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Morphometric Study of the Horizontal and Diagonal Length of the Human Mandible

*Ahmed M[1], Akter M[2], Haque SMA[3], Jewel AA[4]

Abstract

The body of the human mandible has upper and lower borders. The lower border is smooth and called the base of mandible. The ramus has four borders, among them the inferior border is continuous with the base and ends with posterior border of ramus making the angle of the mandible. The cross-sectional, descriptive study was conducted in the Department of Anatomy, Mymensingh Medical College, Bangladesh, between July 2019 to June 2020, to determine the horizontal length and diagonal length of the human mandible. This study was done on 150 fully ossified dry mandibles. A non-random purposive sampling technique was adopted. The diagonal length was measured at the base of mandible from a point on symphysis menti to the posterior most point at mandibular angle, while the horizontal length was measured from the anterior margin of chin to a center point on a projected straight line along the posterior border of two mandibular angle. The mean (±SD) horizontal length of mandible was found 70.87 (±6.2) mm. The mean (±SD) diagonal length of at the right side of the mandible was found 81.90 (±5.3) mm and on the left side, it was 79.72 (±5.1) mm. This study will help the dental and maxillofacial surgeons in their field of practice. Forensic anthropology and prosthesis manufacturer will also be benefited from the study.

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Keywords: Human mandible, horizontal length, diagonal length, mandibular angle, chin

Introduction

The mandible consists of a horizontal u-shaped body and a pair of nearly vertical rami which are continuous at the body's posterior ends. Upper and lower border of the body separates the external and internal surfaces. Anteriorly the upper part of external surface has a faint median ridge called symphysis menti. The upper border contains alveoli for roots of teeth. The lower border or base, extends posterolaterally from lower end of symphysis into that of the ramus behind the third molar tooth. The mandibular ramus is quadrangular having two surfaces, two processes and four borders. The inferior border of the ramus that is continuous with the base, meets the posterior border of the ramus at mandibular angle.[1]

The mandible is considered suitable for study as it is the most durable bone of the facial skeleton and retains its shape better than other bones. The knowledge about the anatomy of mandible will help orthopedic surgeons, medicolegal authorities and anthropologists to give correct interpretation for the diagnostic procedure in living.[2] The present study aims to determine the horizontal length and diagonal length of the human mandible and make our data available for further studies and help clinicians in their practice.

1. *Dr. Muntasir Ahmed, Associate Professor (c.c), Department of Anatomy, Netrokona Medical College, Netrokona.
2. Dr. Mahfuza Akter, Assistant Professor (c.c), Department of Radiology and Imaging, Sheikh Hasina Medical College, Jamalpur.
3. Dr. Shah Md. Atiqul Haque, Assistant Professor (c.c), Department of Anatomy, Mymensingh Medical College, Mymensingh.
4. Dr. Abdul Alim Jewel, Resident, MS Anatomy, Department of Anatomy, BSMMU, Dhaka.

Address of Correspondence:
Email: pololdoc2014@gmail.com

Methods

The cross-sectional, descriptive study was performed in the Department of Anatomy, Mymensingh Medical College, Mymensingh, Bangladesh, between July 2019 to June 2020. Samples were collected from Department of Anatomy, Mymensingh Medical College and Community Based Medical College, Bangladesh (CBMC,B), Mymensingh, Bangladesh. A total of one hundred and fifty fully ossified dry human mandibles were collected by non-random purposive sampling technique. Unossified, broken and abnormal bones are excluded. The diagonal length of mandibular body was measured as the distance on the base of the mandible from anterior most point of lower end of the symphysis menti to the posterior most point of the angle of mandible (Fig. 1). The horizontal length or mandibular length was determined as the distance taken from the anterior point of lower border of chin to a point on a line joining the two mandibular angles (Fig. 2). A digital Vernier slide calipers and a measuring scale were used for those measurements. Diagonal length of mandibular body was measured by vernier calipers on the base of the mandible from anterior most point of lower end of symphysis menti to the posterior most point of the angle of the mandible on both sides and was expressed in mm. Horizontal length of mandible was measured by placing two measuring scales; one touching the two angles of mandible, another scale measuring this length from anterior most point of lower part of symphysis menti to the midpoint of first scale at right angle and was expressed in mm. The mean values and standard deviation were calculated for each variable in Statistical Package for the Social Sciences (SPSS) version 22.0 for the windows. The values were presented in a tabulated form and their frequency distribution was displayed in histogram. The study was approved by the Ethical Review Committee of Mymensingh Medical College, Mymensingh, Bangladesh.

Fig. 1: Measurement of the diagonal length of the human mandible

Fig. 2: Measurement of the horizontal length of the human mandible

Results

In the present study, the horizontal length of the human mandible ranged between 51.5 mm and 87.1 mm with a mean length of 70.87±6.2 mm. More than 80% samples were measured within the range of 62.50 mm and 77.50 mm (Table-I, Fig. 3). The diagonal length of the human mandible on right side ranged between 61.4 mm and 97.5 mm with a mean of 81.90±5.3 mm. More than 86% samples were measured within

the range of 75 mm and 90 mm (Table-I, Fig. 4), while the diagonal length on left side ranged between 57.9 mm and 92.2 mm with a mean of 79.72±5.1 mm. More than 86% respondents were measured within the range of 72.50 mm and 87.50 mm. (Table-I, Fig. 5).

Table-I: Horizontal length and diagonal length of the human mandible (n=150)

Variables		Range (mm)		Mean (mm)	SD (mm)
		Minimum	Maximum		
Horizontal length		51.5	87.1	70.87	6.2
Diagonal length	Right	61.4	97.5	81.90	5.3
	Left	57.9	92.2	79.72	5.1

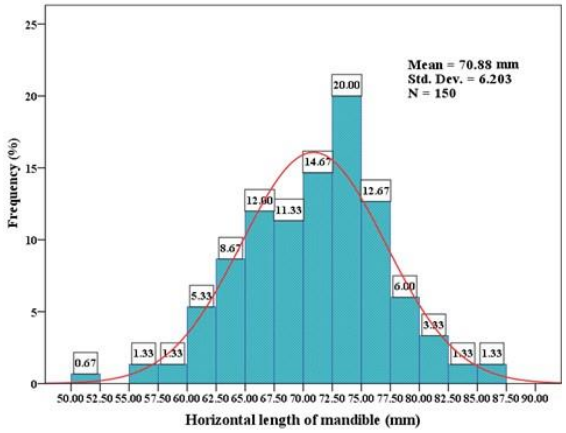

Fig. 3: Frequency distribution of the horizontal length of the mandible

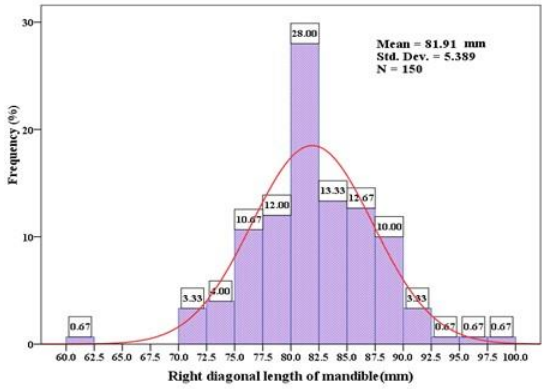

Fig. 4: Frequency distribution of the diagonal length of the mandible (right side)

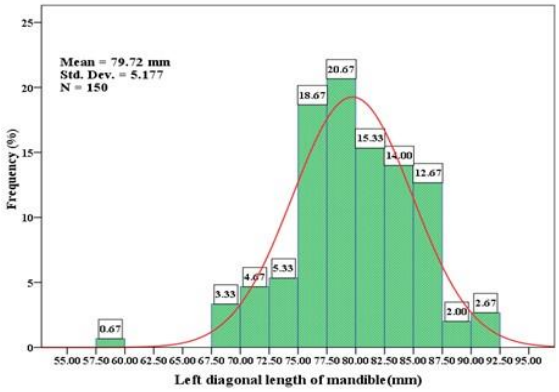

Fig. 5: Frequency distribution of the diagonal length of the mandible (left side)

Discussion

In the present study, the mean horizontal length of the mandible was found 70.87±6.2 mm. Kumar & Lokanadham[3] found higher length (75.31±4.83 mm) than present study. This is also true for Santini & Alayan[4], which was done on three different populations and all values ranged from 94 mm to 98 mm. Kujur *et al*.[2] and Sharma *et al*.[5] classified this measurement as male and female that were nearly similar to the present findings. However, Yuvashree & Thenmozhi6, Vinay, Mangala Gowri & Anbalagan[7] and Datta *et al*.[8] also grouped this length in male and female and each of the findings were higher than the mean value of the present study.

In the present study, the mean diagonal length of the mandible on right side was observed 81.90±5.3 mm, while on the left side, it was 79.72±5.1 mm. Kujur *et al.*[2] & Sharma *et al.*[5] classified this measurement as male and female that were nearly similar to the present findings. However, Datta *et al.*[8] found the measurement significantly lower than that of the present study.

Conclusion

We showed a modest effort to determine the

horizontal and diagonal lengths of the human mandible in our country. The results may help dentistry professionals like orthodontics and maxillofacial surgeons in management of fractures, imperfect dentation, malignancies etc. Prosthesis making is another field where these data will help. However, large-scale, multi-centre studies are warranted to increase the information pool.

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