Original Article

Correlation between Maxillary Canines and Facial Anatomical Landmarks in a Group of Bangladeshi people

Dr. Sharafat Hossain
BDS, MSc
Asst. Professor, Dept of Prosthodontics
University Dental College, Dhaka

Dr. Kazi Ziaul Islam
BDS, MS
Asst. Professor, Dept of Prosthodontics
University Dental College, Dhaka

Dr. K.M. Mohidul Islam
BDS, MPH
Asst. Professor, Conservative Dentistry and Radiology
City Dental College, Dhaka

Correspondence to: Dr. Sharafat Hossain
BDS, MSc
Asst. Professor, Dept of Prosthodontics
University Dental College, Dhaka

Abstract:

Purpose: The objective of this study was to evaluate the correlation between maxillary canines and the facial landmarks including interalar width (IAW) and intercommissural width (ICoW) in a group of Bangladeshi people.

Materials and methods: One hundred Bangladeshi subjects aged 18~35 years were selected. Irreversible hydrocolloid impression of the upper arch was taken and a cast was poured with dental stone. The interalar width (IAW) and intercommissural width (ICoW) were measured using digital vernier caliper. Intercanine tip (ICTW) and width of the distal surface of the canine (WDC) were measured from the cast using digital caliper.

Results: The correlation between ICTW-IAW was 0.246. There was no correlation between ICTW-ICoW. The correlation between WDC-IAW and WDC-ICoW were 0.342 and 0.235 respectively ($p < .05$).

Conclusion: Both interalar width and intercommissural width had a weak correlation with the position of maxillary canine in this Bangladeshi subject group. For the construction of a pleasing and harmonious complete denture esthetic and phonetic outcomes are recommended to be considered in combination with facial landmarks.

Key words: complete denture, facial landmarks, canine position, intercanine tip distance, interalar width.

Introduction :

The face is the most important and observable component of our appearance, which provides our social recognition. In complete edentulous patients, it is difficult to position denture teeth correctly. This is especially true when there are no review records available. Selection and positioning of esthetic and pleasing artificial teeth depends on many factors. Facial and oral anatomical landmarks are frequently valuable in complete denture fabrication. The dentist must consider both anatomy and physiology of the face to achieve a natural looking denture.

Several suggestions are offered as guidance when marking the canine line on the upper occlusion rim. Basker[1] stated that the position of the maxillary canine can be determined by the projection of a line drawn from the innercanthus of the eye to the alae of the nose. This line passes through the upper canine tooth. Many attempts have been taken to evaluate the relation between the maxillary canines and facial anatomical landmarks. Latta[2] studied North American subjects and found no correlation between inter-commissural width, interalar width and /or interpupillary width. Varjao[3] found a weak correlation between intercommissural width and distal of the surfaces of canines for four different racial group.

However, Hasanreisoglu[4] and Al-El-Sheik[5] found positive correlation between intercanine tip width and interalar width on their study. As the canine position has been based on facial anatomical structures, this may relate to individual race. Very few studies regarding the relationship of the canines to the facial landmarks have been performed in people of Asia.

This study was conducted to determine the relationship of the maxillary canine with the facial landmarks in a group of people in Asia. The objective of this study was to determine the relationship between maxillary canine position and the facial landmarks including interalar width, intercommissural width, and the distance between the left and right projection of the line drawn from the inner canthus of the eye to the alae of the nose in a group of Bangladeshi people.

Materials and Methods: One hundred Bangladeshi subjects of both sexes ranging from 18-35 years of age were selected. They all had complete intact dentition except third molar, no crowding, never been orthodontically treated, no crown reconstruction of upper six anterior teeth, without abnormal and altered nose. The subjects were grouped by gender and arch form to determine the effect of these two factors on the correlation of the measurement. Intercanine tip width (ICTW) and width of the distal surface of canine (WDC) were measured from the stone cast with digital caliper (Mitutoyo, Kawasaki, Japan). Interalar width and intercommissural width were measured on the subjects face with digital caliper. No pressure was applied during measurements.

Fig 1: Intercommissural width measurement.

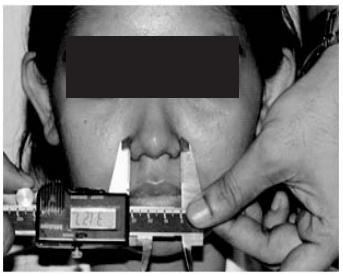

Fig 2: Interalar width measurement.

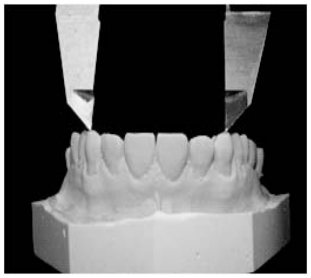

Fig3 : Intercommissural width measurement.

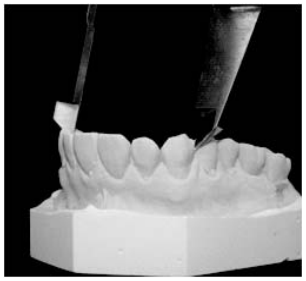

Fig 4: Width of the distal surface of canine measurement.

One operator performed all the measurements. The dimensions were recorded to an accuracy of 0.01 mm. All measurements were repeated three times on three separate occasions and average values were calculated. Multiple regression analysis was used to determine the influence of independent variables on intercanine tip distance and distance between distal surfaces of canines. The independent variables were gender, arch form, IAW, ICoW and DPICa.

Results:

For 100 Bangladeshi subjects, 71 had ovoid arch, 16 had tapering arch, and 13 had square arch forms. Table-1 shows the number of arch forms for Bangladeshi subjects by gender.

Table-1: Number of arch forms for Bangladeshi subjects by gender.

		Arch form			Total
		Ovoid	Tapering	Square	
Bangladeshi	Male	54	11	9	74
	Female	17	5	4	26
		71	16	13	100

To detect outliers for each variable, the data values were converted into standard scores which have a mean of 0 and standard deviation of 1. Then, identifying those cases with standard scores of ±3 or greater as outliers. For Bangladeshi subject group, same 3 subjects were excluded for both WDC and ICoW. Therefore, the total numbers of subjects were 97 Bangladeshi subjects for further statistical analysis.

Pearson's correlation (r) showed the degree of relationship of ICTW and WDC with other measurement variables. For these subjects, ICTW showed correlation with only IAW, but no correlation was found between ICTW-ICoW. However, WDC showed correlation with both the measurement variables. ($p<0.05$) (Table 1 & 2).

Table-2: Correlation of measurement variables in Bangladeshi subjects

		IAW	ICoW
ICTW	*r*	*.246**	*.244*
WDC	*r*	*.342**	*.235**

** (p-value < .05)*

Discussion: It is well accepted that the accuracy of the measurement is suspected when the measurements are made of the soft tissue. As both the interalar width and intercommissural width are soft tissue and they are mobile in nature, special consideration must be taken to minimize errors during taking these measurements.

Many researchers [3,7] have used the curved line distance between ICTW and WDC while correlating the maxillary canine position with interalar width and intercommissural width. However, straight-line distances between the tips of the canines and width of the distal surfaces of the canines were measured in this study. It was due to the fact that the purpose of the study was to evaluate the position of canine rather than the mesiodistal width of the anterior teeth.

The result suggested that the canine tooth position showed correlation with IAW and ICoW in Bangladeshi subjects. For this subject group, a very weak correlation was found between IAW and ICTW. This result was in agreement with AL-EL-Sheikh[5] and Gomes[7]. No correlation was found between ICTW and ICoW. However, WDC had a weak correlation with both IAW and ICoW in Bangladesh subject group. This result contradicts with Smith[9] and Yodsuwan[10].

Though the correlation was not high, these facial landmarks could be used to give clinician an estimation of the position of the canine for construction of prosthesis for edentulous patient. Since the canine position is influenced by many variables, it would be a mistake to claim that either facial landmark was proven superior by this research effort. Evaluation of the canine position by contouring the occlusion wax rim to obtain adequate lip support and optimal occlusal vertical dimension and then marking the canine line must be considered as a tentative method. This is not sufficiently reliable for use as the means for the final decision.[11]

The difference in result from the previous researchers might be due to difference in methodology applied and ethnic group studied. In this study, Bangladeshi subjects aged between 18-35 years with complete natural dentition were studied. Latta2 studied North American edentulous patients and failed to establish any correlation between ICoW, IAW, bizygomatic width and/or interpupillary width. Varjao[8] studied 160 subjects from different population including White, Black, Mulattos and Asian and reported a weak correlation between the ICoW and WDC. AL-EL-Sheikh[5] and Hasanreisoglu4 studied Saudi and Turkish population respectively and reported a weak correlation between ICTW and IAW. Gomes[7] and Varjao[3] measured the curve line distance between ICTW and WDC and compared with IAW and ICoW, respectively. However in this study, straight line distance between the tips of maxillary canines and width of the distal surface of canines were measured.

The differences in predictors from previous studies were possibly due to difference in ethnicity. Generally, facial appearance varies between ethnic groups. Moreover, it is not possible to confirm that each subject in this study was pure Bangladeshi.

People with Bangladeshi nationality may be a mixture of Bangladeshi and Indian or Bangladeshi and Myanmar, etc. Therefore, facial landmarks cannot be too strongly emphasized when a dentist wants to provide complete dentures with pleasing appearance. Esthetic that matches to each individual should be concerned more.

The correlation coefficient (r) found in this study reveals that IAW can be used as guideline for selecting artificial teeth for complete denture prosthesis for this Bangladeshi group and in other ethnic groups as reported by some authors.[5,7,12] But the correlation between ICTW-IAW and WDC-IAW was very low for Bangladeshi subject group.

As the correlation between canine position and facial landmarks were weak, there might be some other factors that influence the position of canine which were out of the scope of this study. The importance of facial landmarks such as interalar width and intercommissural width in determining a harmonious facial appearance cannot be too strongly emphasized in complete denture construction. Esthetic and phonetic outcomes are recommended to be considered in combination with facial landmarks.

Conclusion:

Within the limitation of this study we can conclude that for Bangladeshi subject group, ICTW had correlation with only IAW. WDC had correlation with both IAW and ICoW. However, the correlations of WDC-IAW and IAW-ICoW were very low. The importance of facial landmarks such as interalar width and intercommissural width in determining a harmonious facial appearance cannot be too strongly emphasized in complete denture construction. Esthetic and phonetic outcomes are recommended to be considered in combination with facial landmarks.

References :

1. Basker RM, Devanport JC, Tomlin HR. Prosthetic treatment of the edentulous patient. London, Basingstoke: The Macmillan Press; 1976:118.
2. Latta GH, Weaver JR, Conkin JE. The relationship between the width of the mouth, interalar width, bizygomatic width, and interpupillary distance in edentulous patients. J Prosthet Dent 1991;65:250-4.
3. Varjao FM, Nogueira SS. Intercommissural width in four racial groups as.a guide for the selection of maxillary anterior teeth in complete denture. Int J Prosthodont 2005;18:513-15.
4. Hasanreisoglu U, Berksun S, Aras K, et. al. An analysis of maxillary anterior teeth: Facial and dental proportions. J Prosthet Dent.2005;94:530-8.
5. Al-El-Sheik HM, Al-Athel MS. The relationship of interalar width, interpupillary width, and maxillary anterior teeth width in Saudi. population. Odontostomatol Trop 1982; 21:7-10.
6. Zar JH. Biostatistical analysis. 4th ed. Upper Saddle River, NJ: Prentice-Hall International Inc;1999:436-7.
7. Gomes V, Goncalves LC, Costa M.M, et al. Interalar distance to estimate the combined width of the six maxillary anterior teeth in.oral rehabilitation treatment. J Esthet Restor Dent 2009;21:2636.
8. Varjao FM, Nogueira SS. Intercommissural width in four racial groups as.a guide for the selection of maxillary anterior teeth in complete denture. Int J Prosthodont 2005;18:513-15.
9. Smith BJ. The value of nose width as an esthetic guide in prosthodontics. J Prosthet Dent 1975;34:562-73.
10. Yodsuwan D, Srisamaung J, Santaveesuk O, et al. Relationship between canine lines, cusp tips and distal of the maxillary canine.and corner of the mouths in Thai Esarn sample. Khon Khen Dent J 2003;6:1-7.
11. Hickey JC, Zarb GA. Boucher's prosthodontic treatment for edentulous patient. 8th ed. St Louis: The CV Mosby Company; 1980:321-338.
12. Hoffman W Jr, Bomberg TJ, Hatch RA. Interalar width as a guide in denture teeth selection. J Prosthet Dent 1986;55:219-21.