The Journal of Indian Prosthodontic Society is indexed/listed with DOAJ, Health and Wellness Research Center, Health Reference Center Academic, InfoTrac One File, Expanded Academic ASAP, ProQuest Databases, Genamics JournalSeek, and Ulrich's International Periodical Directory.

The journal is official publication of the Indian Prosthodontic Society, and issues are published quarterly in the last week of March, June, September and December.

The Journal is printed on acid free paper.

Editorial Office
Dr. (Mrs) S. J. Nagda
Prof. & Head,
Dept. of Prosthodontics,
Nair Hospital Dental College,
Mumbai - 400 008, India.
E-mail: jipseditor@yahoo.co.in

Published by
Medknow Publications,
A-109, Kanara Business Centre,
Off Link Road, Ghatkopar (E),
Mumbai - 400075, India.
Tel: 91-22-6649 1818/1816,
E-mail: publishing@medknow.com
Website: www.medknow.com

Websites
www.jprosthodont.com
www.journalonweb.com/jips

The Journal of Indian Prosthodontic Society

Official Publication of Indian Prosthodontic Society
ISSN 0972-4052

IPS Office
Dr. V. Rangarajan
Hon. Gen. Secretary cum Treasurer, 230, Avvai Shanmugham Salai,
Royapettah, Chennai - 600014, India. E-mail: drvranga@gmail.com

The Journal of Indian Prosthodontic Society

July-September 2007 - Vol 7 - Issue 3

CONTENTS

Original Article

Biometric relationship between intercanthal dimension and the widths of maxillary anterior teeth

Ulhas E. Tandale, Shankar P. Dange, Arun N. Khalikar
Department of Prosthodontics, Government Dental College and Hospital, Ghati, Aurangabad, Maharashtra, India

For Correspondence
Dr. Ulhas E Tandale, Room No. 233, Department of Prosthodontics, Government Dental College and Hospital, Ghati, Aurangabad - 431 001, India. E-mail: ulhas_tandle@rediffmail.com

PROBLEM: Selection of appropriately sized maxillary anterior teeth is one of the difficult aspects of esthetics in complete denture prosthodontics. Many attempts have been made to establish methods for estimating the combined width of maxillary anterior teeth and central incisors using anatomical landmarks, but depending on a single method for this purpose is not advisable in such a crucial esthetic stage. This study attempts to provide a guideline along with other methods for determining this relationship. **PURPOSE:** The purpose of the study was to determine whether a relationship exists between the intercanthal dimension and four mesiodistal width combination of the maxillary anterior teeth. **SETTING AND DESIGN:** This study has a cross-sectional design. The work was performed in a dental college and hospital. **STATISTICAL ANALYSIS USED:** Pearson correlation coefficient with paired t test with a confidence interval level of 95%; this is determined on the basis of the sample size. **MATERIALS AND METHODS:** Maxillary anterior teeth of 210 patients were examined. The intercanthal distance was measured between the median angels of the palpebral fissure. The mean widths of two central incisors, combined width of the four incisors and combined width of six anterior teeth were intraorally determined at their widest dimensions. Statistical analysis was performed to determine the relationship between the intercanthal distance and the four measurements of maxillary anterior teeth. **RESULTS:** After the statistical analysis, it was found that biometric ratios of 1: 0.271 and 1: 1.428 could be used to estimate the central incisor width and the combined widths of the six anterior teeth, respectively. **Conclusion:** Within the limitation of this study, the intercanthal distance can be used as a preliminary method for determining the width of the maxillary anterior teeth during the initial selection of the teeth for an edentulous patient.

Key words: Biometric relationship, intercanthal dimension, tooth selection, width of maxillary anterior teeth

For centuries, poetry and literature have indicated that the teeth possess a beauty of their own and also that they greatly contribute to facial beauty. One of the primary concerns in denture esthetics is the selection of maxillary anterior artificial teeth, particularly the central incisors. The size, form and color of the teeth must be in harmony with the oral and facial structures.[1] The width of the teeth is considered to be more critical than the length.[2] When no pre-extraction records are available, selecting the proper anterior teeth size for edentulous patients can be difficult.

In this study, an investigation is conducted on dentulous patients in order to relate the intercanthal dimension and the width of maxillary anterior teeth for initial selection of the teeth for an edentulous patient; this establishes a relationship between them.

The medial junction of the two eyelids is called as medial canthus. The intercanthal distance is the distance between the medial canthi of the palpebral fissure bilaterally [Figure 1]. The intercanthal Dimension (ICD) is considered as a reliable anatomic dimension because 93% of ICD growth has been achieved in 5 years, the maturity is reached between 8 to 11 years and it is considered to be normal for a dimension of 28-35 mm. No differences related to sex, race or age has been shown in the ICD. Thus, ICD may provide a valid approach for anterior tooth selection.[3]

MATERIALS AND METHODS

A total of 210 patients were randomly selected from the outpatient department of the Hospital, out of which 145 were males and 65 were females in the age group of 18-52 years. Subjects had all maxillary anterior teeth present without caries, restoration or severe attrition. Patients with a history of congenital anomaly orbital disease, trauma or facial surgery were excluded.

All the dimensions were measured using Vernier calipers by a clinician [Figure 2]. The mesiodistal

dimensions were recorded at the widest dimension; three measurements per tooth are taken and the mean was calculated [Figure 3].

The four combinations of maxillary anterior teeth are defined as follows:

1) Mean of the mesiodistal width of the central incisor (MCIW)
2) The combined width of the central incisors (CCIW)
3) The combined width of four incisor teeth (CAW)
4) The combined width of six anterior teeth (CAW)

The latter three dimensions were obtained by adding the mesiodistal widths of individual teeth.

The data were statistically analyzed with the use of descriptive statistics and Pearson correlation coefficients to determine whether any correlation existed between the intercanthal dimension and the four dimensions of the maxillary anterior teeth [Table 1, Graph 1].

RESULTS

The mesiodistal widths of central incisors, lateral incisors and canines of every subject are measured and the combinations of the four dimensions are obtained by adding the individual valves. The descriptive statistics such as mean, maximum and minimum of the recorded measurements are listed in Table 2 and Graph 2.

Pearson correlation for all the measurements were high (r = 1); paired t-test shows statistically significant results. The values were greater for men than for women with significant differences for the tested variables. No significant differences were observed between sexes with respect to ICD.

Pearson correlation coefficients for the ICD and four measurement variables demonstrated a positive correlation [Table 1, Graph 1].

The Ratios between the mean ICD and the mean of the four maxillary teeth measurements are presented in Table 3 and Graph 3. For the sample population, the ratio was 0.271 for the central incisors, 0.542 for the combined width of the central incisors, 0.971 for all the four incisors and 1.428 for the six anterior teeth.

Figure 1: Vernier calipers

Figure 2: The intercanthal dimension

DISCUSSION

As the subjects were from the same population, the results of this study are more applicable to the Indian population. In the present study, all the tooth dimensions were significantly larger in men than in women. The mean mesiodistal width of the central incisors is in good agreement with the value obtained

Table 1: Pearson correlation matrix for intercanthal distance dimensions and the widths of four maxillary anterior teeth

	MCIW (*P* value)	CCIW (*P* value)	CIW (*P* value)	CAW (*P* value)
All subjects	0.209 (0.0001)	0.208 (0.0001)	0.254 (0.0001)	0.302 (0.0001)
Men	0.246 (0.0001)	0.245 (0.0001)	0.298 (0.0001)	0.366 (0.0001)
Women	0.190 (0.003)	0.190 (0.003)	0.228 (0.0001)	0.272 (0.0001)

MCIW: Mean mesiodistal width of central incisors, CCIW: Combined width of central incisors, CIW: Combined width of the four incisors, CAW: Combined width of the six anterior teeth

Figure 3: Mesio-distal dimensions of the tooth are measured at the widest dimension

Table 2: Mean values and range of the intercanthal distance and four teeth measurement widths

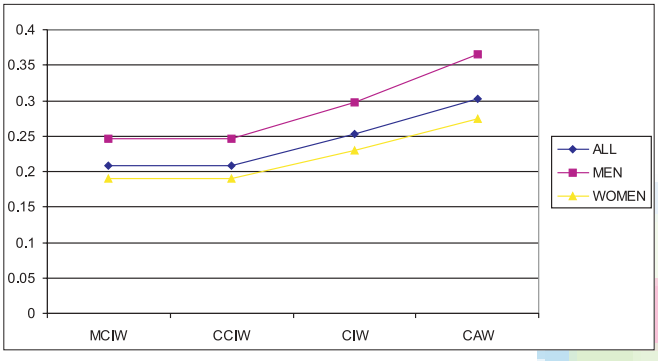
	All subjects (Mean ± SD)	Minimum	Maximum	Men (Mean ± SD)	Women (Mean ± SD)	*P* value
ICD	31.98 ± 2.79	29.6	34.8	32.16 ± 2.62	31.59 ± 2.91	0.914
MCIW	8.67 ± 0.57	7.65	9.8	8.68 ± 0.46	8.40 ± 0.55	<0.0001
CCIW	19.19 ± 1.21	15	18.8	17.38 ± 1.05	16.93 ± 1.18	<0.0001
CIW	31.05 ± 1.98	28.9	34.2	31.62 ± 1.83	30.15 ± 1.98	<0.0001
CAW	45.65 ± 2.74	42.2	49.6	45.81 ± 2.45	45.13 ± 2.76	<0.0001

ICD: Intercanthal distance, MCIW: Mean mesiodistal width of central incisors, CCIW: Combined width of central incisors, CIW: Combined width of the four incisors, CAW: Combined width of the six anterior teeth, MV: Mean value, SD: Standard deviation

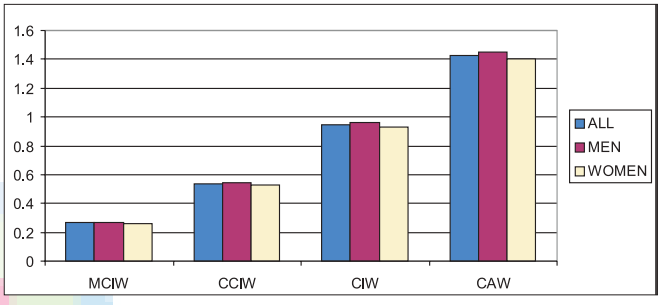
Table 3: Ratio of intercanthal distance to teeth widths

	MCIW (Mean ± SD)	CCIW (Mean ± SD)	CIW (Mean ± SD)	CAW (Mean ± SD)
All subjects	0.271 ± 0.027	0.542 ± 0.051	0.971 ± 0.091	1.428 ± 0.123
Men	0.276 ± 0.024	0.551 ± 0.050	0.989 ± 0.084	1.148 ± 0.119
Women	0.263 ± 0.027	0.535 ± 0.054	0.962 ± 0.095	1.407 ± 0.134

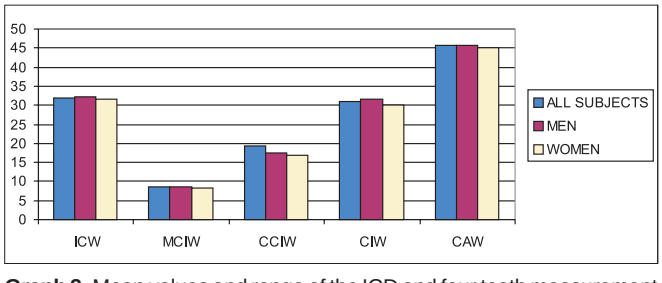
MCIW: Mean mesiodistal width of central incisors, CCIW: Combined width of central incisors, CIW: Combined width of the four incisors, CAW: Combined width of the six anterior teeth



Graph 1: Pearson correlation coefficient for ICD dimensions and the widths of four maxillary anterior teeth variables



Graph 3: Ratio of ICD dimensions to the tooth width factors



Graph 2: Mean values and range of the ICD and four tooth measurement widths

by Scandrett *et al.*[3] The mean value of the combined widths of the six maxillary anterior teeth (45.23 mm) supports the findings of Shillingburgh *et al.* (45.80 mm).[4] Accordingly, although the ICD does not appear to be a reliable guide for selecting the maxillary anterior teeth, it can be used to make a provisional or initial-size selection or used in combination with the other means of tooth selection. Scandrett *et al.*,[4] suggested that more than one anatomic reference is required to predict the width of the maxillary anterior teeth. The final decision regarding tooth selection should be made during the trial insertion stage of the denture and should be confirmed by consultation with the patient.

CONCLUSION

Within the limitations of this study, the intercanthal distance can be used as a preliminary method for determining the width of the maxillary anterior teeth during the initial selection of teeth for an edentulous patient.

REFERENCES

1. Fresh JP, Fisher RD. How dentogenic restorations interpret the sex factor. J Prosthet Dent 1956;6:160-72.
2. Krajicek DD. Natural appearance for the individual denture patient. J Prosthet Dent 1960;10;205-14.
3. Scandrett FR, Kerber PE, Umriger ZR. A clinical evaluation of techniques to determine the combined width of the maxillary anterior teeth and the maxillary central incisor. J Prosthet Dent 1982;48:15-22.
4. Shillingburg HT, Kaplan MJ, Grace CS. Tooth dimensions: A comparative study. J Prosthet Dent 1972;40:830-9.

Source of Support: Nil, **Conflict of Interest:** None declared.