

LINEAR MEASUREMENTS AND INDICES OF MANDIBULAR CANINES

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ABSTRACT: Bindu Aggarwal, Department of Anatomy, GSMCH, Banur, Patiala, Punjab, India. Teeth are an important tool in living and non-living for anthropological, genetic, odontological and forensic investigations. The use of teeth in identification is one of the most commonly recognized aspects of the broad legal field of forensic dentistry. The present study was conducted to determine the dental indices using linear measurements of the mandibular canines in the North Indian population. The investigation was done on dental casts of 80 subjects (40 males and 40 females) in the age group of 17-21 years. The bucco-lingual and mesiodistal diameters of the mandibular canines were measured and the sexual dimorphism between males and females was determined. Using these diameters, the dental indices namely the crown module, crown index and crown area were determined. It was found that the dimensions and the dental indices were significantly different in the males and females.

Keywords: Bucco-lingual diameter, mesiodistal diameter, dental indices, mandibular canines.

INTRODUCTION

Teeth are the most indestructible part of the body. When all other marks of personal identity have been destroyed, the dentist is often able to recognize a body by the repair work that was done on the teeth¹. The permanent canines are considered as the "key tooth" for the purpose of personal identification³.

The male teeth are larger than female teeth and the mandibular canines showed the greatest sexual dimorphism amongst all teeth^{4,5}. Linear dimensions of canines such as the mesiodistal and the bucco-lingual diameter show significant sexual dimorphism⁶.

In this study, the sexual dimorphism in the mesiodistal and the bucco-lingual diameters was found and the dental indices namely the crown module, crown index and crown area were determined using the above two parameters which also presented significant sexual dimorphism.

MATERIAL & METHODS

SELECTION CRITERIA

Seventy subjects, 40 males and 40 females in the age group of 17 - 21 years were selected for this study. This age group was selected, as attrition is minimal in this age group⁷. The study was conducted on the student volunteers after explaining the procedure of the study and taking their consent.

INCLUSION CRITERIA

Subjects with the following status of teeth were included in the study:

1. Healthy state of gingiva and periodontium.
2. Caries free teeth.
3. Normal overjet and overbite.
4. Absence of spacing in the anterior teeth.
5. Normal molar and canine relationship.

INSTRUMENT

The measurements were taken using a vernier caliper, taking into account the error if any, in the instrument. The caliper used had a resolution of 0.02 mm. A divider with a fixing device was also used for taking the measurements. Each measurement was taken thrice and the mean was taken as the final reading.

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MEASUREMENT PROCEDURE

1. MAKING OF STUDYCASTS

The casts of mandibular arches were made using alginate impression material and stone plaster.

2. MEASURING THE MESIODISTAL DIAMETER (Figure 1)

The mesiodistal diameter of the mandibular canines was taken as the greatest width between the contact points of teeth on either side⁸.

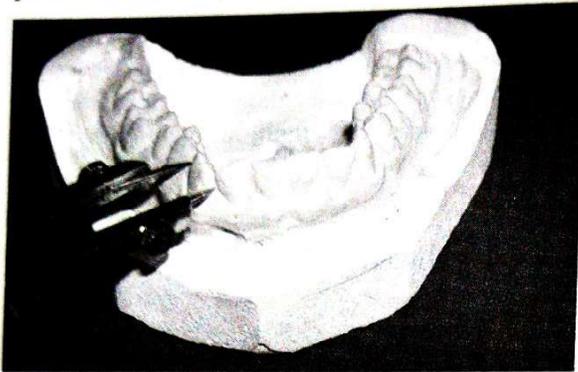


FIGURE 1

3. MEASURING THE BUCCO-LINGUAL DIAMETER (Figure 2)

The bucco-lingual diameter of the mandibular canines was taken as the greatest distance between the buccal and lingual surface of the crown at right angles to the mesiodistal crown diameter of the tooth⁹.



FIGURE 2

4. CALCULATING THE DENTAL INDICES- using the mesiodistal and buccolingual diameters, the dental indices were calculated. The method was adopted from Acharya¹⁰.

$$\text{Crown Module} = \frac{\text{MD} + \text{BL}}{2}$$

$$\text{Crown Index} = \frac{\text{BL} \times 100}{\text{MD}}$$

$$\text{Crown Area} = \text{MD} \times \text{BL}$$

The data obtained was computed, tabulated and statistically analyzed with the purpose of establishing sexual dimorphism.

OBSERVATIONS

STATISTICAL SIGNIFICANCE OF MESIODISTAL DIAMETER

Side	Sex	Mean (mm)	± S.D.	't' stat	'p' value	Significance
Right	Males	7.231	0.376	7.34	<0.001	Highly
	Females	6.585	0.300			Significant
Left	Males	7.387	0.322	10.48	<0.001	Highly
	Females	6.600	0.254			Significant

STATISTICAL SIGNIFICANCE OF BUCCO-LINGUAL DIAMETER

Side	Sex	Mean (mm)	± S.D.	't' stat	'p' value	Significance
Right	Males	7.686	0.63923	4.7676	<0.001	Highly
	Females	7.012	0.56959			Significant
Left	Males	7.695	0.62145	4.9540	<0.001	Highly
	Females	6.964	0.61665			Significant

DENTAL INDICES

DENTAL INDEX	SEX	RIGHT SIDE	LEFT SIDE
CROWN AREA	MALE	55.57	56.84
	FEMALE	46.17	45.96
CROWN MODULE	MALE	7.458	7.541
	FEMALE	6.798	6.780
CROWN INDEX	MALE	106.29	104.16
	FEMALE	106.48	105.45

DISCUSSION

The principal factors which make dental evidence important are that the teeth and bony supporting structures are characteristic of the individual¹¹.

Studies on mesiodistal diameter have been conducted on Iraqi population¹² Saudi Arabian population¹³ Swedish population¹⁴ and Indian populations^{8, 15}. The studies showed that the

mesiodistal diameter of the mandibular canines was more in the males than the females and the difference was statistically significant.

The bucco-lingual diameter was studied in Icelanders¹⁶ Ohio adolescents¹⁷ and Indians⁹ and the diameter was more in males than the females and the difference was statistically significant.

The mesiodistal and bucco-lingual diameters are often combined as indices intended to summarize occlusal form¹⁸. The diameters and indices of teeth have been used earlier by researchers to compare teeth of Anglo-Saxon and modern subjects¹⁹. An investigation was conducted on Portuguese population to check the accuracy of odontometric indices in sex determination and it was found that the canines showed the greatest sexual discriminant characteristics²⁰.

The linear measurements and indices of canines (maxillary and mandibular) were used to evaluate the validity of determination of gender in adult Egyptian population²¹.

In Nepalese population, a stepwise discriminant analysis was undertaken for the canine indices. It gave moderate to high accuracy rates in sexing (69.8-81.1%). As the accuracy reported for linear measurements was more, it was concluded that dental indices had no added utility in forensic sex assessment¹⁰.

In the present study, significant sexual dimorphism was present in the linear dimensions of mesiodistal and buccolingual diameters. Among the dental indices, the crown area and crown module was found to be more in the males but the crown index was more in the females.

The present study thus establishes the impact of the 'sex factor' on the morphometry of the mandibular canines. The results indicate that the dimorphism in mandibular canines can be of immense medico-legal use in identification.

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