

Correlation of Width of Anterior Maxillary Teeth with the Intercanine Distance, Distance from Inner to Outer Canthus of Right Eye and Width of First Three Fingers of Right Hand for Teeth Selection

Research Article

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Abstract

The needs of patients undergoing complete denture treatment for oral health and esthetics are growing, as are their demands for function and comfort. Previously various anthropometric measurements have been suggested for selecting the size of the anterior teeth like inter-alar distance, inter-pupillary distance, intercanthal distance, bi-zygomatic width, intercanine width but the most reliable indicator to determine it remains unclear. The purpose of this study was to evaluate width of anterior maxillary teeth with width of intercanine distance, distance from inner canthus to outer canthus of right eye, and combined width of three fingers of right hand. A total of 50 patients were assessed and reviewed with the usage of digital vernier calliper. The results of comparison of mean differences among three variables Intercanine distance, eye width and combined finger width was done using one way ANOVA test was done. In males, df : 2, F: 11.578, p-value: 0.001(p<0.05) values were obtained which implies statistical significance. In females, df, F: value ,p-value: 0.004 (p<0.05) values were obtained which implies statistical significance. The Pearson correlation coefficient values for variables were Intercanine distance×Eye width: 0.607**, Eye width× Finger width: 0.657** and Finger width×Intercanine distance: 0.856** which implies strong correlation. It was concluded that there is a significant correlation between intercanine distance and combined width of the first three fingers of the right hand and statistical significant difference between intercanine distance and inner to outer distance of right eye.

Keywords: Esthetics; Anterior Teeth Selection; Intercanine Distance; Eye Width; Combined Finger Width; Dental Esthetics.

Introduction

The primary consideration for patients seeking prosthodontic treatment is esthetics. The size, colour, morphology and arrangement of the anterior teeth are the various factors which play an imperative role in achieving excellent esthetics in complete denture [1]. The esthetic restoration of the edentulous patient has an important psychological effect on the edentulous patient [2].

Patients receiving their first set of dentures often have expectations to mimic their natural teeth. Therefore, the correct selection of the artificial teeth, especially the anterior teeth selection has effects on the esthetic outcome. Selection of proper anterior teeth

size for edentulous patients can be difficult without any pre-extraction records availability. In addition, the generation approaching 70 years of age recognizes that maintaining their natural dentition improves appearance and smile and serves as a visible sign of successful aging [3].

Complete denture patients require comfort as their first priority followed by harmonious appearance and functioning. Also, they often expect to appear similar to when they had their natural teeth especially when receiving the first denture set. Thus, correct selection of artificial teeth is essential to achieve a pleasant esthetic outcome [4, 5].

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The size and form of the maxillary anterior teeth are important for facial esthetics as well as dental esthetics. The goal is to restore the maxillary anterior teeth in harmony with the facial appearance. To determine the dimensions of maxillary anterior teeth, knowledge and understanding of a number of physical and biological factors is necessary which is directly related to each patient as an individual [6, 7].

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. Several anatomic measurements, including bizygomatic width (BZW), interpupillary distance (IPD) [8, 9] interalar width (IAW) [10-12], inter canthal distance (ICD) [13-15], and intercommissural width (ICW) [16-18] have been suggested to aid in the estimation of a combined width of the maxillary anterior teeth (intercanine width) [19-22].

Esposito reviewed several methods of tooth size selection but felt that selection of the proper size was a subjective decision that the dentist must make, and that every available aid should be used as a consideration in the selection process [23]. Scandrett et al., the best model of predictor variables took into account interalar width, intercommissural width, age, and inner buccal frenum distance [7]. In 1914 Williams et al., found a relationship between the size of faces and the size of teeth [24]. Pound et al., determined face width by measuring the distance from zygoma to zygoma [25].

Previously our department has published extensive research on

various aspects of prosthetic dentistry [26-36], this vast research experience has inspired us to research about comparative evaluation of width of anterior maxillary teeth with the intercanine distance, distance from inner to outer canthus of right eye and width of first three fingers of right hand.

The purpose of this study was to predict the width of the maxillary anterior teeth in comparison with factors such as intercanine distance, inner canthus to outer canthus of right eye, and width of three fingers of right hand.

Material and Method

The patients reported to the Dept of Prosthodontics, Saveetha Dental College, Chennai, participated in this study. A total of 50 people were taken for this study and were divided into two groups - Group1: Males Group2: Females.

The inclusion criteria were 1) No missing maxillary or mandibular anterior teeth 2) No gingival or periodontal conditions problem in the anterior teeth 3)no interdental spacing or crowding; 4) No anterior restoration; and 5) No history of orthodontic treatment. 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.

The measurements taken were intercanine distance (Figure 1), distance from inner to outer canthus of right eye (Figure 2) and width of the first three fingers of the right hand (Figure 3). For all

Figure 1. Measurement of distance from inner to outer canthus of the right eye.

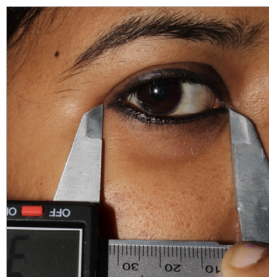


Figure 2. Measurement of combined width of first three fingers of right hand.

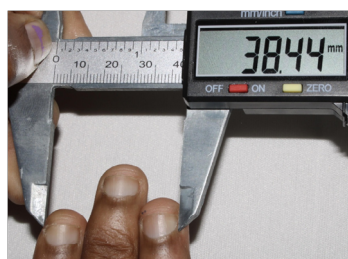


Figure 3. Measurement of width of intercanine distance of maxillary anterior teeth.



the measurements, a digital vernier caliper was used. Data collection was done with IBM SPSS software and tabulated in MS Excel™ (Microsoft Office, USA). Statistical analysis was done using SPSS Statistics Software for windows, version 20.0.

The output variables measured were 1) Intercanine distance of maxillary teeth 2) Distance from inner to outer canthus of right eye and 3) Width of the first three fingers of the right hand. One way ANOVA test was used as the statistical test for the study.

Results

The results were obtained after statistical analysis. Comparison of mean differences among three variables Intercanine distance, eye width and combined finger width (measurement in mm) was done using one way ANOVA test (Table 1). In males, the values of Mean ± SD were Intercanine distance 40.510 ± 1.954, eye width 37.969 ± 2.37 and combined finger width 40.397 ± 1.969 and df: 2, F: 11.578, p-value : 0.001(p<0.05) were obtained which implies statistical significance. In females, the values of Mean ± SD were Intercanine distance 37.450 ± 1.787, eye width 35.692 ± 1.918 and combined finger width 36.978 ± 1.907 and df: F: value ,p-value: 0.004(p<0.05) were obtained which implies statistical significance. A bar graph showing mean values for three variables intercanine distance, eyewidth and combined finger width amongst males and females (Figure 4). The Pearson correlation

coefficient values for variables were Intercanine distance × Eye width: 0.607**, Eye width × Finger width: 0.657** and Finger width × Intercanine distance: 0.856**. According to its interpretation, these values lie between ± 0.50 and ± 1 which implies strong correlation (Table 2).

Discussion

In case of pre-extraction records, selection of upper anterior artificial teeth for complete denture patients is difficult. A universally accepted method for accurate determination of mesiodistal width of upper anterior, artificial teeth has not yet been found. In this present study, 25 males and 25 females were evaluated and variables were measured. The results of one way ANOVA test showed that there is significant correlation between inter-canine distance and combined width of the first three fingers of the right hand and statistically significant difference between inter-canine distance and width of inner to outer canthus of the right eye. Thus, for maxillary anterior teeth selection these parameters can be used. The Pearson correlation coefficient was done for three variables intercanine distance, eye width and combined finger width and the values were between ± 0.50 and ± 1 which imply strong correlation. The value for correlation of intercanine distance and finger width was more inclined towards 1 and thus has a stronger correlation. Thus, finger width can be used as a parameter in maxillary anterior teeth selection.

Table 1. Comparison of mean difference among three groups- Intercanine distance, eye width and combined finger width (measurement in mm).

ANOVA							df	F	p-value
		Mean ± SD	Standard Error	95% confidence interval					
				Lower Bound	Upper Bound				
MALES	ICD	40.510 ± 1.954	0.39	39.704	41.317	2	11.578	0.001*	
	Eye Width	37.969 ± 2.378	0.475	36.987	38.95				
	Finger Width	40.397 ± 1.969	0.393	39.584	41.21				
FEMALES	ICD	37.450 ± 1.787	0.357	36.712	38.187	2	5.904	0.004*	
	Eye Width	35.692 ± 1.918	0.383	34.9	36.483				
	Finger Width	36.978 ± 1.907	0.381	36.19	37.765				

*statistically significant p<0.05
P value is derived from one-way ANOVA test.

Figure 4. A bar graph showing mean values for three variables intercanine distance, eyewidth and combined finger width amongst males and females.

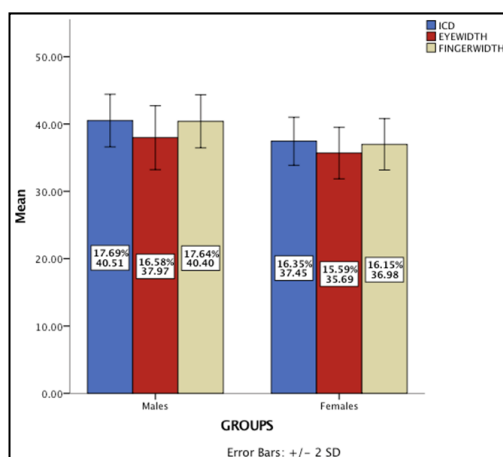


Table 2. Correlation between the eye width and combined finger width groups with mesio distal width of intercanine distance.

		Correlations		
		ICD	EYE WIDTH	FINGER WIDTH
ICD	Pearson Correlation	1	.607**	.856**
	Sig. (2-tailed)	0	0	0
	Sum of Squares and Cross-products	285.452	174.239	261.401
	Covariance	5.826	3.556	5.335
	N	50	50	50
EYE WIDTH	Pearson Correlation	.607**	1	.657**
	Sig. (2-tailed)	0	288.878	0
	Sum of Squares and Cross-products	174.239		201.904
	Covariance	3.556	5.895	4.12
	N	50	50	50
	Pearson Correlation	.856**	.657**	1
	Sig. (2-tailed)	0	0	
	Sum of Squares and Cross-products	261.401	201.904	326.652
	Covariance	5.335	4.12	6.666
	N	50	50	50

One of the critical aspects of esthetic dentistry is designing the mathematical proportion to relate successive widths of anterior teeth whereas golden proportion, golden percentage theories have been introduced into the field. In a study by Kern, it was found that 93% of nasal width was equal to or within 0.5mm of four maxillary incisors [37]. Mavroskoufis et al., in 1980 found that inter ala-nasal width is a reliable guide to selecting the mold of anterior teeth and that incisive papilla for providing a stable anatomical landmark for arranging the labial surfaces of central incisors at 10mm anterior the posterior border of papilla(38). Silverman found that the distal surface of maxillary canines was ± 4 mm from the commissures [39]. Lombardi was first to suggest that application of golden proportion in dentistry. Intercanine distance should be used only as reference value in estimations of central incisor width [40]. Intercanine 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 [41]. In a systematic review by Ashish Jain et al, they stated that 1) The anthropometric measurement used depends on the population group which is being used 2) There is no single anthropometric measurement that can be used to determine width of maxillary anterior teeth. 3) In Indian population, a high degree of correlation was seen between inter-alar distance, inter-pupillary distance, bizygomatic width and width of maxillary anterior teeth [42].

The limitation of the study is that the sample size was limited. More conclusive results can be derived from a larger sample size. To summarize the present study, for maxillary anterior teeth selection, both eye width and combined width of the first three fingers showed statistically significant correlation. But to obtain more accurate results, combined width of the first three fingers can be used as a parameter as it showed a stronger correlation with intercanine distance.

Conclusion

Within the limitation of the study, we concluded that there is a significant correlation between intercanine distance and combined width of the first three fingers of the right hand and statistical significant difference between intercanine distance and inner to outer distance of right eye.

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