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A morphometric study on human mandibular ramus

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Abstract
Background: Many of dental treatment need location of mandibular canal which is used for anaesthetists in nerve block for any surgical procedures. Dimensions of ramus will help in location of mandibular canal and it also it helps in reconstruction of mandible.
Objectives: To determine the dimension of Ramus.
Material and Methods: 100 dried human mandibles of unknown sexes are taken. Height of ramus (from base to mandibular notch), height of condyle, breadth of ramus.
Results: The mean condylar height from base to condyle was 60.31 ± 4.39 mm. The height of ramus from mandibular base to mandibular notch was 44.47 ± 4.08 mm. The mean breadth between anterior and posterior edge of ramus was 31.24±3 mm.

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

Introduction
Mandible is the strongest bone in the facial skeleton. It is horse shaped. Mandible and maxilla help in mastication and it produces a great force about 150 to 300 pounds [1]. Ramus of Mandible is quadrilateral and has two surface, four borders and two processes. The laterally surface relatively featureless and bears the oblique ridge in its lower parts. The thick round posterior border extends from the condylar to the angle and is genially convex backward above and concave below the anterior bolder is thin above where it is continues with edge of the coronoid process and thicker below where it is continuous with the external oblique line. The temporal crest is a ridge that descended on the medial side of the coronoid process from its tip to the bone just behind the 3 molar teeth. The mandible surface present a little above centre the mandibular foramen through which the inferior alveolar neurovascular bundle passes to gain access to the mandibular canal. Anteriormedially, the mandibular foramen is overlapping by a thin sharp triangular spine the lingual to which the sphenomabdibular ligament is attached and which is also the landmark for an inferior alveolar local anaesthetic block injection. The foramen is situated behind and below the mylohyiod groove which runs obliquely lowered and forward. The inferior border is continuous with the mandibular base where it meets the posterior border at the angle which is typically everted in males whereas in female it is inverted. Ramus process give attachment for major primary muscle of mastication. Masseter is attached to the lateral surface medial, pterygoid is attached to the temporal surface temporalis which is inserted into the coronoid process and lateral pterygoid is attached to the condyle[2].

Material and Methods
Study Population
The study was carried out on 100 dry adult complete human mandibles with unknown gender collected from Anatomy Department of Rama Medical College Manadhana Kanpur over a period of six-month July 2018 to December 2018.

Method
The different parameters of each mandible were measured with the help of digital vernier calliper.
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 condyle. From 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.

Observation and Result
The height of the Ramus was observed as 52.04 mm on the left side and 52.56 mm on the right side. The width of ramus was recorded as 37.62mm on left side and on right side it was 37.36 mm. The height of condyle from the base of the ramus was observed as 67.15 mm on the left side and on right side it was 67.11 mm.

Table 1: Descriptive statistics of height of the ramus from base to mandibular notch

Left ramus height			Right ramus height		
Mean	Std deviation	Std. Error Mean	Mean	Std deviation	Std. Error Mean
52.40 mm	8.6 mm	1.5 mm	52.56 mm	9.03 mm	1.6 mm

Table 2: Descriptive statistics of Width of Ramus from anterior border to the posterior border

Left ramus width			Right ramus width		
Mean	Std deviation	Std. Error Mean	Mean	Std deviation	Std. Error Mean
37.62 mm	8.24 mm	1.5 mm	37.38 mm	8.17mm	1.49 mm

Table 3: Descriptive statistics of Condyle height from base

Left Condyle height			Right Condyle height		
Mean	Std deviation	Std. Error Mean	Mean	Std deviation	Std. Error Mean
67.15 mm	9.2 mm	1.69 mm	67.11 mm	9.33 mm	1.7 mm

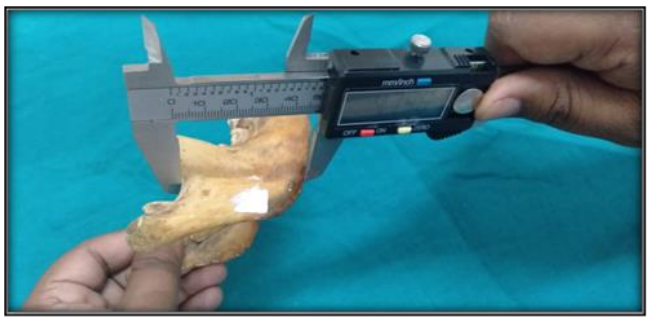

Fig 1: Showing measurement of Height of Ramus

Fig 2: Showing measurement of Width of Ramus

Fig 3: Showing measurement of condyle height form its base

Discussion

Mandible is the very important bone in the facial skeleton. It forms temporomandibular joint which is very important for chewing speaking and others. The present study was done on Kanpur region populations and it was compared with other studies. In present study, the mean height of the ramus from base to mandibular notch is 52.40 mm on the left side and 52.56 mm on the right side. The values of our finding was very less while comparing with M. Punarjeevan Kumar *et al*[3] studying in Andhra Pradesh population, MD Mesnahula *et al.* [4] on Banglasesh population & Anupam Date *et al*[5] worked on South Indian population with known sex. Dr Deepak N kawale *et al.* [6] study on Aurangabad population with known sex of mandibles. But when we comparing our study with Nagaranj S. *et al.* [7] conducted study on Telangana population & Kerosa *et al.* [8]. In Northern Croatia the height was less as compared to our study.

Table 4: Comparative study on Height of the ramus from base to mandibular notch with their population area.

S.N.	Author	Number of mandibles	Population Area	Height of the ramus from base to mandibular notch
1.	M. punarjeevan kumar[3]	80	Andhara Pradesh	62.92±5.30 mm
2.	MD Mesnahula *et al*[4]	85	Banglasesh population	64.22±5.77 mm right and 64.05±5.92 mm left side
3.	Anupam date *et al*[5]	50	South Indian population	67.98±4.40 mm male and 55.72±5.33 mm female
4.	Deepak N kawale *et al*[6]	100	Aurangabad	60.06±5.24 mm male and 50.08±3.87 mm in female
5.	Nagaranj S. *et al*[7]	81	Telangana	44.47 mm
6.	Keros *et al* [8]	100	Northern Croatia	44.79 mm
7.	Present study	100	Kanpur population	52.40 mm left side and 52.56 mm right

Breadth of the Ramus

In this study we found that the mean breadth of ramus from anterior border to posterior was 37.62 mm on the left side and 37.36 mm on the right side while comparing our study with M Punarjeevan Kumar *et al.* [3] studied on Andhra Pradesh population. Dr Deepak N Kawale *et al.* [6] work on Aurangabad population Kasat pat *et al.* [9] performed a study in Mumbai population findings were similar while comparing with MD Mesbahul Hoque *et al.* [4]. Studied in Bangladesh population & Nagaranj S. *et al.* [7] conducted study on Telangana population. Reported less value as compare with our study

Table 5: Comparative study on breath of ramus from anterior border to posterior with their population area.

S.N.	Author	Number of mandibles	Population Area	breath of ramus from anterior border to posterior
1.	M. punarjeevan kumar[3]	80	AndhraPradesh	39.21±3.24 mm
2.	Dr Deepak N Kawale *et al* [6]	100	Aurangabad population	38.93 mm, in male and 36.66 in female mm.
3.	Kasat pat *et al*[9]	100	Mumbai	37.8±3.83 mm of right side and on left side r 38.4±3.84 mm
4.	MD Mesbahu Hoque *et al*[4]	85	Bangladesh	30.48±2.36 mm in right side and 30.31±2.32 mm. on left side
5	Nagaraj. S *et al* [7]	80	Telangana	31.24mm.
6.	Present study	100	Kanpur population	37.62 mm left side and 37.36 mm right

Height of condyle

In present study we found that the mean height of condyle from the base to the highest point in condyle was 67.15 mm on the left side and 67.11 mm on the right side. Our values were similar with Md. Mesbhul hoque *et al.* [4] & Anupam Dutta *et al*[5] but our values were high as compare to M Punarjeevan Kumar *et al.* [3] & Nagaraj *et al.* [7] however study conducted by Archana Markande *et al.* [9] found excessive value as compare to our study.

Table 6: Comparative study of height of condyle from the base to the highest point in condyle with our population area

S.N.	Author	Number of mandibles	Population Area	height of condyle from the base to the highest point in condyle
1.	Md. Mesbhulhoque *et al*. [4]	85	Bangladesh	64.22±5.77 mm on the right side and 64.05±5.92 mm on the left
2.	Anupam Dutta *et al*. [5]	50	South Indian population	63.74 to 77.86 mm in male and 41.72 to 64.64 mm in the female
3.	M Punarjeevan Kumar *et al*. [3]	80	Andhra Pradesh	59.37±5.03 mm
4.	Nagaraj *et al*. [7]	80	Telangana	60.31 mm
5	Dr. Archana Markande *et al*. [9]	100 orthopantomographs		131.30±9.26 mm
6.	Present study	100	Kanpur population	67.15 mm on the left and 67.11 mm on the right

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.

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