm in females. The mean value of interalar width was 38.17mm in males and 31.90mm in females.

When different measurements were tried to relate with each other following relations were observed-

The association between combined breadth of both the maxillary central incisors and philtrum width is shown in the table 1.

Sex	Combined width of maxillary central incisors (in mm)			Philtrum width (in mm)			Significance of the difference of mean
	Mean	SD	SE	Mean	SD	SE	
Male	17.10	0.52	0.06	14.33	0.75	0.08	t=23.21, p<0.001
Female	16.17	1.30	0.21	11.61	0.62	0.10	t=38.95, p<0.001
Comparison of the difference between male and female mean values		t=5.58, p<0.001		t=19.79, p<0.001			

Table 1: Relationship of breadth of both maxillary central incisors and the philtrum width.

The correlation between maxillary intercanine width and interalar width is shown in table 2.

Sex	Maxillary intercanine width (in mm)			Interalar width (in mm)			Significance of the difference of mean
	Mean	SD	SE	Mean	SD	SE	
Male	35.53	2.04	0.23	38.17	1.43	0.16	t=12.20, p<0.001
Female	33.46	2.72	0.43	31.90	2.28	0.36	t=11.96, p<0.001
Comparison of the difference between male and female mean values		t=4.67, p<0.001		t=18.43, p<0.001			

Table 2: Correlation between the maxillary intercanine width and interalar distance.

The relation between the combined mesio-distal dimensions of maxillary anterior teeth and the inter-commissural width is shown in the table 3.

Sex	Combined width of maxillary anterior teeth (in mm)			Intercommissural width (in mm)			Significance of the difference of mean
	Mean	SD	SE	Mean	SD	SE	
Male	52.69	1.60	0.18	51.15	1.43	0.16	t=31.29, p<0.001
Female	52.20	1.28	0.20	50.01	0.81	0.13	t=17.00, p<0.001
Comparison of the difference between male and female mean values		t=1.68, p<0.001		t=4.67, p<0.001			

Table 3: Relation between the combined mesio-distal dimensions of maxillary anterior teeth and the inter-commissural width.

Discussion

The present study showed that the philtrum width was greater in males (mean 14.33 mm) than females (mean 11.61 mm) probably due to the influence of sex factor as mentioned by Frush and Fisher.⁴ The mean value of combined width of maxillary central incisors was found to be lesser in females (males: 17.10 mm and females 16.17 mm) in support of the findings of Frush and Fisher.⁴ John Lee⁵ found equal values of the combined width of maxillary central incisors and the philtrum width. However the present study showed that the combined width of the maxillary central incisors was greater than the philtrum width by 2.77mm and 4.46mm in males and females respectively. The result of our study supported the findings of Swarn, Bhalla and Khanna.⁶

From the present study it can be inferred that the combined width of maxillary central incisors is equal to the philtrum

width within the range of 2.77 mm \pm 0.08 mm in males and 4.46 mm \pm 1.0 mm in females.

The study revealed that the interalar distance is greater than the intercanine width in males but it is the reverse in case of females. Mavroskoufis⁷ *et al* (found that there is a close relationship between interalar width (average value 35.3mm) and intercanine distance (average value 34.3mm). John Lee⁵ found out that the interalar width is the same as intercanine, contradicting the findings of the present study. The difference could be probably due to the racial variation. The result of the present study can be helpful to determine the intercanine width in relation to interalar width. The study revealed that the interalar distance was equal to intercanine distance within the range of 2.54 mm \pm 0.23mm in males 1.56mm \pm 0.43mm in females.

The average combined width of maxillary anterior teeth was found to be greater than the average commissural width in both male and female groups in the present study by a difference of 1.44 mm and 2.19 mm respectively. French FA² mentioned that the upper canine generally occupies a position just inside the corner of the mouth where the cuspid lines would give an approximate width of the upper six anterior teeth. Scandrett⁸ found that the intercommissural width was lesser than the combined width of maxillary anterior teeth. Ellakwa⁹ concluded that the width and length of the maxillary arch and interalar width were the most highly validated indicators of anterior tooth size selection ($r = 0.38 - 0.40$). Combining these measures can improve the strength of the correlation. Using these dimensions can be used to assist clinicians calculate maxillary incisor width. Ibrahimagic¹⁰ noted statistically significant difference between males and females existed for all the measured variables. The width of the nose approximated to the width between the tips of the cusps of upper canines (1.08 : 1).

Conclusion

The present study revealed that certain facial landmarks could be correlated to the size of maxillary anterior teeth and thus could serve as a guideline during the anterior teeth selection. Since the findings could be different on ethnic differences of the subjects undertaken, the findings of this study could serve the purpose in Manipuri population.

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