

RELATIONSHIP OF THE INTER CONDYLAR DISTANCE WITH MAXILLARY INTERCANINE DISTANCE

¹IRFAN AHMED SHAIKH

²KHEZRAN QAMAR

³SAJID NAEEM

ABSTRACT

The objective of this study was to determine the relationship of intercondylar distance with maxillary intercanine distance.

It was a cross-sectional comparative study which was conducted in the Department of Prosthodontics, Lahore Medical and Dental College, Lahore from April 2011 to Sep 2011.

A total of 250 dentate subjects fulfilling the inclusion criteria were selected. Upper and lower arch impressions were taken. Vernier caliper was used to measure the distance between the cusp tips of maxillary canines. Intercondylar distance was measured using arbitrary face bow. The distance between the two condylar rods measured in millimeters with vernier caliper. Every distance was measured three times to ensure the accuracy and mean taken. Data were recorded on the proforma for statistical analysis.

Pearson correlation coefficients (r) for the intercondylar distance and maxillary intercanine showed positive correlation and significant ($r = .24; p = 0.0005$).

It was concluded that Intercondylar distance provides significant measurements for the selection of anterior teeth in edentulous patients.

Key words: *Esthetics, Complete denture, Edentulous, Tooth arrangement, Intercondylar distance, Intercanine distance*

INTRODUCTION

Prosthodontics help to regain patient's comfort, lost oral functions, confidence and esthetics.¹ For a patient undergoing Prosthodontic treatment, esthetics is of major concern.² By replacing lost or congenitally missing natural teeth and associated structures esthetics can be achieved.³ Proper selection of the teeth results in superior esthetics, function and comfort.⁴ Many denture failures may be traced to improper selection and arrangement of the teeth. The best

position of the artificial teeth is the one occupied by naturals.³

The artificial teeth selection becomes difficult in completely edentulous patients when no pre extraction records exist.⁵ The residual ridge resorption further complicates the orientation of the denture teeth.⁶ The faulty selection of the denture teeth results in poor esthetics, discomfort and instability of the denture.⁷

Many methods have been proposed in literature for the artificial teeth selection.^{8,9} The reliability of the

¹ **For correspondence:** Demonstrator, Department of Prosthodontics, Lahore Medical and Dental College, Canal Bank North, Tulpura, Lahore 53400, Pakistan. Email: irfanahmedshaikh80@yahoo.com Phone No: 03342728011

² 213 – B, Revenue Employees Cooperative Housing Society, Johar Town, Lahore, Pakistan. E-mail: drsajidnaeem@hotmail.com Phone No: 042-35185858, 0300-4577548

³ Professor, 213 – B, Revenue Employees Cooperative Housing Society, Johar Town, Lahore, Pakistan. E-mail: drsajidnaeem@hotmail.com Phone No: 042-35185858, 0300-4245331

routinely used anatomical landmarks including the width of the mouth, inter alar width, bizygomatic width and inter pupillary distance has been investigated.^{2,3} It has been concluded that these relationships are effective when used in combination, however racial and gender variations were detected when anatomical measurements were evaluated individually.²

However some researchers have correlated intercondylar distance with maxillary intercanine distance in a ratio of 1:3.39. They stated that this ratio can be used for the selection of maxillary anterior teeth.⁵ They stated that the intercondylar distance remains fairly static throughout life.⁵

METHODOLOGY

A total of 250 dentate subjects of both genders were selected. The age was ranging from 20 to 40 years. Out of these subjects 149(59.6%) were male and 101(40.4%) were female. Demographic data and informed consent of all the patients were obtained. The exclusion criteria included subjects with a history of temporo-mandibular joint pain or dysfunction. Subjects treated orthodontically and having congenital or acquired orofacial deformities were also excluded. Subjects with restored or attritioned canines were also not included.

Upper and lower full arch impressions were taken using two stage impression techniques, with additional silicon putty and light body (Reprosal-Dentsply CAULK.USA) in a metal perforated tray. Dental cast were made using dental stone type IV (Elite Rock Zhermack). The vernier caliper was used to measure the distance between the cusp tips of maxillary canines from the cast.

Intercondylar distance was measured using arbitrary face bow (Hanau-H2) at rest position. Fork was attached to the teeth with silicon (Elite H-D+: Zhermack Spa) impression material. The tragus canthus lines were drawn and the hing axis were marked 13 mm anterior to the upper border of the tragus. The mark will be confirmed by manual palpation. The distance between the two condylar rods were measured in millimeters using vernier caliper. Every distance was measured three times to ensure the accuracy and mean was taken. The data was recorded on the proforma for statistical analysis.

Data was analyzed in statistical software (SPSS version 11). Quantitative variables intercondylar distance, maxillary intercanine distance 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 determine the correlation among maxillary intercanine distance with intercondylar distance. P-value ≤ 0.05 was considered for significance. Partial correlation coefficient were also computed after controlling of age to observe an effect of age on correlation.

RESULTS

Two hundred and fifty dentate subjects were included in this study. Most of the patients belonged to 20 to 25 years of age that is 142(56.8%) as shown in figure 1. The average age of the patients was 25.07±3.47 years (95% CI: 24.64 to 25.50). Out of 250 patients, 149(59.6%) were male and 101(40.4%) were female. The average age of male patients was 25.97±3.69 years and female was 23.75±2.59 years.

The average intercondylar distance was 124.96±8.34 mm (95% CI: 123.92 to 126) similarly averages of maxillary intercanine distance is 35.09±1.99mm (95% CI: 34.84 to 35.34). Average distances of intercondylar and maxillary intercanine were significantly higher in male than female (p<0.01) as shown in table 1.

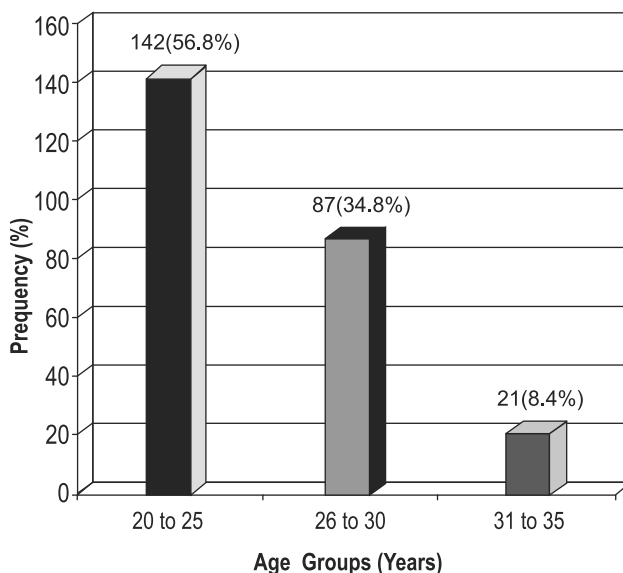


Fig 1: Distribution of the patients n=250

The mean intercondylar distance and the mean intercanine distance is in the ratio of 1:3.65. This ratio can be used directly for the purpose of teeth selection.

Pearson correlation coefficients (r) for the intercondylar and maxillary intercanine distances were showing positive correlation and significant (r= .24; p=00005) table 2. Similarly correlation coefficients were also estimated for gender. Correlation was positive and not significant for male while for female, correlation of intercondylar distance and maxillary intercanine was negative (r= - 0.13; p=0.19).

Partial correlation coefficients were presented in table 3. Age was not an effect in relationship. Slight differences were observed in correlation after controlling age.

TABLE 1: COMPARISON OF TOOTH MEASUREMENT BETWEEN GROUPS

Variables	Male n=149	Female n=101	P- values
Intercondylar Distance (mm)	129.46±7.04	118.31±5.01	0.0005*
Maxillary Intercanine Distance (mm)	35.45±1.85	34.56±2.07	0.0005*
Independent sample t test applied			

(* significant difference)
mm =Millimeters
n =Number

TABLE 2: CORRELATION BETWEEN INTERCONDYLAR DISTANCES WITH MAXILLARY INTERCANINE DISTANCE

	INTERCONDYLAR DISTANCE					
	Overall n=250		Male n=149		Female n=101	
	R	p- value	R	p- value	r	p- value
Maxillary Intercanine Distance (mm)	0.24	0.0005*	0.29	0.0005*	- 0.13	0.19

*Significant
mm=Millimeters
n=Number

TABLE 3: PARTIAL CORRELATION BETWEEN INTERCONDYLAR DISTANCES WITH MAXILLARY INTERCANINE AFTER CONTROLLING AGE

	INTERCONDYLAR DISTANCE					
	Overall n=250		Male n=149		Female n=101	
	Par- tial r	p- value	Par- tial r	p- value	Par- tial r	p- value
Maxillary Intercanine Distance (mm)	0.23	0.0005	0.27	0.001	- 0.13	0.001

* Significant Control variable=Age
mm=Millimeters
n=Number

DISCUSSION

The purpose of the present study was to determine the relationship between inter condylar distance with inter canine distance that can help in the selection of artificial teeth. In the present study 250 patients were selected at Lahore Medical and Dental College Outpatient Department. The subjects were all of Pakistani extract.

The population comprised of 149 (59.6%) males and 101 (40.4%) females. The age range was from 20 to 40 years. The average age of male patients was 25.97±3.69 years and female was 23.75±2.59 years.

Similarly just like this study Keshvad A et al⁵ conducted their study to find out the relationship of inter condylar and inter canine width to aid in denture teeth positioning. The laboratory procedures for the cast fabrication was also similar.⁵

In the present study, the vernier caliper was used to measure the intercanine distance on a stone cast with the help of vernier caliper and repeated three times, as used by Varjao FM³ Smith BJ⁸ and Keshvad et al⁵ in their respective studies.

An arbitrary face bow (Hanau –H2) for measuring inter condylar distance was used as used by Keshvad et al.⁵ They also reported no significant difference between the readings of inter condylar width when recorded with an arbitrary and a kinematic face bow. They further concluded that the arbitrary face bow can

be used effectively for measuring inter condylar distance.⁵

In the present study the mean intercondylar distance correlates with the findings of Lazic B et al¹⁰ but is less than the values reported by Keshvad et al.⁵ A higher mean of intercondylar distance was found for males than for females. Variation based on gender has also been reported by Lazi B et al¹⁰ and Keshvad et al.⁵ All of these studies showed a higher mean intercondylar distance of males compared to that of females as in the present study.

The mean maxillary intercanine distance of subjects in the present study was almost similar to Keshvad et al⁵, but was less to the values reported by Gomes et al,⁴ and greater than that reported by Varjao et al.¹¹

In the present study the ratio between the mean intercondylar and maxillary intercanine distance is 1; 3.65. Similarly in a study by Kashvad et al⁵ the ratio obtained was 1:3.39, which is almost same as the ratio in the present study. Both of these studies concluded that this ratio can be used directly for the selection of artificial anterior teeth.

There was no significant difference found between the mean intercanine distance measurements in relation to sex. Means for intercanine distance measurements were a little higher for males than females. This finding is in accordance with the study carried out by Varjao et al¹¹ and Keshvad et al.⁵

Based on the result of this study it was noted that the inter condylar distance measurement can be used for the selection of the anterior teeth. The inter condylar distance is stable and reproducible and does not affected by the constraints of soft tissues and resorption as the other anatomical landmarks do. However, it is not suggested that this method is the only way to position anterior teeth; rather it is an additional aid especially for the completely edentulous patients without pre extraction records. No assessment was made regarding skeletal relationships or ethnic variation. Further studies are necessary to determine if these factors lead to different ratios.

CONCLUSION

Within the limitations of this study, the following conclusions can be drawn:

- 1 Intercondylar and intercanine distances are showing positive correlation and significant.
- 2 The intercondylar and maxillary intercanine ratio that could be used the selection of maxillary anterior teeth is 1:3.65.
- 3 Intercondylar distance may provide significant measurements for the selection of the teeth in edentulous patients.
- 4 Average intercondylar and maxillary intercanine distances were significantly higher in male than female.

REFERENCES

- 1 Grave AM, Becker PJ. Evaluation of the incisive papilla as a guide to anterior tooth position. *J Prosthet Dent* 1987; 57: 712-14.
- 2 Hasanreisoglu U, Berksun S, Aras K, Arslan I. An analysis of maxillary anterior teeth: facial and dental proportions. *J Prosthet Dent* 2005; 94:530-38.
- 3 Varjao FM, Nogueira SS. Nasal width as a guide for the selection of maxillary complete denture anterior teeth in four racial groups. *J Prosthodont* 2006; 15:353-58.
- 5 Keshvad A, Winstanley RB, Hooshmand T. Intercondylar width as a guide to setting up complete denture teeth. *J Oral Rehabil* 2000; 27:217-26.
- 6 El-Gherinai AS. A new guide for positioning of maxillary posterior denture teeth. *J Oral Rehabil* 2007; 19: 535-38.
- 7 Engelmeier RL. Complete-denture esthetics. *Dent Clin North Am* 1996; 40:71-84.
- 8 Smith BJ. The value of the nose width as an esthetic guide in Prosthodontic. *J Prosthet Dent* 1975; 34:562-73.
- 9 Grave AM, Becker PJ. Evaluation of the incisive papilla as a guide to anterior tooth position. *J Prosthet Dent* 1987; 57: 712-14.
- 10 Lazic B, Tepavcevic B, Keros J, Komar D, Stanicic T, Azinovic Z. Intercondylar distances of the human temporomandibular joints. *Coll Antropol* 2006; 30:37-41.
- 11 Varjao FM, Nogueira SS. Intercommissural width in 4 racial groups as a guide for the selection of maxillary anterior teeth in complete dentures. *Int J Prosthodont* 2005; 18:513-15