

Determination Of Sex Of Mandible From Pieces Of Mandible

Lavina Sharma¹, Riya Narwani²

Department of Anatomy, Sawai Man Singh Medical College and Hospital, Jaipur, Rajasthan, India

Department of Anatomy, Sawai Man Singh Medical College and Hospital, Jaipur, Rajasthan, India

For correspondence:

Lavina Sharma, Department of Anatomy, Sawai Man Singh Medical College and Hospital, Jaipur, Rajasthan Pin 302004 India, e-mail: lavinassmsmch@gmail.com

Abstract:

Background: Mandible is a strong bone and shows sexual dimorphism. As criminals are trying to obliterate the identity of victim; instead of intact mandible, pieces of mandible are sent for examination. Sex determination is the first parameter in determination of identity as other parameters like age, stature and race etc. are dependent on sex. *Methods:* This is an observational study. Four Morphometric Parameters were examined in 90 mandibles (46 male and 44 female). *Results:* Statistical analysis and 'p-value' determination was done for all Metric Parameters. Gonion-Gnathion-Distance (Diagonal Length), Maximum Height of Ramus, Symphyseal Height were found to be 'Statistically Significant' while the Mandibular Angle was found to be 'Not Statistically Significant'. *Interpretation and Conclusion:* Determination of sex from pieces of mandible is crucial in Medicolegal Cases and in Anthropology. The conventional method of observation of morphological features is difficult when examining a piece of mandible. Therefore, metrical parameters are the only option available. Our study is helpful in choosing the morphometric parameter which are 'Statistically Significant' while not choosing those which are 'Not Statistically Significant'.

Key words: Diagonal Length/Gonion-Gnathion-Distance, Mandibular Angle, Maximum Height of Ramus, Pieces of Mandible, Sexual Dimorphism, Symphyseal Height.

INTRODUCTION

It has been observed that in recent times criminals try to obliterate the identity of the victims by crushing, cutting etc. Therefore, instead of intact bones, only pieces of bones are available for examination. Examination of pieces of bones is encountered in Medicolegal cases, Anthropological and Archeological study routinely. Mandible is a strong bone and compared to other bones resists environmental conditions and is thus well preserved after death.¹ Also mandible is one such bone that shows significant sexual dimorphism.² Routinely, morphological features play a dominant role. The problem arises when instead of intact mandible. A piece of mandible is available for examination. Thus, if we cannot resort to observation of details of morphological-features, we need to have some alternate way.

We found three morphometric parameters which show statistical significance. Whatever piece of mandible is available, at least one or more than one parameter would be found to be helpful by the Examiner.

MATERIAL AND METHODS

In this Cross Sectional, Observational Study we examined 90 dried human mandibles. These were available in museums of departments of Anatomy and Forensic Medicine at SMS Medical College, Jaipur.

Inclusion Criteria: Well developed, adult, intact mandibles.

Exclusion Criteria: Damaged, Deformed or Edentulous mandible.

The mandibles were divided into two groups: 46 male and 44 female, based on morphological features.

The following four morphometric parameters were analyzed:

Gonion- gnathion distance (Diagonal Length of the Mandible Body): Diagonal length (DL) of the mandible body³: The DL (gonion-gnathion-length) of the mandible body was measured from the point at the base of the mandible at the level of the symphysis menti to the posterior most point at the angle at the junction of the body and the ascending rami of the mandible with the help of a digital vernier calipers
Maximum Height of Ramus⁴: The distance between the mid-point of the mandibular notch and the angle of the mandible
Symphyseal Height⁴: The direct distance between the alveolar process and the inferior border of the mandible, perpendicular to the base at the level of symphysis menti.
Mandibular Angle³:

Angle of the mandible: It was taken with the help of a Mandibulometer as the angle between the base and a tangent drawn along the posterior border of the ramus, touching the posterior-most point on the condyle and the posterior most point on the posterior border.

The parameters were measured on the right side. Digital Vernier Calipers and Mandibulometer were used.

RESULTS

All the four morphometric parameters were measured. Observations were recorded in Microsoft Excel in Spread Sheet Program. For statistical analysis Graph Pad Prism (online) was used. ‘ T- test calculator’ was used for analysis of result. It is a component of Graph pad prism. We applied unpaired T test. Significance level was set at ‘p < 0.05’. We determined the p value, Mean and Standard Deviation.

Table no. 1 shows the values obtained of the following Morphometric Parameters.

Gonion–gnathion distance (Diagonal Length of the Mandible Body)

Maximum Height of Ramus

Symphyseal Height

Mandibular Angle

We found that the Standard Deviation was higher in males. It means that greater variability shown by males than females.

Parameter	Mean ± SD		p- value
	Male	Female	
Mandibular Angle (in degree)	124.00 ⁰ ± 6.27077	124.03 ⁰ ± 5.30116	0.384
Gonion - gnathion distance (Diagonal Length of the Mandible Body) (in mm)	79.7670 ± 4.67766	73.8320 ± 4.84304	0.000
Maximum Height of Ramus (in mm)	46.701 ± 5.8011	44.7001 ± 5.3001	<0.04
Symphyseal Height (in mm)	25.402 ± 4.5002	23.201 ± 3.7016	<0.008

DISCUSSION AND CONCLUSION:

Whenever intact mandibles are available for examination, Morphological Parameters are found to be very useful for determination of sex. However, we are considering a scenario where rather than an intact mandible; a piece of mandible only is available for examination. Here we think that metric parameters would be more objective and helpful. In our study the mean of the Diagonal Length was found to be 79.77 ± 4.68 mm. In adult males and 73.83 ± 4.84 mm in adult females. Maneesha Sharma et.al.³ found in their study the mean diagonal length in adult male to be 79.770 ± 4.68mm and 73.830 ± 4.84mm in adult females. Ongkana and Sudwan⁵ in their study found the mean diagonal length in adult males as 8.32 ± 0.52 cm in males and 7.92 ± 0.46 cm in females. We found the p-value to be statistically significant.

In our study the mean of the maximum ramus height 46.70 ± 5.80 mm in adult males and 44.70 ± 5.30 mm in adult females. Aprajita Sikka et.al.⁴ in their study found the mean of maximum Ramus Height in adult males as 4.670 ± 0.58 cm and in adult females as 4.470 ± 0.53 cm. We found the p value to be statistically significant. In our study we observed that the mean of the symphyseal height in adult males was 25.40 ± 4.50 mm and in adult females it was 23.20 ± 3.70 mm. Aprajita Sikka et.al.⁴ in their study recorded the mean of symphyseal height in adult males is 2.540 ± 0.450 cm and in adult females as 2.320

± 0.370 cm. We found the p value to be statistically significant. In our study the mean angle of mandible in adult males was $124^\circ \pm 6.27^\circ$ in females it was $124.03^\circ \pm 5.3^\circ$. Maneesha Sharma et.al.³ in their found that mean angle of mandible in adult males was $124.0^\circ \pm 6.27^\circ$ and in females in was $124.03^\circ \pm 5.3^\circ$. Rai et.al.⁶ in their study observed that the mean mandibular angle in adult females was 121° and in adult males it was 118° . We found that the p value was 'Not Statistically Significant'. The results of our study show that our data will be useful in not only medicolegal cases but also in other academic fields.

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