

Original Research

A Morphometric Study On Human Mandibular Ramus

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Abstract

Background: The mandibular ramus is quadrilateral and has two surfaces (lateral and medial), four borders (superior, inferior, anterior, and posterior), and two processes (coronoid and condylar). The lateral surface is relatively featureless and bears the (external) oblique ridge in its lower part

Objectives: To determine the dimension of Ramus.

Material and Methods: 200 dried human mandibles of unknown sexes are taken—the height of the ramus (from base to mandibular notch), the height of condyle from the base of the ramus, and the breadth of the ramus.

Results: The length of the ramus from base to ramus notch was 47.93 on the left side and 48.62 on the right side, and The Breadth of the Ramus was 35.17 and 36.19 on the left and right side. The Height of the condyle 57.93 and 58.62 were left and right side

Keywords: mandibular ramus, mandible, condylar height, mandibular symmetry

Introduction

The mandibular ramus is quadrilateral and has two surfaces (lateral and medial), four borders (superior, inferior, anterior, and posterior), and two processes (coronoid and condylar). The lateral surface is relatively featureless and bears the (external) oblique ridge in its lower part. The mandibular foramen, through which the inferior alveolar neurovascular bundle passes to access the mandibular canal is sited midway between the anterior and posterior borders of the ramus about level with the occlusal surfaces of the teeth. Anteromedially overlaps it by a thin, sharp, triangular spine, the lingula, to which the sphenomandibular ligament is attached. It is also the landmark for an inferior alveolar local anesthetic block injection. Below and behind the foramen, the mylohyoid groove runs obliquely downwards and forwards. The inferior border is continuous with the mandibular base and meets the posterior border at the angle, which is typically everted in males but frequently inverted in females. The thin superior border bounds the mandibular incisure which is surmounted in front by the somewhat triangular, flat coronoid process and behind by the condylar process. The thick, rounded posterior border extends from the condyle to the angle and is gently convex backward above and concave below. The anterior border is thin above, where it is continuous with the edge of the coronoid process, and thicker below, where it is continuous with the external oblique line^{1,2}.

Material and Methods

Study Population

The study was carried out on 200 dry adult complete human mandibles with unknown genders collected from Anatomy—Department of Index Medical College Indore from May 2022 to August 2022.

Method

The different parameters of each mandible were measured with the help of a digital vernier caliper all measurements were taken in mm (millimeters).

Measurements to be determined are as follows-

1. The Length of the Ramus. From Base to Ramus Notch (BN).
2. The Breadth of the Ramus. From Anterior to the posterior Border (AP)
3. The Height of the condyle. From the Base of the Ramus to condyle height (BH).

Inclusion criteria: Complete unbreakable mandibles.

Exclusion criteria: Broken mandibles.

Statistical Analysis: Statistical analysis was performed by using computer-based software, Statistical Package for Social Science (SPSS). Mean values of parameters were compared to determine.

Result

The BN Measurement of the left side right is given below in Table No. 1

Group Statistics					
Side	Mean	Std. Deviation	Std. Error Mean	P -Value	T- Value
Left	47.93	6.02	.42	1.000	1.145
Right	48.62	6.02	.42		

Table no. 1 shows the BN Measurement. of the left side right, which was 47.93 ± 6.02 and 48.62 ± 6.02 with a P value of 1.00 and T value of 1.145.

The AP Measurement of the left side and right is given below in Table No. 2

Group Statistics					
Side	Mean	Std. Deviation	Std. Error Mean	P -Value	T- Value
Left	35.17	2.45	.17	1.00	1.145
Right	36.19	2.50	.17		

Table no 2 shows the AP Measurement of the left side and right, which was 35.17 ± 2.45 and 36.19 ± 2.50 with a P-value of 1.00 and T value of 1.145.

The BH Measurement of the left side and right is given below in Table No. 3

Group Statistics					
Side	Mean	Std. Deviation	Std. Error Mean	P -Value	T- Value
Left	57.93	6.02	.45	.988	.507
Right	58.62	6.01	.46		

Table no 3 shows the BH Measurement of the left side and right, which was 57.93 ± 6.02 and 58.62 ± 6.01 with a P value of 0.988 and t Value of 0.507.



Fig No.1 shows the distance between the base of the mandible to the mandible notch.



Fig. 2 Shows the distance between the anterior and posterior borders of the mandible.



Fig No. 3 shows the distance between the base of the mandible to the condylar process.

Discussion

The Length of the Ramus from Base to the Ramus notch

In our present study, we observed that The Length of the Ramus from Base to the Ramus notch of the right, which was 47.93 ± 6.02 and 48.62 ± 6.02 with P value 1.00 and T value 1.145 while comparing our study with **M. Punarjeevan Kumar & S. Lokandham 4**, studied 80 mandibles and observed that the mean height of ramus was 62.92 ± 5.30 mm which is slightly high compared with our study. Another study of **MD Mesnahul Hoque et al 5**. studied 85 dry mandibles and found that the height of ramus from its base to notch was 64.22 ± 5.77 mm and 64.05 ± 5.92 mm on the right and left side, respectively, **Anupam Datta et al 5**. studied 50 mandibles with known sex and observed that the height of the ramus of male mandible varies from 63.74 to 77.86 mm with an average of 67.98 ± 4.40 and that of female mandible varies from 41.72 to 64.64 mm with an average of 55.72 ± 5.33 mm. The proportion of the female is quite similar to our study.

While comparing our study with Dr. Deepak N Kawale et al 6. studied 100 mandibles with known sex, i.e., 50 male and 50 female and observed that the height of ramus in male had mean 60.06 ± 5.24 mm and 50.08 ± 3.87 mm in female mandibles Which is not similar with our study. Another study of **Nagaraj. S et al 7**. conducted a study on 80 mandibles with unknown sex, and the

observed mean height of ramus was 44.82 ± 4.01 mm which is very less as compared with our investigation.

The Breadth of the Ramus. from anterior to the posterior Border

In our present study, we observed that The Breadth of the Ramus. from the anterior to the posterior Border, the Measurement of the left side and right which was 35.17 ± 2.45 and 36.19 ± 2.50 with a P-value of 1.00 and a T value of 1.145. at the same time, comparing our study with **M. Punarjeevan Kumar & S. Lokandhan**³. Studied 90 mandibles and noticed that the mean width of the ramus was 39.21 ± 3.42 mm, which is similar to our study. Another study of **MD Mesbahu Hoque et al**⁵. studied on 85 dry mandibles and detected that the mean width of ramus was 30.48 ± 2.36 mm on the right side and 30.31 ± 2.32 mm on the left side, which is a little less than our study.

Dr. Deepak N Kawale et al⁶. observed 100 mandibles with known sex mandible and analyzed that the maximum ramus breadth in males had a mean of 38.93 mm, standard deviation of 0.35 mm, standard error of mean of 0.478 mm while in female mean 36.66 mm, standard deviation 0.36 mm, standard error of mean is 0.07233 and the P value is 0.0013 which is similar with our study.

Kasat pat et al⁸. performed a study on 100 mandibles and observed that the mean breadth of the right side ranged from 25 to 30 mm with a mean 37.8 ± 3.83 mm and of left side ranged from 28 to 48 mm with 38.4 ± 3.84 mm having P-value 0.0014 (P-value <0.05) which is similar with our study

The Height of the condyle from base to the ramus to condyle height

In our present study, The Height of the condyle from the base to the ramus to condyle height was observed on the left side and right, which was 57.93 ± 6.02 and 58.62 ± 6.01 with P value 0.988 and t Value of 0.507 while comparing our study with **Dr. Archana Markande et al**⁹. observed 100 orthopantomographs in which 50 were males and 50 were female having the condyle height mean 131.30 ± 9.26 mm which is very high as compared to our study, **M Punarjeevan Kumar et al**^[12]. studied 80 mandibles with unknown sex and notice that the mean height of condyle was recorded 59.37 ± 5.03 mm which is a little less than our study. **Anupam Dutta et al**⁵. observed 50 mandibles with known sex and recorded that the mean height of condyle was 63.74 to 77.86 mm in male and 41.72 to 64.64 mm in the female with P value 0.0001 which is quite similar with our study. **Dr. Deepak N Kawale et al**⁶., studied 100 mandibles having sex known observed that the mean height of condyle in males was having mean 60.06 mm, standard deviation 0.5249 mm and standard error of mean is 0.0749 mm, while in females indicate 50.88 mm which is below than our study. **Nagaraj et al**⁷. studied 80 mandibles and found that the mean height of mandibles was 60.31 mm which is similar to our study. **Md. Mesbuhhoque et al**⁴. observed 85 dry mandibles and found that the distances from the base of the mandible to the highest point of the head of the mandible were 64.22 ± 5.77 mm on the right side and 64.05 ± 5.92 mm on the left side which is similar to our study.

Conclusion

The findings of the present study can be used for preoperative planning and postoperative outcome of maxillofacial, plastic mandible reconstruction and neuro surgeries. Our study also tells the differences in size of mandible in different geographical region.

Reference

1. Datta AK. Essentials of human anatomy (Head and Neck); Edit 5; Current books international, Kolkata, 2009, 158.
2. Standring S. Gray's Anatomy. 39th ed. London: Elsevier Churchill Livingstone, 2005.
3. M. Punarjeevan Kumar^{1,*}, S. Lokanadham² Sex determination & morphometric parameters of human mandible International Journal of Research in Medical Sciences Kumar MP et al. Int J Res Med Sci. 2013 May;1(2):93-96
4. Md. Mesbahul Hoque¹, Shamim Ara², Shahanaz Begum³, A.H.M. Mostafa Kamal⁴, Morphometric Analysis of Dry Adult Human Mandibular Ramus Bangladesh Journal of Anatomy January 2014, Vol. 12, No. 1 pp. 14-16

5. Anupam Datta¹, Santhosh Chandrappa Siddappa^{2,*}, Viswanathan Karibasappa Gowda³, et al A Study of Sex Determination from Human Mandible Using Various Morphometrical Parameters Indian Journal of Forensic and Community Medicine, July - September 2015;2(3):158-166
6. Dr. Deepak N Kawale¹, Dr. Pratima R Kulkarni², Dr. Sukre B Shivaji³, et al Sexual Dimorphism in Human Mandible: A Morphometric Study IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861. Volume 14, Issue 7 Ver. III (July. 2015), PP 42-45
7. Nagaraj. S ^{*1}, Gayatri. N ², Anil. R. Sherke ³. study of mandibular ramus by metric parameter International Journal of Anatomy and Research, Int J Anat Res 2017, Vol 5(1):3358-61. ISSN 2321-4287 DOI: <https://dx.doi.org/10.16965/ijar.2016.476>
8. Kasat Pa ¹ shyamkishore K² Bhuiyan PS³ bhosale YJ⁴ a study of anatomical variation in the dry adult mandible Indian journal of clinical Anatomy and physiology April – june 2017 ;4;(2) 136-146
9. Dr. Archana Markande, Mandibular ramus: An indicator for sex determination – A digital radiographic study Journal of Forensic Dental Sciences / July-December 2012 / Vol 4 / Issue 2