SMU
Sikkim Manipal University

SMU Medical Journal

ISSN : 2349 – 1604 (Volume – 3, No. 2, July 2016) Research Article

Indexed in SIS (USA), ASI (Germany), I2OR & i-Scholar (India) and SJIF (Morocco) databases. Impact Factor: 3.835 (SJIF)

Sexual dimorphism in primary canines of preschoolers in Gujarati population- A Pilot Study

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Manuscript received : 01.04.16
Manuscript accepted: 15.05.16

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Abstract

Non existence of any data of sexual dimorphism in primary canines of gujarati population. The study comprised of preschoolers (30 males and 30 females). Mesiodistal dimensions of primary mandibular canines were measured at the maximum mesiodistal width intraorally using sterilized stainless steel dividers and the values were subjected to statistical analysis. Mean value of mesiodistal dimension of primary canines for males was 7.01mm and for the females it was 5.91mm.So male children were sexually more dimorphic than female children. For males the mean value of mesiodistal dimension of primary maxillary canines was

7.21mm and for mandible it was 6.82mm which was statistically significant and for female the mean value of mesiodistal dimension of primary maxillary canines was 6mm and for mandible it was 5.82mm which was statistically not significant. So maxillary canines in males were sexually more dimorphic than mandibular canines. Male children are sexually more dimorphic than female children. Maxillary canines in males were sexually more dimorphic than mandibular canines.

***Key words*:** Primary canine width, Sexual dimorphism, Forensic dentistry.

Introduction

"Sexual dimorphism" refers to those differences in size, stature and appearance between males and females that can be applied to dental identification [1]. Sex of a person can be predicted with high degree of accuracy from the pelvic [2] and cranial bones [3], however, the tendency of these bones to be fragmented may preclude accurate sex estimation.

Dental identification in forensics has long been considered a reliable method when other methods fail because of critical body conditions or unavailability of body parts. Teeth are the most durable organs in the body and can endure post-mortem degradation and extreme changes in temperature (up to 1,600°C) and pressure,better than most human tissues and without appreciable loss of microstructure [4].

The growing crime against children in the form of battering, physical/sexual abuse and abduction has become a major cause for child mortality in recent times, and in such cases, exfoliated teeth may be the only evidence available at the crime scene. Paediatric dentists are often the first to deal with children. Hence, a comprehensive understanding of the science of forensic dentistry is absolutely necessary for them. Paediatric dentists can play a valuable role in helping forensic experts elicit a biologic profile of the decedent [5].

Discriminant functions have become a widely used method for the sexual diagnosis of human skeletal remains. Recently, several investigators [6,7] have had success with

discriminant functions based on the tooth-crown diameters of the permanent teeth alone. Although these investigators did not discuss the obvious implications of their results for the sexual diagnosis in children, it is apparent that discriminant functions of the human dentition may provide reliable non-radiographic means for sexing immature skeletons.

The use of discriminant functions based on the permanent teeth is limited to gender identification in children older than 12 years of age. If sexual dimorphism in tooth-crown size is as pronounced in the deciduous dentition as it is in the permanent dentition, then it may be possible to correctly assess the sex of children as young as two years [6]

Of all the teeth in the human dentition, canines are the least frequently extracted teeth,possibly because of the relatively decreased incidence of caries and periodontal disease. Mandibular canines are considered to be the key teeth for sexual dimorphism. Also, canines are reported to withstand extreme conditions and have been recovered from human remains even in air disasters and hurricanes [8].

The search in data bases of EBSCO, MEDLINE, PUBMED, UPTO DATE and GOOGLE SCHOLAR revealed very few studies conducted on sexual dimorphism in primary teeth. Hence, the present study was designed to assess the sexual dimorphism in primary canines and its applicability to gender identification which could generate new data of sexual dimorphism in children by conducting a pilot study in Gujarati population.

The objective was to assess sexual dimorphism in the primary canines, if any, to gender identification of the same children.

Materials and Methods

The study group consisted of 60 children - 30 male and 30 female attending preschools from Vadodara, Gujarat, aged below 6 years, having fully erupted and complete

primary dentition.Children who had partially-erupted dentition or missing teeth, teeth with proximal or extensive dental caries, physiologic or pathologic wear and tear (e.g., attrition, abrasion, abfraction, erosion), and developmental defects were excluded from the study. Informed consent from the parents and prior permission was taken from schools. Ethical clearance from the institutional Ethical committee was obtained.

Mesiodistal width of maxillary and mandibular primary canines of both male and female children were measured from its highest point of contour on mesial and distal side with the help of a sterilized stainless steel dividers which had been used once for each patient after sterilization in adequate light. The tooth were wiped off with sterilized cotton before taking measurement. All measurements were recorded on specially designed proforma sheet.

The gathered data were statistically analysed using the formula given by Garn and Lewis[9] to determine if any sexual dimorphism exists.

Formula: $\frac{Xm}{\overline{Xf}} \times 100$

Xm = Mean value of canine width in males

Xf = Mean value of canine width in females

Data were subjected to statistical analysis using Two sided paired 'T' test

Results and Discussions

The present study was undertaken to assess the sexual dimorphism in the primary canines of Gujarati population in Vadodara, Gujarat and to assess its applicability to gender identification of the same children.

Graph 1 shows mean values of maxillary (right &left) and mandibular (right and left)

primary canines of all males and females. Significant mean values for maxillary and mandibular canines in males was seen than in females.

Graph 2 shows mean values of primary maxillary and mandibular canines of all males and females. Significant mean values in both maxillary and mandibular canines of males was seen than in females.

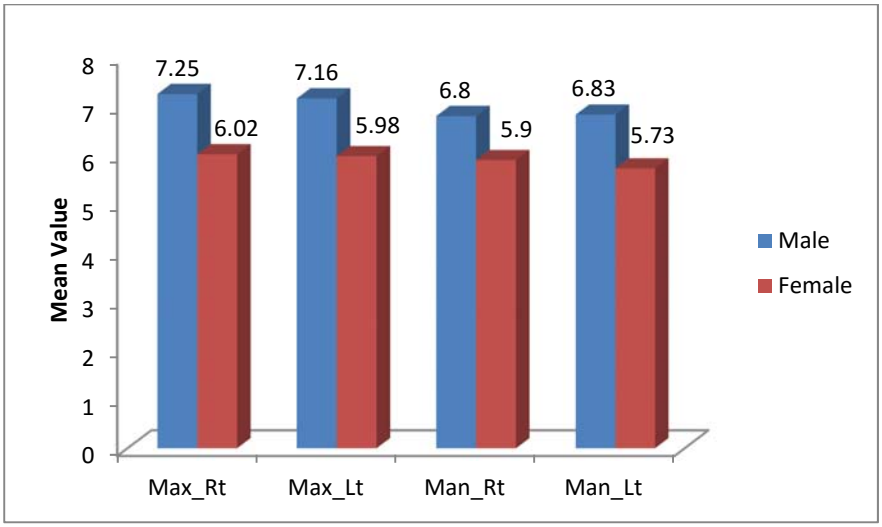
Graph 3 shows mean values of primary canines for males and females. Significant mean values for males was seen than in females.

Table 1 shows mean values of primary maxillary and mandibular (right & left) canines for both males and females.P value is < 0.001

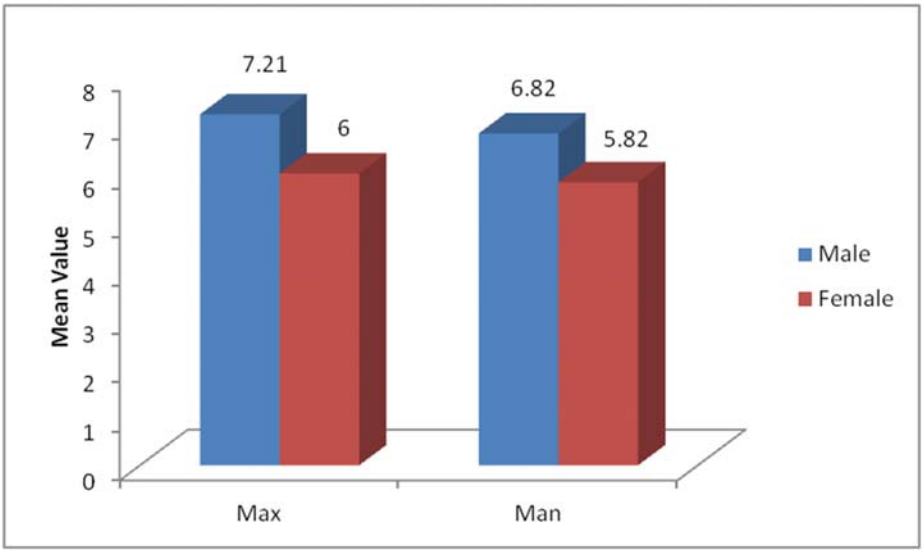
Mean value of mesiodistal dimension of primary canines for male was 7.01mm and for the female it was 5.91mm(**graph 3**)So male children were sexually more dimorphic than female children. For males the mean value of mesiodistal dimension of primary maxillary canines was 7.21mm and for mandible it was 6.82mm which was statistically significant and for females the mean value of mesiodistal dimension of primary maxillary canines was 6.82mm and for mandible it was 5.82mm(**graph 2**) which was statistically not significant. So maxillary canines in males were sexually more dimorphic than mandibular canines (**graph 1**) which can be predicted by the graphs given below.

Gender determination in mutilated dead bodies or from skeletal remains constitutes the foremost step for identification in medico-legal examination. Dental identification has long been considered a reliable method when other methods fail because of critical body conditions or unavailability of body parts. Although DNA profile gives accurate results, measurement of linear dimensions, such as the mesiodistal width of the teeth, can be used for determination of sex in a large population because it is simple, reliable, inexpensive and easy to perform [10].

Graph 1. Mean values of maxillary (right & left) and mandibular (right & left) Canines for males and females



Graph 2. Mean values of primary maxillary and mandibular canines for males and females



Graph 3. Mean values of primary canines for males and females

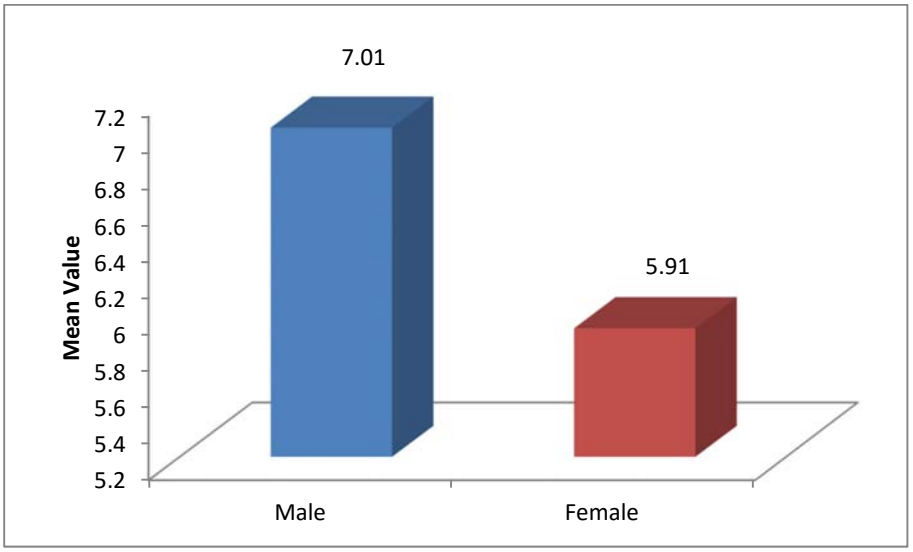


Table 1. Mean mesiodistal width of primary canines (maxillary & mandibular) obtained by clinical examination

GROUP	SIDE	MEAN VALUE OF MESIODISTAL PARIMARY CANINES WIDTH (IN MM)	P- VALUE
MALES	Max_R	7.25	<0.001
	Max_L	7.16	
	Man_R	6.80	
	Man_L	6.83	
FEMALES	Max_R	6.02	
	Max_L	5.98	
	Man_R	5.90	
	Man_L	5.73	

The “sexual dimorphism of teeth” refers to those differences in size, stature and appearance between boys and girls that can be applied to dental identification because no two mouths are alike [1]. The present study was taken up to assess the gender predictive potential of the sexual dimorphism in the mesiodistal dimensions of primary canines.

Numerous studies [11-13] have confirmed that the mesiodistal dimensions of teeth in males tend to be larger than those in females. Garn et al [14] have reported that it is the Y chromosome which intervenes most in the size of teeth by controlling the thickness of dentin, whereas the X chromosome, for a long time considered to be the chromosome responsible, only governs the thickness of enamel.

Lysell and Myrberg [15] noted that boys exhibited larger mesiodistal tooth widths than girls in both the deciduous and the permanent dentitions. However, Black [16] reported a relatively small degree of tooth-crown size dimorphism in the deciduous dentition as compared to the permanent dentition.

In our study we noticed significant differences in the mesiodistal dimensions in males than in the females with the most significant values obtained for the maxillary canines in male. In a similar study, Hashim and Murshid [17] have observed that sex differences were maximum for the deciduous canines.

Although Potter [18] has also observed that the canines were significantly larger in males, the differences were mostly found with the permanent canines compared to the deciduous dentition. Findings similar to those of the present study have been reported by Kushwandari and Nishino [19] who observed that in the primary dentition the lateral incisor and first molar in the maxilla, and the canine, first and second molars in the mandible showed the highest dimorphism.

In the present study, Mean value of mesiodistal dimension of primary canines for

male was 7.01mm and for the female it was 5.91mm, So male children were sexually dimorphic than female children. For male the mean value of mesiodistal dimension of primary maxillary canines was 7.21mm and for mandible it was 6.82mm which was statistically significant and for female the mean value of mesiodistal dimension of primary maxillary canines was 6.82mm and for mandible it was 5.82mm which was statistically not significant. So maxillary canines in males are sexually dimorphic than mandibular canines However, Lavelle [20] and Black [21] reported the greatest sexual dimorphism for primary maxillary canines of 3.15% and 1.8% respectively.

The sexual dimorphism of the deciduous dentition is less as compared to that of the permanent dentition. The relatively small degree of tooth crown size dimorphism in the deciduous dentition makes the discriminant functions computed from these dimensions less effective for separating the gender than similar discriminant functions calculated from the permanent dentition [22].

Considering the fact that there are differences in odontometric features in specific populations, even within the same population, it is necessary to determine specific population values in order to make identification possible on the basis of dental measurements. Astete et al [23] observed that Spanish individuals show higher sexual dimorphism than the Chilean group, which suggests population-specific behavioural differences.

It can be stated that because of the nature of the study sample, the findings from this study are not representative of other ethnic groups in India or other countries. Given that there are no studies conducted on Gujarati children,the present study provides baseline information regarding the tooth dimorphism of this population which may be useful in the future for determining the gender for this population. However, further research including larger populations is suggested in order to achieve more accurate values for predicting the sex in the current scenario.

Conclusion

From the present study, the following conclusions can be made:

1. The mesiodistal dimensions of primary canines in males tend to be larger than those in females. Thus males appear to be sexually more dimorphic than females.
2. The maxillary canines in males are sexually more dimorphic than mandibular canines.

Sexual dimorphism in tooth-crown diameters appears to be less pronounced in the deciduous than in the permanent dentition. The results of this study may be tempered by the observation that the population studied here is a statistical population of a particular state and the pattern and degree of dimorphism may be different than that which might be encountered in a vast biological population. Furthermore, the results reported here relate to the study population alone and should not be generalized beyond it without substantiation from large scale data.

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SMU Medical Journal, Volume – 3, No. – 2, July, 2016, PP. 193 – 204.