J.Sarvesh Kumar et al /J. Pharm. Sci. & Res. Vol. 8(6), 2016, 487-490

ISSN:0975-1459
Journal of Pharmaceutical Sciences and Research
www.jpsr.pharmainfo.in

Sex Determination Using Human Mandible

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Abstract

Aim :
To determine the gender of a person using mandible

Objective :
The study was conducted to identify the features used for sex determination using mandibles of an individual apart from the usual distinguishing features

Background :
The identification of skeletal remains is of paramount importance in medico-legal investigations. The skeletal components most frequently investigated for sex determination are the pelvis and skull bones, with the mandible being a practical element to analyze the sexual dimorphism in the fragmented bones. Presence of a dense layer of compact bone makes it highly durable and well preserved than many other bones present in the body. The mandibular ramus can be used to differentiate between two sexes and it also expresses a strong univariate sexual dimorphism in humans.

Reason :
Identification and determination of the sex of unknown human skeletal remains have been one of the most challenging tasks for forensic dentistry. The purpose of this study was to determine the feasibility of the analysis of bigonial breadth, bicondylar breadth and coronoid breadth

Key words : sex determination; mandible; bigonial breadth; bicondylar breadth; coronoid breadth

INTRODUCTION:

Identification of sex from remains of skeleton is one of the important forensic considerations because from the view of examiner it eliminates approximately half the population [1]. The sex of an unknown individual can be determined based on the data from the metric features and morphology of skull and mandible, soft tissues and also by dna analysis of teeth [2]. In human skeleton, the skull is the second most sexually dimorphic region apart from pelvis. As part of skull, the mandible may also be considered sexually dimorphic. The mandible is one of the strongest bone in the human body and persists in a well preserved state much longer than any other bone[3]. In accidents explosions, aircraft crashes, natural disasters, warfare, and earthquake disasters, identification and sex determination of a victim is generally done by dental records. When dental records are not available or doesn't exist, sex determination of unknown human mandibles are done by the usual methods of size and muscular markings become unreliable [4]. Male and female mandibles are distinguished by general size, chin shape, gonial flaring and the gonial angle [5]. Assessment of sex by morphological features is subjective, and many fine peculiarities may be missed or misinterpreted by an inexperienced examiner[6]. Therefore the present study was done to determine the new features to determine sex using mandible apart from usual distinguishing features

METHODS

The study was conducted using human mandibles obtained from the department of anatomy saveetha dental college and hospitals ,chennai. The total number of mandibles used was 53 among which 15 mandibles were excluded from the study due to damage, the remaining 38 human mandibles were grouped into male and female mandibles using the morphological features like gonial flaring which counted up to 25 male mandibles and 13 female mandibles. These mandibles were studied to find other new features to distinguish them, which are ;

Bigonial breadth – the perpendicular distance between the two gonia.

Coronoid breadth – the perpendicular distance between the most lateral points on the two coronoid process.

Bicondylar breadth - the perpendicular distance between the most lateral points on the two condyles.

The measurements were taken using a manual vernier caliper with no zero error and the values were entered and evaluated using spss software and the results were analyzed.

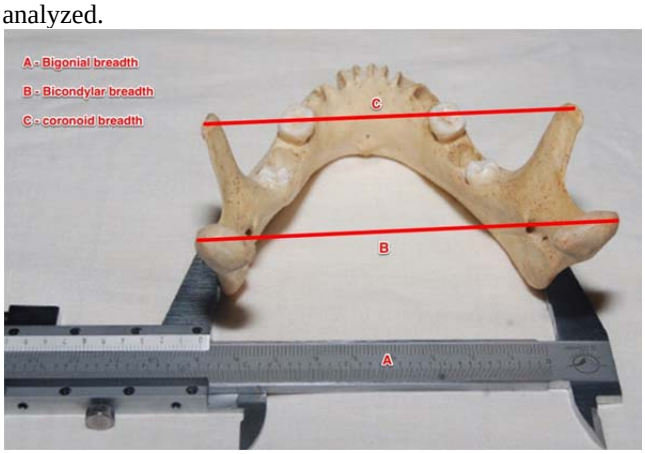

Figure 1 : measuring values using vernier calliper

RESULT

Table 1 - Statistical Observation In Male Mandibles

Total no. Of mandibles - 25	Coronoid breadth	Bicondylar breadth	Bigonial breadth
Minimum	8.50	9.70	8.50
Maximum	10.80	12.10	11.30
Mean	9.4880	11.0680	9.4080
Std. Deviation	.61395	.50392	.68612

Table 2 - Statistical Observation In Female Mandibles

Total no. Of mandibles - 13	Coronoid breadth	Bicondylar breadth	Bigonial breadth
Minimum	8.30	9.30	7.90
Maximum	9.60	11.50	9.50
Mean	9.0923	10.6077	8.8231
Std. Deviation	.41122	.72280	.36321

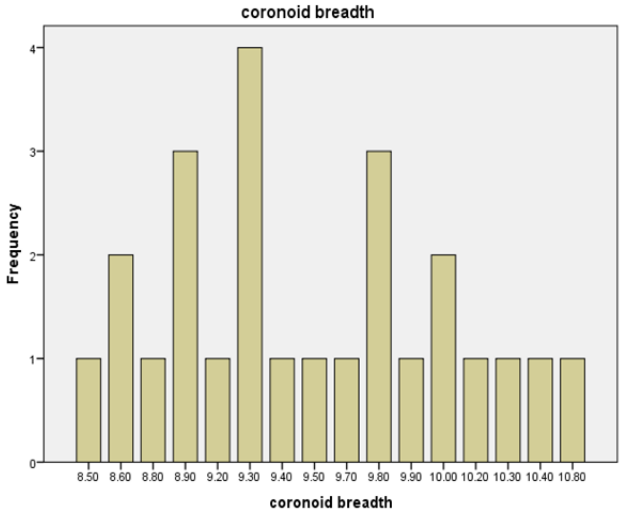

Figure 2 : Measurement Of Coronoid Breadth In Male Mandibles

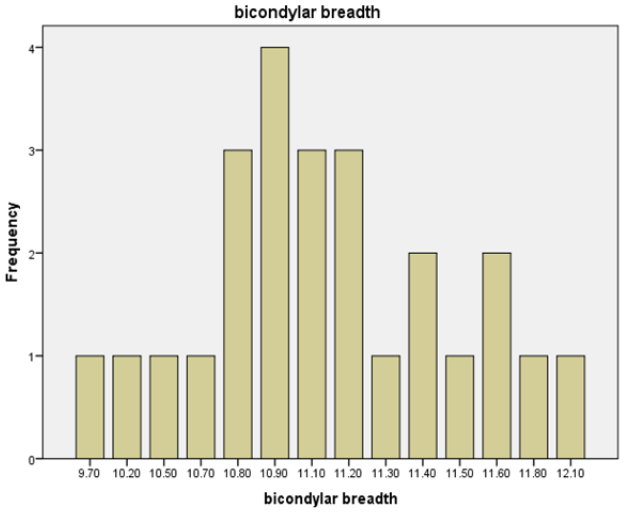

Figure 3 : Measurement Of Bicondylar Breadth In Male Mandibles

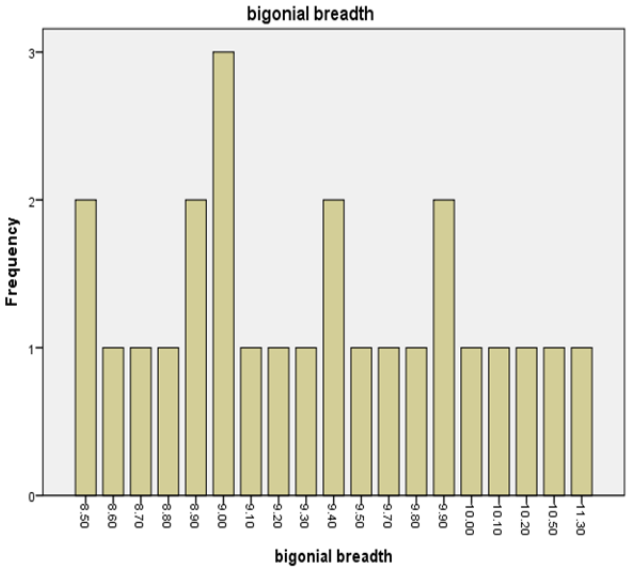

Figure 4 : Measurement Of Bigonial Breadth In Male Mandibles

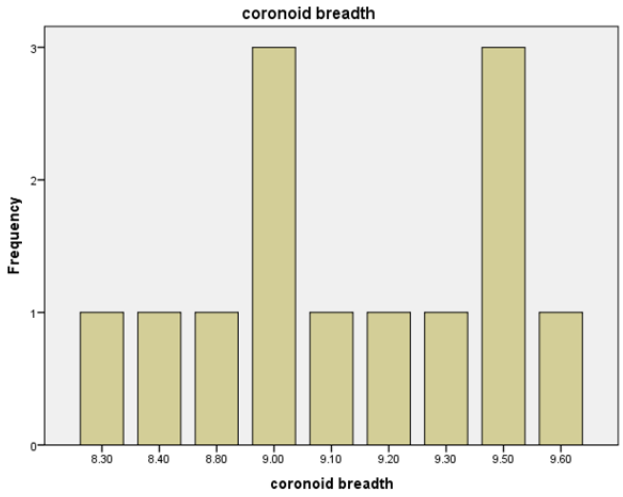

Figure 5 : Measurement Of Coronoid Breadth In Female Mandibles

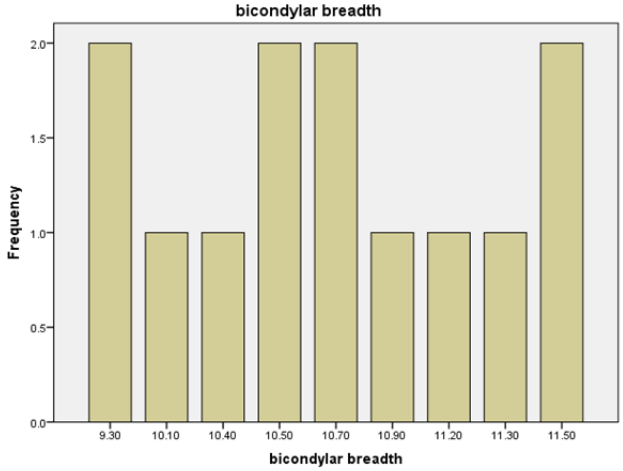

Figure 6 : Measurement Of Bicondylar Breadth In Female Mandibles

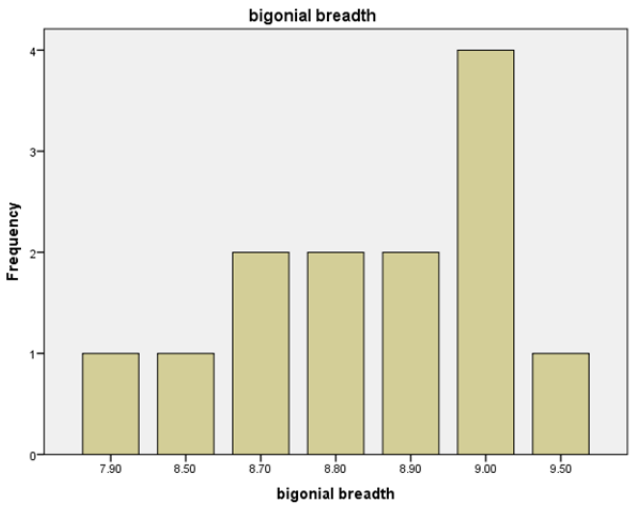

Figure 7 : Measurement Of Bigonial Breadth In Female Mandibles

Bigonial breadth

In male mandibles the mean breadth was found to be 9.4080 cm, the range was found to be 8.50 - 11.30 (2.80) and the standard deviation was 0.68612. In female the mean breadth was found to be 8.8231 cm, the range was found to be 7.90 - 9.50 (1.60) and the standard deviation was 0.36321. The sex differences in mean values of bigonial breadth of male and female mandibles is statistically significant ($p<0.05$).

Coronoid breadth

In male mandibles the mean breadth was found to be 9.4880 cm, the range was found to be 8.50 – 10.80 (2.30) and the standard deviation was 0.61395. In female the mean breadth was found to be 9.0923 cm, the range was found to be 8.30 – 9.60 (1.30) and the standard deviation was 0.41122. The sex differences in mean values of coronoid breadth of male and female mandibles is statistically significant ($p<0.05$).

Bicondylar breadth

In male mandibles the mean breadth was found to be 11.0680 cm, the range was found to be 9.70 - 12.10 (2.40) and the standard deviation was 0.50392. In female the mean breadth was found to be 10.6077 cm, the range was found to be 9.30 – 11.50 (2.20) and the standard deviation was 0.72280. The sex differences in mean values of bicondylar breadth of male and female mandibles is statistically significant ($p<0.05$).

DISCUSSION

Bigonial breadth

Vinay et al. [7] in their study with 250 mandibles the mean value of bigonial breadth of male mandibles was found to be 9.45 cm and in female mandibles was 8.74 cm. The standard deviation for bigonial breadth in male mandibles was 0.53 and in female mandibles was 0.54. Ongkana [8] studied with 102 mandibles of individuals who had lived in the upper part of northern thailand, the mean value of bigonial breadth of male mandibles was found to be 9.68 cm and in female mandibles was 8.97 cm. The standard deviation for bigonial breadth in male mandibles was 0.77 and in female mandibles was 0.59. Jayakaran et al. [9] in their study with 207 mandibles the mean value of bigonial breadth of male mandibles was found to be 9.38 cm and in female mandibles was 8.71 cm. The standard deviation for bigonial breadth in male mandibles was 0.54 and in female mandibles was 0.48. Ranganath et al.[10] in their study with 111 mandibles the mean value of bigonial breadth of male mandibles was found to be 8.68 cm and in female mandibles was 8.62 cm. The standard deviation for bigonial breadth in male mandibles was 1.37 and in female mandibles was 0.72. Franklin et al. [11] in their study with 225 mandibles the mean value of bigonial breadth of male mandibles was found to be 9.35 cm and in female mandibles was 8.70 cm. The standard deviation for bigonial breadth in male mandibles was 0.57 and in female mandibles was 0.56.

In the present study the mean value of bigonial breadth of male mandibles was found to be 9.4080 cm and in female mandibles was 8.8231 cm. The standard deviation for bigonial breadth in male mandibles was 0.68612 and in female mandibles was 0.36321. The values of male was comparatively more than female mandibles.

Bicondylar breadth

Vinay et al. [7] in their study with 250 mandibles the mean value of bicondylar breadth of male mandibles was found to be 11.34 cm and in female mandibles was 10.82 cm. The standard deviation for bicondylar breadth in male mandibles was 0.55 and in female mandibles was 0.70. Ongkana [8] studied with 102 mandibles of individuals who had lived in the upper part of northern thailand the mean value of bicondylar breadth of male mandibles was found to be 12.38 cm and in female mandibles was 11.61 cm. The standard deviation for bicondylar breadth in male mandibles was 0.63 and in female mandibles was 0.59. Jayakaran et al. [9] in their study with 207 mandibles the mean value of bicondylar breadth of male mandibles was found to be 11.26 cm and in female mandibles was 10.77 cm. The standard deviation for bicondylar breadth in male mandibles was 0.53 and in female mandibles was 0.53. Ranganath et al.[10] in their study with 111 mandibles the mean value of bicondylar breadth of male mandibles was found to be 10.98 cm and in female mandibles was 11.51 cm. The standard deviation for bicondylar breadth in male mandibles was 1.48 and in female mandibles was 0.93. Franklin et al. [11] in their study with 225 mandibles the mean value of bicondylar breadth of male mandibles was found to be 11.36 cm and in female mandibles was 10.86 cm. The standard deviation for bigonial breadth in male mandibles was 0.60 and in female mandibles was 0.58.

In the present study the mean value of bicondylar breadth of male mandibles was found to be 11.0680 cm and in female mandibles was 10.6077 cm. The standard deviation for bicondylar breadth in male mandibles was 0.50392 and in female mandibles was 0.72280.

Coronoid breadth

Kanchankumar et al. [12] in their study with 82 mandibles the mean value of coronoid breadth of male mandibles was found to be 9.53 cm and in female mandibles was 9.13 cm. The standard deviation for coronoid breadth in male mandibles was 0.065 and in female mandibles was 0.113

In the present study the mean value of coronoid breadth of male mandibles was found to be 9.4880 cm and in female mandibles was 9.0923 cm. The standard deviation for coronoid breadth in male mandibles was 0.61395 and in female mandibles was 0.41155. The values of male was comparatively more than female mandibles.

CONCLUSION

Determination of sex from skeletal remains has high forensic importance. The determination of sex by analyzing the morphological aspects depends on the expert's ability. The present study has helped us to determine sex using metric parameters like bigonial breadth, bicondylar breadth and coronoid breadth, which are easy to determine and more reliable compare to traditional non metric method.

REFERENCES

1. Ahmed AA, Mohammed HA, Hassan MA. Sex determination from cranial measurements in recent northern sudanese. Khartoum med j 2011;4:539-47.
2. Rai,J. Kaur. Sex determination methods in forensic odontology. Evidencebased forensic dentistry. Doi.10.1007/978-3-642-28994-1_5@ springerverlag berlin heidelberg 2013; 73-79.
3. sexdetermination using nonmetric characteristics of the mandible in koreans.j forensic sci 2006;51:1376-82.
4. Reddy ksn. Identification. The essentials of forensic medicine and toxicology. 24th ed. Hyderabad: k suguna devi; 2005. Pp. 79–81
5. Vodanovic m, et al. Odontometrics: a useful method for sex determination in an archaeological skeletal population. Journal of archaeological science. 2006:1–9.
6. Kanchankumar p. Wankhede,rajesh v. Bardale1,gunwant r. Chaudhari,namdeo y. Kamdi.determination of sex by discriminant function analysis of mandibles from a central indian population.j forensic dental sciences / january-april 2015 / vol 7 / issue 1
7. G, vinay. "sex determination of human mandible using metrical parameters." *jcdr journal of clinical and diagnostic research* (2013).
8. Nutcharin ongkana, paiwan sudwan. Gender differences in thai mandibles using metric analysis. Chiang mai med j. 2009; 48(2):43-48.
9. Flossie jayakaran, sayee rajangam, janakiram s, thomas im. Sexing of the mandible. Anatomica karnataka. 2000; 1(1):11–16.
10. Ranganath vallabhajosyula, yogitha ravindranath, roopa ravindranath. Sexual dimorphism in mandibular morphology: a study on south indian sample.south asian anthropologist. 2008; 8(1):9-11
11. Daniel franklin, paul o'higgins, charles e oxnard, ian dadour. Sexual dimorphism in the subadult mandible: quantification using geometric morphometrics. J forensic sci. 2007; 52(1): 6-10.
12. Wankhede, kanchankumarp, rajeshv bardale, gunwantr chaudhari, and namdeoy kamdi. "determination of sex by discriminant function analysis of mandibles from a central indian population." *journal of forensic dental sciences j forensic dent sci* 7.1 (2015): 37.