BIOMETRY OF MANDIBLE

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ABSTRACT

BACKGROUND
The purpose of study of biometry of mandible is to evaluate the sex of the individual by statistically significant various parameters of the mandible and also a few selected landmark points on the mandible.

MATERIALS AND METHODS
100 mandibles collected from Department of Anatomy at Mamatha Medical College and NRI Medical College were included in the present study. The following parameters were studied. 1. Ramus - a. Breadth, b. Height; 2. Interlingular distance; 3. Angle of mandible; 4. Bonwill's triangle.

RESULTS
Rami's breadth in males and females 34.16 and 30.8 mm; rami's height in males and females 49.76 and 44.24; T-test value is 10.61; angles of mandible in males - 104°, in females - 125°; interlingular distance in males - 78.28 mm, in females - 65.5 mm; angle of gonion in males - 400 and in females - 410; Bonwill's triangle - are equal in 40% females and 20% in males.

CONCLUSION
Biometry of mandible useful in medicolegal cases to differentiate the sex and age in maxillofacial surgery. A multimetric analysis by experienced person is most essential for accurate conclusions.

KEYWORDS
Mandible, Ramus, Bonwill's triangle.

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BACKGROUND

The purpose of this study of biometry of mandible is to evaluate the sex of the individual by studying various parameters of the mandible and also a few selected landmark points on the mandible. This work on biometry of mandible is useful especially in medicolegal cases to differentiate the sex and age of an individual and also useful in maxilla facial surgery and in the correction of craniofacial deformities. A multimetric analysis is most essential of accurate conclusions.

The objectives of the study were to measure the-

1. Ramus - a. Breadth; b. Height.
2. Interlingular distance.
3. Angle of mandible.
4. Bonwill's triangle.

Several studies have been conducted previous by the morphometry of mandible,[1,2,3] but the available literature on the morphometry in South India population is scanty. So, the present has been taken up.

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AIMS AND OBJECTIVES

The main aim of this study to-

1. Biometry of mandible is to evaluate the sex of the individual by studying various parameters of the mandible and a few selected landmark points, which are statistically significant.
2. Determine the age of the individual and the sex of the individual in medicolegal cases.
3. The shape of the mandible and the size of Bonwill's triangle have significance in clinical prosthetics and also in anthropological studies. By studying this, any asymmetry in the mandible may also be noted.
4. Biometry of mandible may be useful in plastic surgery in the correction of craniofacial deformities because now a days in the society the consciousness of beauty and the profession of modeling have increased.
5. Biometry of edentulous mandibles is of greater importance in the prosthetic dentistry.
6. It is useful in dentistry and oral surgery to know and note any abnormality found in the mandible such as excess presence of mental foramen of different shapes of the coronoid process, etc.

Review of Literature

Various authors have studied different aspects of mandible and a large collection of literature is available.

Different authors studies various parameters of the mandible, the teeth, volume and wt. of the mandible and the position of foramen of the mandible and the heights of the coronoid and condyloid processes and the angle of the mandible and different shapes of the coronoid process to prove the sex, age and race.

Franklin D[1] studies the morphological features between white and Negro mandibles.

Borovansky L[4] has studied the sexual dimorphism of the mandible.

William Ingalls[5] studied weights of individual bones in entire skeletons and stated that the weight of bones differ in males from that of females. Bone weights are different at different ages.

M.F. Ashley Montagu[6] determined the sex taking into consideration the following dimensions of the mandible.

1) Bigonial diameter.
2) Height and breadth of ramus of the mandible.

Karl Pearson[7] studied the measurements of various bones of the skeleton and stated that the dimensions of female bones are 8% less than that of male dimensions. The ratio between male and female are 100:92.

T.D. Stewart[8] stated that the sex of the disease with 90%-95% accuracy if the entire skeleton is provided and if skull one is available the accuracy of sex determination is up to 50% only.

Hanihara K[4] in 1959 he studied the Japanese skull by multimetric analysis to determine the sex.

Giles[9] studied a total of mandibular parameters and by using them he determined the sex with an accuracy of 87%.

MATERIALS AND METHODS

The present study was carried on 100 dry mandible were collected from the Department of Anatomy and Forensic Medicine at Mamatha Medical College, Khammam, NRI Medical College, Chinakakani.

Parameters Study

a) Ramus - Breadth - between anterior and posterior borders mandible.
   Height - The distance from the lower border of the mandible to the tip of the condylar process.
b) Interlingular distance - between right and left lingular distance.
c) Angle of mandible - Angle between lower border and posterior border of ramus.
d) Angle of gonion - The midpoint on the curve marking the transition between the body and ascending ramus of mandible.
   I) Between gonion to tip of the coronoid process.
   II) Between gonion to tip of the condylar process.
e) Bonwill's triangle - Between mid-incisor point to right and left condylar tips.

The data was statistically analysed for making difference of sex by calculating the mean, range and standard deviation.

Instruments and equipment used for this study are-

1. Sliding calipers.
2. Compass box.
3. Goniometer.
4. Thread.
5. Scale.

The lineal measurements were taken in millimetres and angular measurements are taken in degrees. The results obtained were recorded and tabulated. The results were statistically analysed.

RESULTS

Sl. No.	Statistical Measurements	Male	Female
1.	Mean	49.76	44.24
2.	SD	2.908	2.746
3.	Range	48.59 to 50.923	43.14 to 45.25

Table 1. Ramus Height

"T" test = 8.62 - Highly significant.

Figure 1. Measurement of Height

Sl. No.	Statistical Measurements	Male	Female
1.	Mean	34.16	30.8
2.	SD	2.1923	3.205
3.	Range	35.03 to 33.28	32.08 to 29.923

Table 2. Ramus Breadth

"T" test = 5.57 - Highly significant.

Figure 2. Ramus Breadth

Sl. No.	Statistical Measurements	Male	Female
1.	Mean	99.20	125^0
2.	SD	6.64	2.878
3.	Range	96.385 to 101.85	123.815 to 126.185

Table 3. Interlingular Distance

"T" test = 5.282 - Highly significant.

Figure 3. Interlingular Distance

Sl. No.	Statistical Measurements	Male	Female
1.	Mean	34.28^0	37.56^0
2.	SD	3.6	2.054
3.	Range	35.783 to 32.797	36.714 to 38.40

Table 4. Angle of Mandible

"T" test = 3.961 - Highly significant.

Figure 4. Angle of Mandible

Bonwill's Triangle	Number of Mandibles Observed and Percentage in Males	In Female
Equilateral triangle where all the three dimensions of Bonwill's triangle are same	5/25=20%	10/25=40%

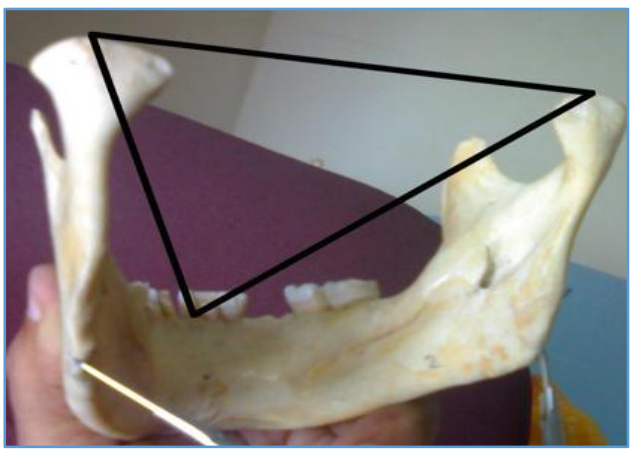

Figure 5. Bonwill's Triangle

DISCUSSION

In the present study of biometry of mandibles, the various statistical measurement are compared with similar parameters worked by various authors in the determination of sex, which is of medicolegal importance. Various authors have attempted to identify the sex from individual bones like humerus, ulna, cranium, mandible, femur and pelvis.

According to Hanihara,[10] the breadth of ramus range in males was 33.388 to 32.692 mm, and in the present study, it is 33.28 to 35.03 mm. The mean female ramus breadth was 31.1 mm. In the present study, it is 29.923 to 32.082. The above values are very near to the findings of Hanihara.

In present study, the mean mandibular ramus height in males = 49.76.

The mean mandibular ramus height in females = 44.24.

Kean,[11] Bapana,[11,12] Diwan C. V.[11] and have done work on angle of mandibles.

Keen 1950		Diwan C. V.		Bapana		Present Study	
Male	Female	Male	Female	Male	Female	Male	Female
125.3	128.0	112.38	119.8	122.0	123.0	99.12	125

Investigator like Bonwill[13] have shown that the sides of this triangle may vary somewhat in length relative to one another. The author studied on mandibles and noted that the sides in Bonwill's triangle were rarely equal in the male. In the present study, all the three dimensions of the Bonwill's triangle are equal in 40% specimens of female mandibles, but in males, it is only 20%.

According to Borovanxky L,[4] Giles,[9] Weber J. S. Ursi[14] has done the work on 100 mandibles of both sexes in Negros and assessed the sex from various parameters of the mandible.

In present study, mean of interlingular distance in males is 78.28 mm and in females is 69.5 mm. Hence, this parameter is of value in determining the sex of the individual.

In the present study, the mean gonion angles in males and females are 40° and 41°. Hence, it is concluded that all the parameters in adult male and female mandibles are

in accordance with those of the previous authors like Keen and Broman, Hanihara and Bonwill and Indian authors like Bapana. The biometry of the adult male and female mandibles will be of value in forensic studies in sexual differentiation and in prosthetic dentistry.

In the present study, the gonion angle in females is greater than in males and the range of gonion angle in female mandibles is greater than in males.

CONCLUSION

The purpose of this study of biometry of the mandible is to evaluate the sex of the individual by studying various parameters of the biometry of mandible is useful in forensic medicine for the identification of sex in medicolegal cases. In present study, the measurements of various parameters are studied in 50 males, 45 females and 5 old mandibles and compared the measurements with the findings of other workers. M. Fashley Montagu,[6] Karl Pearson,[7] T.D. Stewart[8] stated that the sex of the diseased with 90%-95% accuracy if the entire skeleton is provided, and if skull one is available, the accuracy of sex determination is up to 50% only.

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