

SEX DETERMINATION FROM MEASUREMENT OF ANATOMICAL CROWN LENGTH OF MAXILLARY CANINE

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Abstract:

Introduction: Sexual dimorphism refers to the differences in size, shape, etc., between males and females. The dentition's use in sex assessment has been explored and advocated owing to its strength and resistance to peri- and post-mortem insults.

Objective of the research: The study evaluated permanent maxillary incisors and canines for sexual dimorphism and estimated the level of accuracy with which they could be used for sex determination.

Materials and methods: The study was conducted on 100 subjects (50 males, 50 females). The mesiodistal dimension of permanent maxillary incisors and canines was measured and the data were subjected to statistical analysis.

Result and discussion: By SPSS analysis the P value for male left was 0.65 female left was 0.80 and male right was 0.65 and female right was 0.80 which is more than 0.05 hence the values obtained are statistically insignificant

Conclusion: The analysis revealed that all permanent maxillary canines exhibited larger mean values of anatomical crown length in males compared to females. The study showed maxillary canines exhibiting significant sexual dimorphism and can be used for sex determination along with other procedures.

Keywords: Anterior teeth, forensics odontology, mesiodistal dimension, sexual dimorphism

Introduction

A sex-determination system is a biological system that determines the event of sexual organization in an organism. Sex determination is an important parameters in forensic identification. (1) Sexual dimorphism is referred as systemic difference within the form (either in shape or size) between individuals of assorted sexes among an equivalent species. (2).teeth are known to be unique organs made from the foremost enduring mineralized tissues within the physical body , as such, they need

a unprecedented resistance to putrefaction and therefore the effects of external agents (physical, thermal, mechanical, chemical or biological) that makes them invaluable component for anthropological, genetic, biological process, odontologic, evolutionary and forensic investigations.(2,3). Sex determination using dental features is primarily based upon the comparison of tooth dimensions in males and females, or upon the comparison of frequencies of nonmetric dental traits, like Carabelli's trait of upper molars.(4). Measurement of long bones particularly humerus and femur, pelvis, or skull are often used for sex determination. avitha H. Sex determination in tooth.. The teeth being the most durable tissue of our body exhibits the least turnover rate because of its intense resistance to destruction. Hence, they can be considered for gender determination. (5) Prediction of gender makes the task simpler since the missing person of only one gender is to be evaluated.(5,6). Various odontometric parameters have been used for gender determination such as mandibular and maxillary canine indices, mandibular canine dimensions, maxillary canine dimension, maxillary first molar dimensions, and cumulative dimension of all teeth.(7)

The identification of a dead body may be required in cases of sudden and unexpected death, fires, explosions, railway or aircraft accidents, mutilated or hidden decomposed bodies, or foul play and often needs great medico-legal acumen.(6,7) The aim of the study is to determine the Sex determination from measuring the anatomical crown length of maxillary canine

Materials and method:

The study sample consisted of 50 dental students (25 males and 25 females) selected from saveetha dental college, who were selected based on the following criteria:

Age-20-30 years.

Complete set of fully erupted teeth.

Periodontally healthy teeth.

Noncarious teeth.

Non Attrited and intact teeth.

Satisfactorily aligned maxillary teeth, no spacing or diastema, and no crowding.

No history or clinical evidence of crown restoration, orthodontic treatment, trauma.

After obtaining informed consent, the maximum mesiodistal dimension of each tooth was measured between the anatomic contact points directly on the subject, with the help of a digital vernier caliper accurate to 0.01 mm (Mitutoyo Digital Caliper, Japan) held parallel to the occlusal plane. If it was difficult to place the vernier caliper, a manual divider was used with very fine tips to measure the dimension; later we measured the divider distance with the same digital vernier caliper. All the measurements were done by a single examiner to eliminate interobserver error. Each reading was taken three times and the average of three values was obtained to minimize the intraobserver error. The data thus collected were subjected to statistical analysis. The SPSS software package version 17 was used for statistical analysis. The mean, range, and standard

deviation were calculated for the size of the teeth. A two-sample t-test was used to test for statistical difference between means

Result:

Males showed greater mean mesiodistal dimensions for each tooth in comparison to females. Statistical analysis of permanent maxillary incisors and canines showed that the mesiodistal dimensions of only right and left maxillary canines were significantly different in males compared to those in females.

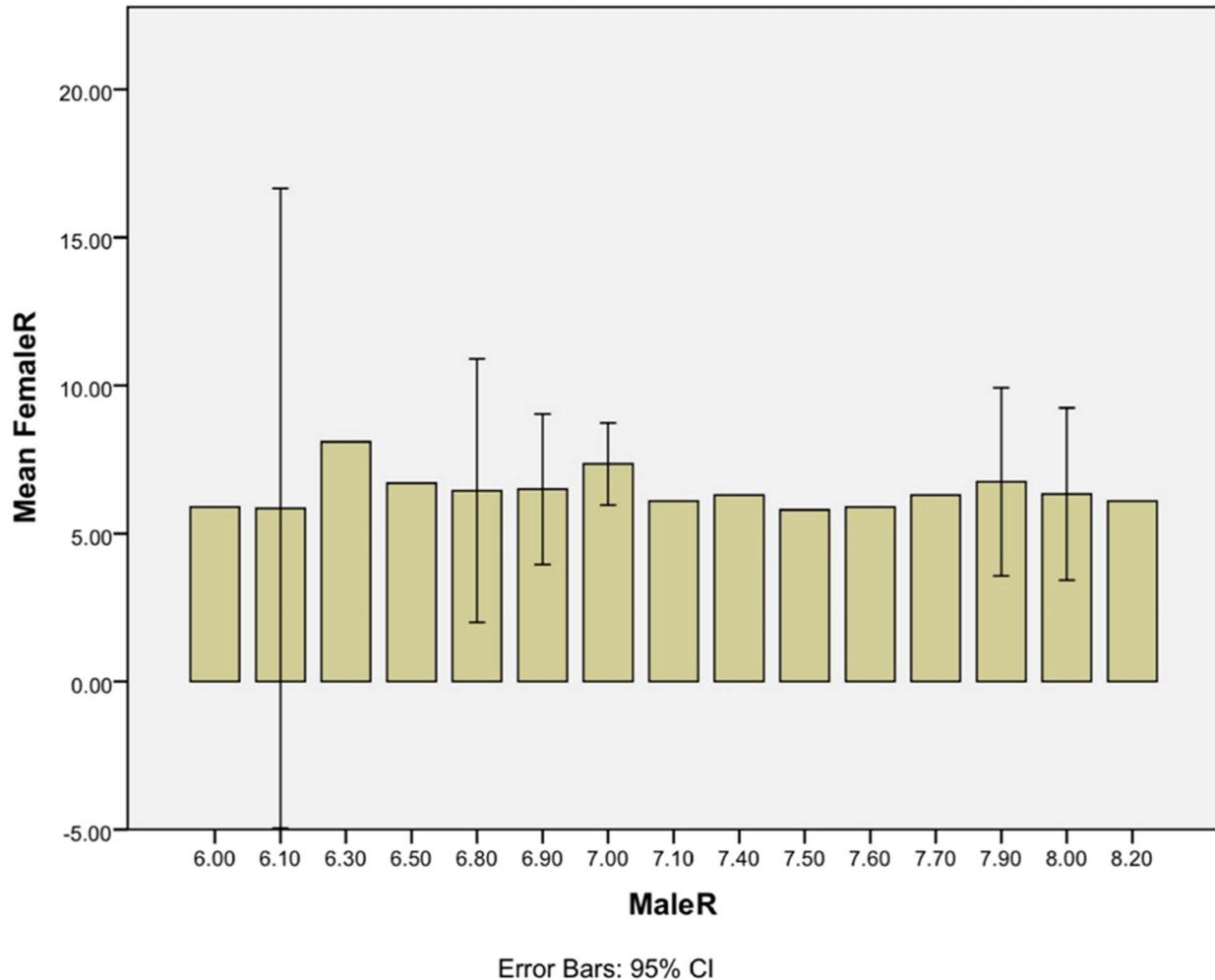
Several stepwise discriminant function statistics have been used to develop formulas to determine sex. The group centroids indicate the average discriminant scores for each sex.

Raw coefficients are the discriminant function coefficients used to calculate the discriminant score. To assess the sex, tooth dimensions are multiplied with the respective raw or unstandardized coefficients and added to the constant. If the values thus obtained were greater than the sectioning point the individual was considered a male and if less than the sectioning point the individual was considered female.

By SPSS analysis the P value for male left was 0.65 female left was 0.80 and male right was 0.65 and female right was 0.80 which is more than 0.05 hence the values obtained are statistically insignificant

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
MaleR	25	6.00	8.20	7.1520	.65264
FemaleR	24	5.00	8.10	6.5292	.80891
MaleL	25	6.00	8.20	7.1520	.65264
FemaleL	24	5.00	8.10	6.5292	.80891
Valid N (listwise)	24				



Discussion:

Gender determination in damaged and mutilated dead bodies or from skeletal remains constitutes the foremost step for identification in medico-legal examination and bio-archeology.(8) Whenever it is possible to predict the sex, identification is simplified because then missing persons of only that sex need to be considered. Although the DNA profile gives accurate results yet measurement of linear dimensions such as anthropometric or odontometric parameters can be used for determination of sex in a large population because they are simple, reliable, inexpensive, and easy to measure.(5) Considering the fact that there are differences in odontometric features in specific populations, even within the same population in the historical and evolutionary context, it is necessary to determine specific population values in order to make identification possible on the basis of dental measurements. (9)

Various odontometric dimensions have been used for the purpose of sex estimation such as mandibular canine index, buccolingual dimension of teeth, and height of tooth.

In this study, all the required dental measurements were taken directly on the subjects. As it was difficult to accurately measure the buccolingual width, of maxillary canines, under indirect vision, only the mesio-distal width of these teeth was evaluated for sexual dimorphism.

Univariate analysis of the study showed that M-D dimensions of male dentition are greater than those of females which is in accordance with previous studies. Richardson et al (6) found that teeth of males tend to be larger than those of females for each type of tooth in both the arches. Sanin and Savara (10) reported differences in crown size patterns even among good occlusion cases. Howe et al (11) in their study found combined mesiodistal width for males to be more compared to females.

In this study, statistically significant dimorphism was exhibited by only two permanent maxillary anterior teeth, i.e., right and left maxillary canines. The Hashim and Murshid study(12) in 1993 also showed that the canines were the only teeth to exhibit sexual dimorphism.

Garn et al.(13) studied the magnitude of sexual dimorphism by measuring the mesiodistal width of the canine teeth and showed that “the mandibular canine showed a greater degree of sexual dimorphism than the maxillary canine. However, Minzuno reported that maxillary canine showed a higher degree of sexual dimorphism compared to the mandibular canine in a Japanese population. Maxillary left canine in the study conducted by Pratibha et al. (14)also exhibited a sexual dimorphism which is in accordance with the studies conducted on Turks by Iscan. (13)A study conducted by Otuyemi and Noar shows dimorphism in maxillary canines bilaterally and another by Lund and Monstad shows dimorphism of maxillary canine.

The multivariate analysis of the data showed that when combination of values for right and left maxillary canines was taken 64% females were classified correctly and 58% males were classified correctly. However the study conducted by Al-Rifaiy showed that an average of 65.5% of individuals could be classified correctly. (15)

Conclusion :

The study evaluated the use of a linear dimension (mesiodistal) of permanent maxillary incisors and canines because of simplicity and reliability. The study showed that right and left maxillary canines can be used for sex determination with 64% of accuracy in the case of females and 58% accuracy in the case of males. Thus this study indicates that maxillary canines show significant sexual dimorphism and can be used as an adjunct along with other accepted procedures for sex determination when fragmentary remains are encountered in mass disasters.

LIMITATIONS:

The sample size taken for the study was considerably small and the results of the study can not be generalized.

FUTURE SCOPE:

To increase the sample size and also to include people with various age group and race,

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