Criteria for Determination of Sex from Mandible

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Abstract

One of distinction between a genetic man and genetic woman is the characteristic of their skeleton. Mandible and teeth specially mandibular teeth are found to exhibit greatest dimorphism.

To define the morphometric criteria for mandible in Haryana population, the present study has been conducted on 102 mandible (52:50); M:F) in the age group of 20 to 60 years. The study revealed that if the dimensions are greater than the given deviation value than the probability of sex being male is 95%. The following deviations are

Intercanine distance - 25.5 mm
Mesiodistal diameter of mandibular canines - 7.1 mm
Interlingula (covering inferior alvoelar foramen) - 85 mm
Mental foramen to lingula
(covering inferior alvoelar foramen) - 53 mm
Intercondylar distance - 100 mm

INTRODUCTION

Skeleton is an excellent material in living and non-living population for genetic, anthropological, odontologic and forensic investigations. Skull and bone features vary from male to female and differentiation is usually based on the male features that are typically more pronounced and marked than female features.

Krongman ranks accuracy of sex determination using the pelvis at 95% followed by the skull at 90%, the pelvis and skull at 98% and long bones at 80%. Stewart's indicated slightly lower yields. However the order of accuracy was the same with the long bones again being the least accurate.

Success rates are somewhat lower for negroid and mongoloid skeletons.

Mandible of female cranium tends to have a pointed chin. The area around the gonial angle is smooth and not projected. The male mandible tends to have a “square” shape and in extreme cases the area around the gonial angle is flared. The dentition of males is frequently larger.

MATERIALS AND METHODS

The study was conducted on the mandibles from the Department of Forensic Medicine and G.D.C., PGIMS, Rohtak. The following measurements were taken in all the mandibles :

- Intercanine distance
- Intercondylar distance
- Interlingula (covering inferior alvoelar foramen)
- Mesiodistal diameter of mandibular canines
- Mental foramen to lingula (covering inferior alvoelar foramen)

All measurements are taken on an anatomically sound basis using a vernier callipers having resolution of 0.02 micrometers and a divider.

According to Garn and Lewis (1967) :

Sexual dimorphism : (Xm / Xf) x 100

Xm = mean value for males
Xf = mean value for females

The reading obtained was subjected to statistical analysis to derive conclusions and sexual dimorphism.

OBSERVATIONS AND RESULTS

STATISTICAL SIGNIFICANCE OF PARAMETERS

The following BR parameters were determined on the mandible in males and females :

- Intercanine distance
- Intercondylar distance
- Interlingula (covering inferior alvoelar foramen)
- Mesiodistal diameter of mandibular canines
- Mental foramen to lingula (covering inferior alvoelar foramen)

Figure 1

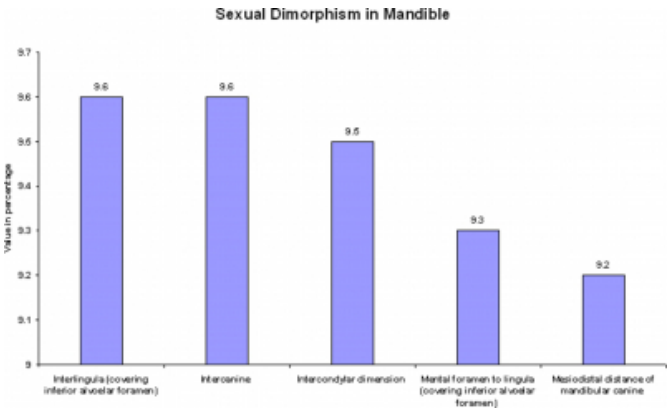
Table 1

Sr. No.	*Distances (in mm)*	*Male (mean value)*	*Female (mean value)*
1.	Intercanine	25.8	24.8
2.	Mesiodistal diameter of mandibular canines	7.1	6.6
3.	Interlingula (covering inferior alvoelar foramen)	85.0	82.0
4.	Mental foramen to lingula (covering inferior alvoelar foramen)	53.0	49.0
5.	Intercondylar	100.2	95.2

Sexual dimorphism in mandible in Haryana

Interlingula (covering inferior alvoelar foramen)	- 9.6%
Intercanine	- 9.6%
Intercondylar	- 9.5%
Mental foramen to lingula (covering inferior alvoelar foramen)	- 9.3%
Mesiodistal diameter of mandibular canines	- 9.2%

Figure 2



PROBABILITY OF SEX DETERMINATION

The probability of sex being male is 95% if 3 or more of the dimensions are greater than their deviation value.

Deviation values vary from population to population but criteria to measure the dimensions of the mandibles will remains the same.

Figure 3

Figure 1 : Intercondylar distance

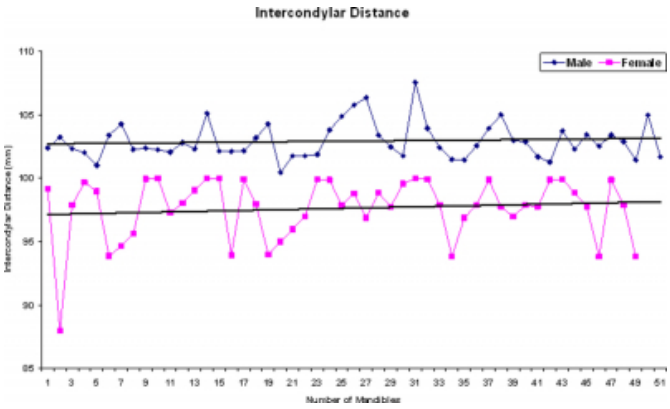


Figure 4

Figure 2 : Interlingula (covering inferior alvoelar foramen)

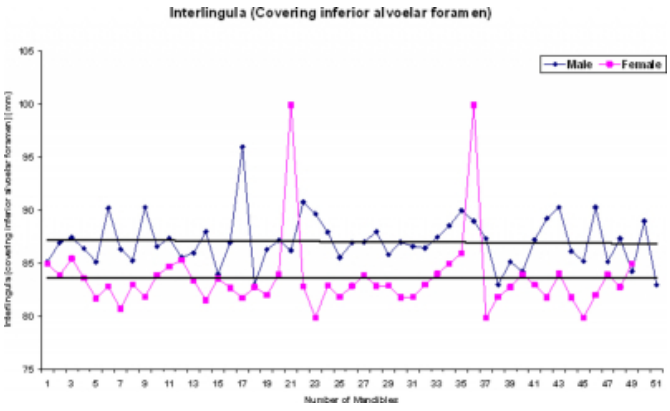


Figure 5

Figure 3 : Mental foramen to lingula (covering inferior alvoelar foramen)

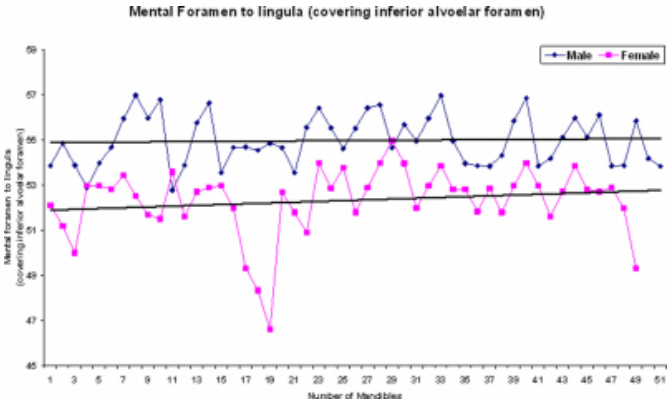


Figure 6

Figure 4 : Intercanine distance

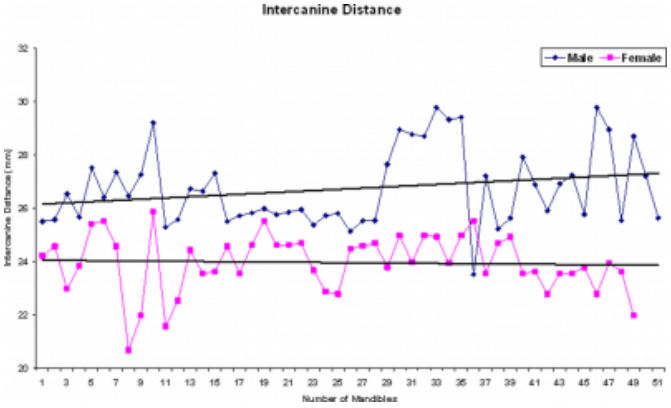
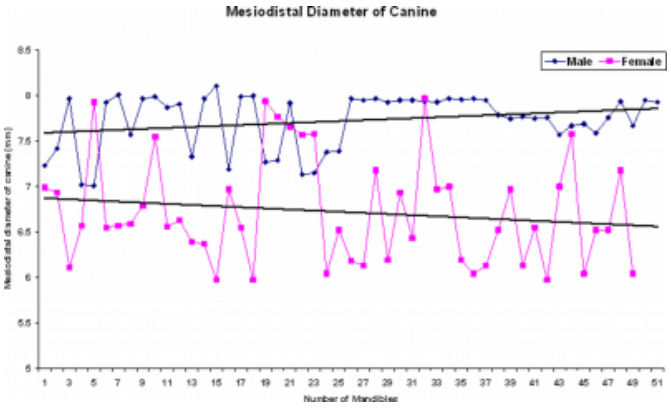


Figure 7



DISCUSSION

The present study establishes the existence of definite statistically significant sexual dimorphism in the mandible. Garn and Lewis (1967) and Lysell and Myberg (1986) concluded that the mandible canine with 6.4% and 5.7% respectively demonstrated the greatest sexual dimorphism among all the teeth.

Nair et al (1999) in their study on South Indian subjects concluded that left mandibular canine with 7.7% followed by the right manidbular canine with 6.2% shows the maximum sexual dimorphism.

Gabriel (1958) has stressed that any measurement of teeth unaccompanied by age, race and sex must be treated with great reserve. Amongst the significant finding that can be obtained from teeth are race, age sex, habits and racial customs.

Recognizable sex difference does not appear until after puberty except in pelvis and the accuracy from this bone is about 75 to 80%. Determination of sex is based mainly upon the appearances of the pelvis, skull, sternum and long bone.

The present finding might proved to be of immense importance in identification of subject for medico-legal purpose.

CONCLUSION

BR criteria for determination of sex reveals that the probability of male sex is 95% if three or more of the dimensions described in the Table – 1 are greater than their deviation values. Deviation's value varies from population to population but the criteria to measure the dimensions of the mandible will remain same.

In addition the mandibular angle was found inverted in males and everted in females which is very important finding for medico-legal purpose.

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