THE ROLE OF THE INTERALAR WIDTH IN THE ANTERIOR TEETH SELECTION

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ABSTRACT

The objective of the present study was to determine the correlation between the interalar width and the combined mesiodistal width of maxillary six-anterior teeth in Pakistani population. It was a cross sectional study and was carried out from May 2011 to November 2011.

A total of 159 dentate subjects fulfilling the inclusion criteria were selected from the department of Prosthodontics, Lahore Medical and Dental College, Lahore. The demographic information like age and sex were recorded and the informed consent was taken.

The patients were seated at upright position and asked to look straight. The interalar width was determined by measuring the external width of the alae of the nose at the widest point by using a digital caliper. With subject in a relaxed position, the recording part of the caliper was brought in contact with the outer surface of both alae without applying pressure.

The inter canine width was measured from the maxillary stone cast with the help of dental floss, placed at the greatest curvature of the maxillary arch. The distal surfaces of both the maxillary canines were marked on the maxillary cast. The dental floss was sectioned and made straight .The digital caliper was used to measure the distance between the marks.

Both the parameters were recorded three times by the single person to ensure the accuracy and the mean was taken. The measurements were recorded in a Proforma .

The statistical results of this study have shown that there is no correlation between the interalar width and the combined mesiodistal width of maxillary anterior teeth.It was concluded that the interalar width is not a reliable predictor for the selection of the width of maxillary anterior teeth in the edentulous patients in Pakistani population.

Key Words: Interalar width, Inter canine distance, Esthetics, Complete denture, Teeth arrangement.

INTRODUCTION

The concerns of a completely edentulous patient are primarily related to comfort, function and aesthetics.[1] Failure to achieve the esthetic appearance of an edentulous often results in the rejection of well constructed, comfortable and efficient denture.[2] The artificial teeth restored successfully within the esthetic zone, results in a positive effect on patient's self-esteem and quality of life.[3]

The anterior teeth are related to the esthetics, lip

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support, incision and phonetics.[4] For a completely edentulous patient, it is mandatory that the colour, size and the form of the teeth must be in harmony with the surrounding facial environment.[5] All these objectives are difficult to achieve when pre extraction records of the natural teeth such as casts or photographs are not available.

Many studies are available in the dental literature regarding the selection of the width of the anterior six teeth.[6] Some authors have investigated the correlation of the facial measurements and mesiodistal width of maxillary anterior teeth.[7, 8] They have proposed a ratio between the facial size and the tooth size that helps in selecting denture teeth.[7, 8]

These authors however have also registered variations in the soft tissue measurements with the age and they stated that these facial references are subjective to change.

The one of such landmark is the interalar width.[9] According to the embryogenic philosophy,[10] the nose has been considered as the most essential guide in selecting the size of the upper incisors. As it has been known that the nose and the four upper maxillary incisors develop from the same embryonic origin called the fronto nasal process.[10]

Furthermore the interalar width is a facial landmark that is at the closest distance from the teeth.

The aim of the present study was to find out the correlation between the interalar width and the combined mesiodistal width of the maxillary anterior teeth in Pakistani population. If any relation exists than it could be utilized for the artificial teeth selection, for the patients with no pre extraction records.

METHODOLOGY

A total of 159 dentate subjects were randomly selected from the department of Prosthodontics, Lahore Medical and Dental College, Lahore. The demographic information like age and sex was recorded. The age was ranging from 18 to 30 years. The subjects were selected on the clinical basis. The individuals with Angle's class I canine and molar relationships were included in the study. All the subjects with the history of orthodontic treatment, extractions, drifting and attrition of the teeth were excluded. The subjects having any restoration (crowns, bridge, fillings and removable prosthesis) in upper anterior segment were also not included in the study. None of the patient had any facial deformity, spacing or crowding of the anterior teeth. The informed consent was taken from all the subjects for using their data in research.

The subjects were seated at upright position and asked to look straight ahead. All the measurements were made using a digital caliper having fine pointed end that fitted interdentally. Digital caliper was having the precision of 0.1 mm and possibility of measuring distances from 0-200 mm.

The participants were required to inhale and exhale rapidly and deeply several times and then to hold their breath and not to expand the alae of the nose during the measurements of interalar width. Interalar width was determined by measuring the external width of the alae of the nose at the widest point. With patient in relaxed position recording part of the caliper was brought in contact with the outer surface of both alae without applying pressure. Each measurement was recorded three times for accuracy and precision.

For measuring the inter canine width, the artificial stone casts of maxillary arches were made from irreversible hydrocolloid impressions in perforated stock trays. Dental floss was placed at the greatest curvature of the maxillary cast and was fixed with the adhesive tape. The marks were made on the distal surface of both the canines. The dental floss was sectioned at the markings, made straight. The distance between the marks was measured using digital caliper.

Each parameter was measured three times by the single person to ensure the accuracy and the mean was taken. The measurements were recorded in a proforma.

The data was analyzed in statistical software (SPSS version 11). The quantitative variables interalar width and the inter canine distance [ICW]) were presented as mean and ± standard deviation. A qualitative variable like sex was presented as frequency and percentages. Pearson's correlation coefficient was used to find out the correlation between interalar width with inter canine distance. P-value ≤ 0.05 was considered for significance.

RESULTS

A total of 159 dentate subjects were included in the study to determine the correlation between the interalar width and combined mesiodistal width of maxillary anterior teeth. The histogram of the age distribution was presented in figure 1.The average age of the patients was 23.08 ± 2.34 year (95% CI: 22.72 to 23.45). The percentage of the male and the female subjects was shown in figure 2.

The average Inter canine width was 46.01±7.31 mm (95% CI: 44.96 to 47.25) similarly the average of the interalar width was also presented in Table 1. Average Inter canine width was significantly higher in male than female (p<0.01), while average interalar width was not significant between gender (p=0.266) as shown in Table 2. The Relationship between the Inter canine width (combined mesiodistal width) and interalar width is also presented in scatter plot which are showing weak relationship as presented in figure 3. Pearson correlation coefficients (r) for the Inter canine width and interalar width established a positive correlation (r=0.025). The relationship was very weak and not significant (P=0.75). While correlation was positive and significant (r =0.259; p=0.02) for male while for female correlation was negative and not significant (r= - 0.035, p=0.76). The relationship were observed for interalar width with combined mesiodistal width of maxillary six-anterior teeth after controlling of age effect. Partial correlation coefficients were presented in table 3 and 4. Ages were effect in relationship because a slightly difference was observed in correlation after controlling age.
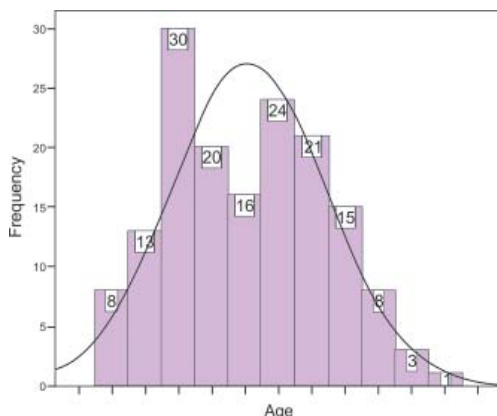
n=159
Mean± SD = 23.08±2.34 Years (95%CI: 22.72 to 23.45)
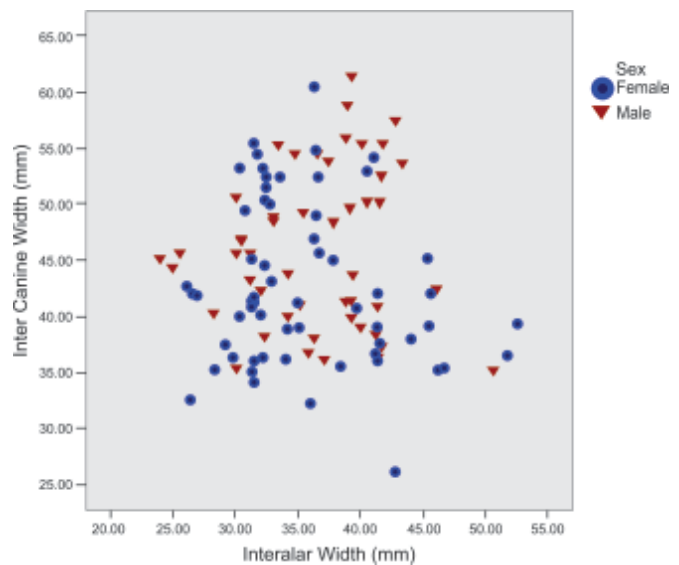Median (IQR) = 23(4) Years
Maximum Age = 19 Years
Minimum Age = 29 Year
Fig 1: Histogram of age distribution of the patients

n=159

Fig 2: Gender Distribution

n=159

Pearson Correlation Coefficient

	(r)	P-Value	Decision
Overall	0.025	0.75	Not significant
Male	0.259	0.02	Significant
Female	-0.035	0.76	Not Significant

Fig 3: Relationship between inter canine width and interalar width

DISCUSSION

The dentures play a role in restoring the esthetics of a completely edentulous patient. When there are no pre-extraction records, the selection of the size and the form of the artificial teeth becomes difficult. There are many different methods available in the dental literature for the selection of the size of the artificial teeth. However no universally accepted method currently exists. Most of the methods are based on the soft tissue references and the age related variations in the soft tissue measurements were also reported.

TABLE 1: DESCRIPTIVE STATISTICS OF STUDY CHARACTERISTICS OF THE PATIENTS
n=159

Variables	Mean ± SD	95%CI	Median(IQR)	Max - Min
Inter canine width	46.01±7.31	44.96 to 47.25	45.6(12.3)	61.44-26.26
Interalar width	35.46±5.60	34.52 to 36.33	34.8(8)	52.49-24.01

TABLE 2: COMPARISON OF TOOTH MEASUREMENT BETWEEN GROUPS

Variables	Malen=80	Femalen=79	P-Values
Inter canine width	47.53±6.72	44.67±73.63	0.013*
Interalar width	35.95±5.46	34.96±5.73	0.266

Independent sample t test applied (* significant difference

TABLE 3: PARTIAL CORRELATION COEFFICIENT OF INTER CANINE WIDTH WITH INTERALAR WIDTHINTER PAPILLARY DISTANCE

Partial Correlation Coefficient		
Parameter	Inter Canine Width	P-Values
Inter Commissural Distance	- 0.059	0.46
Interalar Width	0.04	0.61

Control Variables = Age

TABLE 4: PARTIAL CORRELATION COEFFICIENT AFTER CONTROLLING OF AGE EFFECT WITH RESPECT TO GENDER

Partial Correlation Coefficient Inter Canine Width				
Parameter	Male		Female	
	r	P-value	r	p-value
Interalar Width	0.22	0.05*	-0.14	0.21

Control Variables = Age

One of the landmarks is the interalar width.[9] According to the embryogenic philosophy,[10] the nose has been considered as an essential guide for the selection of the size of the upper incisors. The nose and the four upper maxillary incisors develop from the same embryonic origin called the fronto nasal process.[10] Furthermore the interalar width is a facial landmark that is at the closest distance from the teeth. The present study was conducted to find out the correlation between the interalar width and the combined mesiodistal width of the maxillary anterior teeth in Pakistani subjects.

The study was carried out at the outpatient department of Lahore Medical and Dental College, for which 159 subjects were selected. All these subjects were Pakistani Nationals. The population sample was comprised of 80 (50.3%) male and 79 (49.7%) female. The age ranged from 18 to 30 years.

The vernier caliper was used in the present study to measure the inter-canine distance on a stone cast. The measurements were repeated three times by the same operator to avoid biasness in the results, as done in various studies.[11,12,13,14,15] The measurement of interalar width was also recorded by using vernier caliper as done by Varjao FM et al[12,15].

The intercanine distance presented a mean value (46.01 ± 7.31 mm), and it is significantly high in male than female.

Similarly the mean of the inter canine distance in a study done by Al- Wazzan K et al[8] was (45.16 ± 3.28 mm) that is nearly same as in the present study. The difference of the value in the gender (45.16 ± 3.52 mm) for male, (43.93 ± 3.22 mm) for female was also found.

In few studies the low intercanine mean value than the mean in the present study has been shown.[16,1718,19] However the mean values statically higher than the present study were also reported in the dental literature.[11,20]

In agreement with the present study the gender based variations were also reported in the literature.[8,16,20] however in contrast to the results of the present study few studies have reported no gender based variations.[11,17]

The mean nasal width dimensions were 35.46 +_ 5.6 mm. This value is in correlation with the studies of Smith[13] (33.5mm), Mavroskoufis and Ritchie (35.3

mm)[21] and Scandrett et al (34.4 mm)[22]. However, Latta et al[23], studying edentulous patients found the mean nasal width of 40 mm.

The correlation coefficient (r) for interalar width is found to be 0.259 for males and _0.035 for females. This is in disagreement with those found by Smith (0.37)[13] and Hoffman et al (0.413). Scandrett et al[22] found a correlation coefficient of 0.336. Pearson correlation coefficients (r) for the Inter canine width and interalar width established a positive correlation (r=0.025). The relationship was very weak and not significant (P=0.75). While correlation was positive and significant (r =0.259; p=0.02) for male while for female correlation was negative and not significant (r= - 0.035, p=0.76). Relationship was observed for interalar width with combined mesiodistal width of maxillary six-anterior teeth after controlling of age effect. Ages were effect in relationship because a slightly difference was observed in correlation after controlling age. In contrast to the results obtained in the present study, few studies have suggested the nasal width as predictive factor.[22,26] The results of the present study just like other studies[13,21,24,25] have suggested that the nasal width method is not an accurate method for the selection of the width of the maxillary anterior teeth.

CONCLUSION

From the results of this study, the following conclusions were drawn:

The measurements of nasal widths showed a weak relationship with combined mesiodistal width of six anterior teeth for males and no relationship for females. This study showed that the interalar width is not accurate for the selection of the artificial teeth in Pakistani population. The measurement of the interalar width showed the gender-based difference.

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