

Evaluation of the Relationship Between Three Different Anatomical Landmarks on the Face with Width of the Maxillary Anterior Teeth

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ABSTRACT

Aim: To evaluate the relationship between three different anatomical landmarks on the face with a width of anterior maxillary teeth.

Material and methods: A total of 100 subjects participated in this study. In whom inter commissural width, interpupillary width, and bizygomatic width were measured with a digital Vernier calliper. And maxillary anterior teeth width is measured from the canine tip of one side to another side across the facial surfaces, using ligature wire and metal scale. Mean, standard deviation, t-test, and Pearson correlation coefficient were calculated to determine the relationship between intercommissural width, interpupillary width, and bizygomatic width to maxillary inter canine width.

Results: The mean, standard deviation, t value, and p-value shows there is a significant difference exists between inter commissural, interpupillary, bizygomatic width, and maxillary inter canine width. The Pearson correlation coefficients were relatively low; a negligible relationship existed between intercommissural width, interpupillary width and bizygomatic width, and the maxillary anterior teeth width.

Conclusion: This current study suggested that no correlation has found between intercommissural width, interpupillary distance, bizygomatic width to maxillary anterior teeth width for the population.

Keywords: Intercommissural width, Interpupillary width, Bizygomatic width.

INTRODUCTION

In complete edentulous patients, the selection of anterior teeth is a primary consideration for aesthetics. Patients receiving their first dentures often expect to appear similar to when they had their natural teeth. So the correct selection of artificial teeth is essential to achieving a pleasant esthetic outcome.¹ The maxillary anterior teeth must be in proportion to facial morphology to look attractive. The dentist has many available guides for the selection of anterior teeth by using pre-extraction records, facial guides, anthropometric

measurements, measurements on occlusal rims, and dentogenic concept.² When pre-extraction records are unavailable, selecting the suitable size of the anterior teeth becomes somewhat arbitrary. Anatomic landmarks of different types have been proposed to aid in determining the size of the anterior teeth, including bizygomatic width, interpupillary distance, intercanthal distance, interalar width, and inter-commissural width.³

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Fig 1: Measuring intercommisural width.



Fig 2: Measuring interpupillary width.



Fig 3: Measuring bizygomatic width.



Fig 4: Measuring maxillary intercanine width.

Table 1: Mean, standard deviation, t-test, and p values of males and females.

	Male	Female	t value	p-value
	Mean and SD	Mean and SD		
ICW	50.97 ± 2.7	46.41 ± 2.6	8.22	0.001 sig
IPW	65.51 ± 2.8	62.01 ± 2.6	6.31	0.001 sig
BZW	107.42 ± 4.52	104.55 ± 4.8	3.05	0.003 sig
MICW	40.94 ± 1.8	39.52 ± 3.24	2.68	0.004 sig

ICW=inter commissural width, IPW=inter pupillary width, BZW=bizygomatic width, MICW=maxillary inter canine width, SD=Standard deviation, Sig = significance

Table 2: Mean and standard deviation values of study subjects.

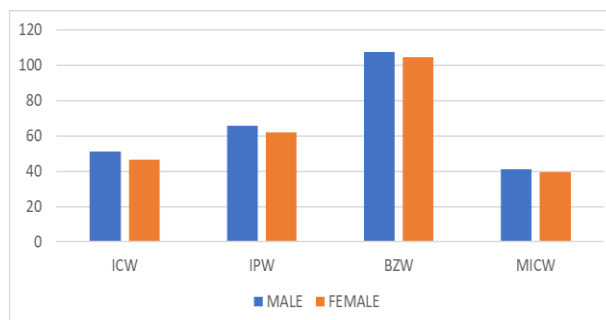
	MEAN	SD
ICW	48.69 ± 3.52	3.52
IPW	63.76 ± 3.2	3.2
BZW	105.98 ± 4.88	4.88
MICW	40.2 ± 2.73	2.73

ICW=inter commissural width, IPW=inter pupillary width, BZW=bizygomatic width, MICW= maxillary inter canine width.

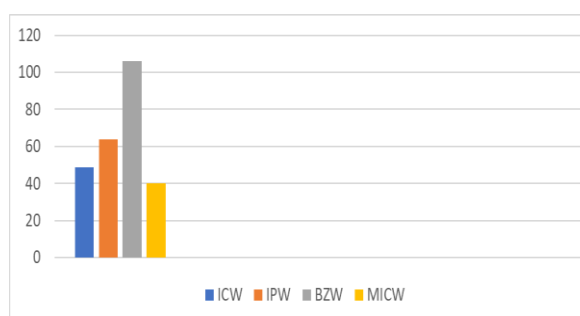
Table 3: The correlation coefficient between ICW, IPW, and BZW to MICW.

	MICW	t value	p value	r value
ICW	48.69 ± 3.52	40.2 ± 2.73	18.94	<0.05 sig r= 0.3933
IPW	63.76 ± 3.2	40.2 ± 2.73	55.22	<0.05 sig r= 0.2957
BZW	105.98 ± 2.7	40.2 ± 2.73	117.52	<0.05 sig r=0.2349

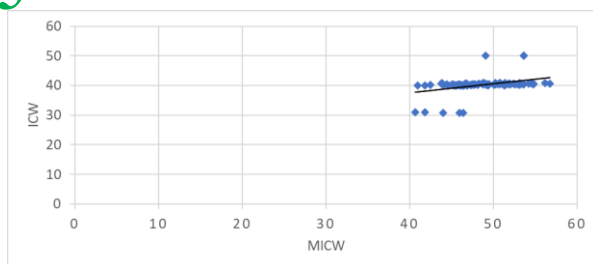
ICW=inter commissural width, IPW=inter pupillary width, BZW=bizygomatic width, MICW=maxillary inter canine width. r= correlation coefficient



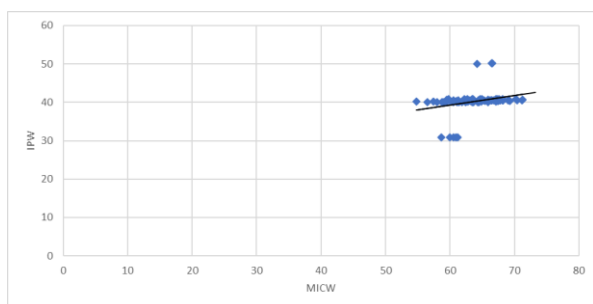
Graph 1: comparison of ICW,IPW,BZW and MICW between males and females.



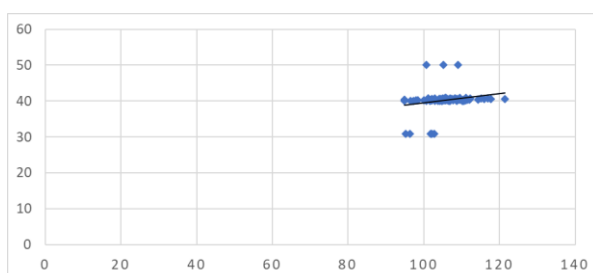
Graph 2: comparison of ICW,IPW,BZW and MICW.



Graph 3: Correlation coefficient between intercommisural width and maxillary anterior teeth width.



Graph 4: Correlation coefficient between interpupillary width and maxillary anterior teeth width.



Graph 5: Correlation coefficient between bizygomatic width and maxillary anterior teeth width.

There is no universally accepted parameter that presently exists for the selection of anterior teeth.⁴ Hence, this study is to evaluate the relationship between inter-commisural width, interpupillary width, and bizygomatic width to the maxillary anterior teeth width.

MATERIALS AND METHODS

A total of 100 subjects were selected for study between the age group of 18 – 40 years from the G.pulla reddy dental college and hospital, Kurnool, Andhra Pradesh, India.

The inclusion criteria were

1. They should be Indian
2. They should have all permanent maxillary and mandibular anterior and posterior teeth
3. Age should be above 18 years
4. No inter-dental spacing and crowding
5. No anterior restoration
6. No history of orthodontic treatment.
7. No gingival or periodontal conditions problems in the anterior teeth
8. They should have well-aligned maxillary anterior teeth, devoid of dental caries, anatomical malformations, teeth wear, and midline diastema.¹

Procedure for measuring anatomical landmarks on the face :

Each subject was advised to sit relaxed in a dental chair with the head upright supported by the headrest to enable them to face forward on the horizon, with the occlusal plane of the maxillary teeth parallel to the floor. For measuring intercommisural width: Two points were marked in the outer surface of the corner of the lip. By using a Vernier, calliper width is measured passively. Repeated measurements were taken three times, and the mean value was recorded by the examiner.³(Fig.1)

For measuring interpupillary width: The distance between the mid-pupils of the eyes was recorded by advising the subject to open eyes look forward without blinking, and were measured using a digital Vernier calliper. Repeated measurements were taken three times, and the mean value was recorded by the examiner.⁵(Fig.2) For measuring bizygomatic width: In this method, a Vernier calliper was used to measure the distance from the most prominent point on the zygomatic bone on both sides without applying pressure. Repeated measurements were taken three times, and the mean value was recorded by the examiner.⁶(Fig.3)

Procedure for measuring the width of anterior maxillary teeth:

A ligature wire was bent manually according to the arch form of the patient, and two points were marked on the ligature wire at canine tips one side to the other. For each patient, a new ligature wire has used. Following this, the ligature wire was straightened, and the distance between the two marked points on the ligature wire was measured

using a metal scale. Readings were repeated three times, and the mean value was recorded by the examiner and has calculated.³(Fig.4)

For statistical analysis mean, standard deviation, t-test, and Pearson correlation coefficients to know whether any correlation existed between ICW, IPW, and BW and maxillary inter canine width.

RESULTS

The average inter commissural width of males (50.97 mm) was higher than females (46.41mm), and the average interpupillary width of males (65.51mm) was more than females(62.01mm), and the average bizygomatic width of males (107.42 mm)was more than females (104.55 mm), and average maxillary intercanine width of males (40.94)is more than females (39.52). Statistically, a significant result is shown with t-test. (TABLE 1).

The mean valve of inter commissural width, interpupillary width, and bizygomatic width is greater than maxillary intercanine width. (TABLE 2)

Pearson's correlation statistical analysis revealed a low correlation exists between intercommissural width and maxillary inter canine width(MICW), and a negligible correlation exists between interpupillary width, bizygomatic width, and maxillary inter canine width(MICW). (TABLE 3)

Finally, there exists a significant difference between intercommissural width, interpupillary width, and bizygomatic width to maxillary intercanine width.so this study showed that intercommissural width, interpupillary width, and bizygomatic width could not be used as a dependent parameter to estimate the width of maxillary anterior teeth width.

DISCUSSION

Dental aesthetics and facial appearance have become essential to this current generation, resulting in an increased interest in achieving optimal treatment outcomes.⁷ The perfect selection of artificial teeth is essential to obtain a pleasant aesthetic outcome.³ The subjects were all of the Indian population. Because the sample was relatively homogeneous, the results of this study are more applicable to the community evaluated.⁸ Various techniques have been employed for the selection of artificial anterior teeth, Which is

dependent on the physical characteristics of the dentofacial form. The anthropological assessment shows that the greatest bizygomatic width of the skull divided by 16 corresponds to the width of the upper central incisor, and the bizygomatic width divided by 3.3 corresponds to the overall width of the maxillary six anterior teeth arranged on a curve.⁹ Schiffman P¹⁰ determined the size of the artificial maxillary teeth by using the incisive papilla and the cuspid eminence. Ricketts¹¹ advocated drawing a perpendicular through the pupil of the eye. The corners of the mouth fell halfway between this line and the outer limits of the alae portion of the nose. Mean values from a study by Shillingburg et al. .¹² indicated that as a percentage of circumferential arc distance between the distal surface of canines, the combined width of the central incisors would occupy 37 % of the distance, with the combined widths of the lateral incisors occupying 31 % of the distance and the combined widths of the canines 32 % of the distance.

Silverman¹³ pointed out that the mesiodistal dimension of anterior teeth can be related to the distance between the corners of the mouth. In this study, the Intercommissural width of the subjects showed no correlation to the maxillary anterior teeth width. Thus the inter commissural width cannot be considered reliable in predicting the width of anterior teeth. It is in contrast to the findings by Silverman, who said that the mesiodistal dimension of anterior teeth could be correlated to the distance between the corners of the mouth.

In this study, no correlation has found between intercommissural width, interpupillary width, Bizygomatic width and anterior maxillary teeth which showed similarity to the findings by Latta et al. .¹⁴ concluded that the no correlation has found between mouth width, interalar width, bizygomatic width, or interpupillary distance for the population as a whole, nor when it has divided into the race, sex, or group.

In the present study, there is a significant difference in females bizygomatic width and maxillary anterior teeth width this showed the difference to the findings by Ufuk Hasanreisoglu et al. .¹⁵ concluded that in women Bizygomatic width and internal width may serve as references for establishing the ideal width of the anterior maxillary teeth.

Teeth give uniqueness for dentition, and one must be careful while selecting this to create satisfying esthetics to attain harmony with the facial appearance. Giving importance to central incisors and then to lateral and canines in decreasing width. Also, race, gender, facial morphology, and psychological factors should be kept in mind.¹⁶

Therefore, it might be inferred from this simple test of the data that there is some value in using more than one measurement in the selection process. In the final analysis, however, the dentist should keep in mind that "beauty lies in the eye of the beholder," and the patient must always be allowed to make the actual decision.

CONCLUSION

The study is confined to only one specific area and showed no direct correlation between intercommisural width, interpupillary width, bizygomatic width to the width of the anterior maxillary teeth. Therefore intercommisural width, interpupillary width, bizygomatic width cannot be used as a reliable guide for measuring the width of the maxillary anterior teeth. However, other facial measurements could be used to establish the width of the maxillary anterior teeth.

Within the limitation of the study, the following conclusions were drawn:

- Intercommisural width, interpupillary width, and bizygomatic width showed a significant relationship with maxillary intercanine width.
- No correlation was found between intercommisural width, interpupillary distance, bizygomatic width to maxillary anterior teeth width for the population.
- Intercommisural width, interpupillary width, bizygomatic width are not reliable factors for measuring the width of the maxillary anterior teeth.

Clinical significance:

Esthetics is a major consideration for patients seeking complete removable prosthesis treatment. So, to achieve this goal, the morphology and arrangement of the anterior teeth must be in proportion to the facial dimension. The

intercommisural width, interpupillary width and bizygomatic width cannot give the accurate measurement to establish anterior teeth width. Other facial measurements could be used to establish the width of the anterior maxillary teeth.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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