

The study of anthropometry of human mandibles in Wardha region

Richa Singh

Department of Anatomy, Jawaharlal Nehru Medical College, Sawangi (M), Wardha, Maharashtra, India

Correspondence to: Richa Singh, E-mail: drricha392@gmail.com

Received: October 15, 2018; Accepted: March 10, 2019

ABSTRACT

Background: The knowledge of different measurements of mandible is important to the dental surgeons in maxillofacial surgeries, reconstructive surgery of mandible, and plastic surgeries of face. The study of mandible is also important for individual identity such as age, sex, race, and stature. **Objective:** The objective of this study was as follows: Determination of sex, identification of individual for medicolegal purpose, and craniofacial reconstruction. **Materials and Methods:** In the present study, 140 cadaver mandibles including 100 male and 40 female mandibles of Wardha regions were studied. I have measured the bicondylar width, bigonial diameter, and mandibular symphyseal height of the left ramus with the help of spreading caliper (Vernier). **Results:** The calculated range for 100% accuracy is measured by mean \pm 3.5 standards deviation. **Conclusion:** On the basis of percentage beyond demarking point, these parameters are found to be very useful in sex determination.

KEY WORDS: Anthropometry; Mandible; Bicondylar Width; Bigonial Diameter

INTRODUCTION

Anthropometry is an advanced branch in the research field which helps to know the morphological variations and asymmetry of a bone. Anthropometric study helps us to know the developmental and functional changes in the human skeleton during its development from fetal to adult size.

The main objectives of human as well as primate skulls are studied by means of exact measurements. This helps us in determining the differences between racial groups, character, and relationship of the individuals.

The human mandible has always been a difficult bone to sex confidently by merely looking at the usual morphological features such as size, weight, and prominence of muscular markings as they show the least sexual dimorphism.

Variability in the techniques and landmarks used by previous workers necessitated the detailed study on mandible with the above aim in the present study.


AIMS AND OBJECTIVES

The objectives of this study were as follows:

1. Determination of sex
2. Identification of individual for medicolegal purpose
3. Craniofacial reconstructions.

MATERIALS AND METHODS

The mandibles and instruments required for this research were used from the dissection hall, Department of Anatomy, Jawaharlal Medical College, Sawangi (m), Wardha. All mandibles used for this study were of adults >20 years of age and without resorption of alveolar margin. The fractured, fragmented bones were discarded and only the complete and intact mandibles were used for the measurements. A total of 140 cadaver mandibles of Wardha zone were studied. 100 were from men and 40 from female. Technique of taking mandibular measurements:

Access this article online	
Website: http://www.ijmsph.com	Quick Response code
DOI: 10.5455/ijmsph.2019.1030410032019	

International Journal of Medical Science and Public Health Online 2019. © 2019 Richa Singh. This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material for any purpose, even commercially, provided the original work is properly cited and states its license.

The technique of taking mandibular measurements and landmarks on the bone was studied and then taken from the textbooks on practical anthropometry by various authors. [3,8,10,11] The measurements were taken with the help of an osteometric board, tape, sliding compass, Vernier caliper, spreading caliper, goniometer, and measuring scale. The thread was used for measuring the mandibular arc (half). The bony points were first localized, and then, the measurements were taken. The measurements were repeated twice on two separate occasions and the mean is taken to get accurate results and then recorded. A straight distance between two bony points was measured.

1. Bicondylar width (A)

The bicondylar width was measured between the maximum distances on the lateral surfaces of the mandibular condyles. This was taken in any direction.

2. Bigonial diameter (B)

The maximum diameter externally on the angles of the jaw (gonion) in any direction was measured.

3. Mandibular symphyseal height (C)

This was measured from the infradentate to the lowest median point on the jaw in the symphyseal plane, this plane being determined by anatomical appreciation.

4. Height of the left ramus (or the projecting length of the left ramus) (D)

This was measured straight distance from the tip of the left condyle to the left gonion.

As per method, the demarking point was obtained by calculated range which was worked out by adding and subtracting ± 3.5 standard deviation (S.D) to the mean value of each parameter.^[10]

RESULTS

It is shown from Table 1 that the mean bicondylar width of male mandibles is 113.69 mm and that of female is 102.38 mm. There is quite an overlap between male and female values. The calculated range for male (mean ± 3 S.D.) is 100.64–126.74 mm and females 89.72–115.04 mm. On the basis of demarking points (D.P.), 33% of male and 32.5% of female mandibles could be accurately sexed. Hence, these parameters are of some value for sexual discrimination of human mandibles.

It is shown from Table 2 that the mean bigonial diameter of male mandibles is 97.50 mm and that of female mandibles is 84.20 mm. There is quite an overlap between male and female values. The calculated range for male (mean ± 3 S.D.) is being 79.62–115.38 mm and female 69.59–98.81 mm. On the basis of D.P., 43% of male and 17.5% of female mandibles could be accurately sexed. Hence, this parameter is of some value for sexual demarcation.

It is shown from Table 3 that the mean symphyseal height of male mandibles is 30.62 mm and that of female mandibles

is 20.17 mm. There is quite an overlap between male and female values. The calculated range for male (mean ± 3 S.D.) is being 20.66–40.58 mm and female 10.18–30.16 mm. On the basis of D.P., 47% of male and 65% of female mandibles could be accurately sexed. Hence, this parameter is of some value for sexual demarcation.

Left ramus: It is shown from Table 4 that the mean height of the left ramus of male mandible is 62.49 mm and that of female mandible is 50.42 mm. There is quite an overlap between male and female values. The calculated range for male (Mean ± 3 S.D) is being 48.03–76.95 mm and female 40.13–60.71 mm. On the basis of D.P., 64% of male and 10% of female mandibles could be accurately sexed. Hence, this parameter is of some value for sexual demarcation.

DISCUSSION

A total of 140 unknown mandibles were differentiated on the basis of the appearance of muscular markings, size of mandible, eversion and inversion of gonial angles, and

Table 1: The statistical analysis of bicondylar width of mandible

Detailed measurements	Male	Female
Number of bones	100	40
Range (mm)	101–122	94–111
Mean (mm)	113.69	102.38
SD.	4.35	4.22
I.P.	>111	<101
% of identified bone	70	32.5
Calculated range	100.64	89.72
Mean ± 3 S.D. (mm)	126.74	115.04
D.P.	>115.04	<100.64
% beyond D.P.	33	32.5

D.P.: Demarking points, I.P.: Identification points, S.D.: Standard deviation

Table 2: The statistical analysis of bigonial diameter

Detailed measurements	Male	Female
Number of bones	100	40
Range (mm)	85–116	74–99
Mean (mm)	97.50	84.20
S.D	5.96	4.87
I.P.	>99	<85
% of identified bone	33	50
Calculated range	79.62	69.59
Mean ± 3 S.D. (mm)	115.38	98.81
D.P.	>98.81	<79.62
% beyond D.P.	43	17.5

D.P.: Demarking points, I.P.: Identification points, S.D.: Standard deviation

Table 3: The statistical analysis of mandibular symphyseal height

Detailed measurements	Male	Female
Number of bones	100	40
Range (mm)	21–37	16–28
Mean (mm)	30.62	20.17
S.D.	3.32	3.33
I.P.	>28	<21
% of identified bone	78	62.5
Calculated range	20.66	10.18
Mean±3 S.D. (mm)	40.58	30.16
D.P.	>30.16	<20.66
% beyond D.P.	47	65s

D.P.: Demarking points, I.P.: Identification points, S.D.: Standard deviation

Table 4: The statistical analysis of height of the left ramus (or the projecting length of the left ramus)

Detailed measurements	Male	Female
Number of bones	100	40
Range (mm)	48–70	45–61
Mean (mm)	62.49	50.42
S.D.	4.82	3.43
I.D.	>61	<48
% of identified bone	55	10
Calculated range	48.03	40.13
Mean+3 S.D. (mm)	76.95	60.71
D.P.	>60.71	<48.03
% beyond D.P.	64	10

D.P.: Demarking points, I.P.: Identification points, S.D.: Standard deviation

presence and absence of ramal flexure on the posterior border of the ramus of mandible at occlusal plane.

For medicolegal purpose, in determination of sex, 100% accuracy is required. Maximum and minimum limits of parameters values determined on the basis of ± 3.5 S.D. which are named D.P.

There is considerable overlap between male and female values of a particular measurement, so difficulty arises in discriminating them on that measurement basis. The maximum and minimum measurements in this overlapping zone have been named as identification points.^[2,7] The calculated range for 100% accuracy is measured by mean ± 3.5 S.D.

CONCLUSION

Bicondylar width, bigonial diameter, symphyseal height, and height of left ramus are important in sexual diameter. These data can be used in maxillofacial surgeries, reconstructive surgery of mandible, and plastic surgery of face.

ACKNOWLEDGMENT

The author wishes to acknowledge Dr. V. K. Chimurkar for his constant moral support and encouragement throughout the work.

REFERENCES

1. Alling CC. Mandibular prognathism. *Oral Surg* 1961;14 Suppl:3-22.
2. Anagnostopoulou S, Venieratos D. Quantitative method for the classification of human mandibular condyles. *Acta Anat (Basel)* 1986;127:201-4.
3. Ashley MF. A study of man embracing errors. *Technol Rev* 1947;49:345-62.
4. Atasever N, Enacar A, Başar R, Uzel I. The study of the relationship between the face type and condyle morphology (a cephalometric and anthropometric study). *Turk Ortodonti Derg* 1990;3:24-31.
5. Bapna N, Mehta L, Harneja NK. Metrical features of mandible in Rajasthan zone. *J Anat Soc India* 1977;26:108-10.
6. Caldwell JB, Letterman GS. Vertical osteotomy in the mandibular rami for correlation of prognathism. *J Oral Surg* 1954;12:185.
7. Furuta Y, Sakurada M, Fukuda K, Koizumi A. Morphological studies on Indian mandibles 3: Exterior of the mandibular ramus and interior of the mandibular ramus. *Shigaku* 1983;70:887-907.
8. Hardlicka A. In: Stewart TD, editor. *Practical Anthropometry*. 2nd and 3rd ed. Philadelphia, PA: Wistar Institute; 1947.
9. Hill CA. Technical note: Evaluating mandibular ramus flexure as a morphological indicator of sex. *Am J Phys Anthropol* 2000;111:573-7.
10. Inderjit. The house of skeleton case. *J Anat Soc India* 1979;23:3.
11. Morant GM, Adyanthaya NK. A biometric study of human mandible. *Biometrika* 1936;28:84-112.

How to cite this article: Singh R. The study of anthropology of human mandibles in Wardha region. *Int J Med Sci Public Health* 2019;8(5):352-354.

Source of Support: Nil, **Conflict of Interest:** None declared.