

Measurement of the Mandibular Angle in Dry Adult Human Mandible in a Bangladeshi population

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Abstract

The angle of the mandible is a bony prominence situated between the ramus and the body of the mandible, and is formed by the junction of the horizontal and vertical planes of the mandible. It is an important structure in the head neck region that is often used as a reference point for various surgical procedure. A cross-sectional, descriptive study was done in the Department of Anatomy, Mymensingh Medical College, Bangladesh, between July 2019 to June 2020, to measure various mandibular angles. A non-random purposive sampling technique was adopted. A total of 150 fully ossified dry human mandibles were collected. The mandibular angle is formed by the line tangent to the lower border of mandible and the line tangent to the distal border of ascending ramus and the condyles. The angle was recorded by goniometer. One arm of a transparent goniometer was placed along the base of mandible and other arm on the line touching the posterior most point on condyles and posterior border of ramus on both sides. The mean±SD angle of the mandible on right side was 125.56°±6.5° and on the left side was 125.69° ±6.5°. The mandibular angle on the both sides ranged between 110° and 142°. The observations of this study have a greater impact on reconstructive surgeries of angle of mandible like augmentation or reduction, fracture fixation as well as forensic odontology.

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Introduction

Mandible is the largest bone of face that forms the inferior part of facial skeleton which helps in chewing, speech and facial expression. It consists of a curved, horizontal body and two perpendicular rami, which unite with the end of the body.¹ The mandibular body have upper and lower border. The lower border or base extends posterior-laterally from symphysis into that of ramus behind the third molar tooth. The mandibular ramus is quadrilateral having two surface and four borders. Among them, the inferior border is continuous with the base and meets the posterior border of ramus forming the mandibular angle or gonial angle.² Mandibular angle fracture denotes the highest percentage of mandibular fracture that occur in motor vehicle collisions and assaults. The causes are thinner cross-sectional area and presence of third molar tooth that weakens that region.³ There are also need for mandibular angle resection in reconstructive surgeries like one stage long curved osteotomy and lateral cortex osteotomy by intraoral or retro auricular approach.⁴ The gonial angle can also be used in forensic odontology and for the assessment of facial

symmetry and if present, correction by mandibular angle augmentation or reduction operations. Moreover, there might be racial variation comparing to the findings of the studies done in different western as well as afro-asian regions. However, we lack anthropological or anatomical research on mandibles of humans in our country. Therefore, we proposed this study to measure the mandibular angle in a Bangladeshi population.

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Methods

This cross-sectional, descriptive study was conducted between July 2019 and June 2020 in the Department of Anatomy, Mymensingh Medical College, Mymensingh, Bangladesh. Finally, a total of one hundred and fifty fully ossified dry human mandibles were collected by non-random purposive sampling technique after discarding unossified, broken and abnormal bones.

The mandibular angle is formed by the line tangent to the lower border of mandible and the line tangent to the distal border of ascending ramus and the condyles. The angle was recorded by goniometer. One arm of a transparent goniometer was placed along the base of mandible and other arm on the line touching the posterior most point on condyles and posterior border of ramus on both sides (Fig. 1). The mandibular angle was measured in degrees. The mean value was calculated after taking all the readings.



Fig. 1: Measurement of the angle of the mandible

Following data collection, data input was done. The collected data was assessed for completeness, accuracy, and consistency before analysis. Statistical analysis was carried out using Statistical Package for Social Sciences (SPSS) version 22.0 for windows.

Continuous variables were expressed as mean and standard deviation (SD). The data were presented in tables, graphs and figures. Ethical clearance was obtained from the Institutional Review Board (IRB) of Mymensingh Medical College, Mymensingh, Bangladesh (Memo No. MMC/IRB/2019/206).

Results

In our study, the angle of the mandible on the right side had a mean of $125.56^{\circ} \pm 6.5^{\circ}$. The mandibular angle on the right side ranged between 110° and 142° . More than 79% samples were measured within the range of 117° to 135° (Table-I, Fig. 2). Similarly, the angle of the mandible on the left side had a mean of $125.69^{\circ} \pm 6.5^{\circ}$. The mandibular angle on the left side ranged between 110° and 142° . More than 77% samples were measured within the range of 119° to 135° (Table-I, Fig. 3).

Table-I: Measurement of the angle of the mandible (n=150)

Side	Range		Mean±SD
	Minimum	Maximum	
Right	110°	142°	$125.56^{\circ} \pm 6.5^{\circ}$
Left	110°	142°	$125.69^{\circ} \pm 6.5^{\circ}$

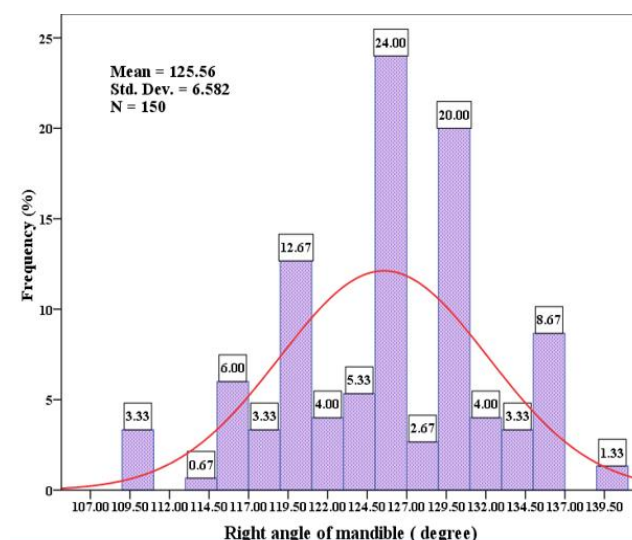


Fig. 2: Frequency distribution of the right mandibular angle (n=150)

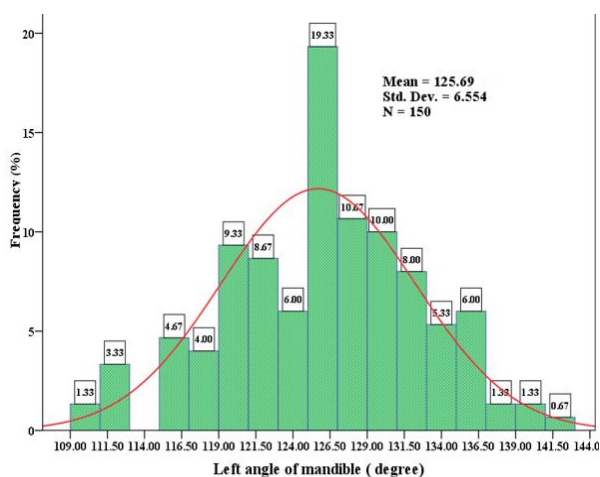


Fig. 3: Frequency distribution of the left mandibular angle (n=150)

Discussion

In this study, the mean angle of the mandible on right side was $125.56^{\circ} \pm 6.5^{\circ}$ and on the left side the mean was $125.69^{\circ} \pm 6.5^{\circ}$. Casey *et al.*⁵ found the mean angle 126.3° , which is near to the present findings. Ennes & Medeiros⁶ observed similar measurement of the mandibular angle (125°). However, Shalini *et al.*⁷ found a much lower value (117°) for the mandibular angle. The findings reported by Kumar & Lokanadham⁸ and Oguz & Bozkir⁹ were 122.55° and 120.2° respectively; those measurements are also lower than that of our study. In contrast, Kujur *et al.*¹⁰ and Datta *et al.*¹¹ found strikingly higher values (135.42°) in females. Sharma *et al.*¹² and Vinay & Gowri¹³ noted gender difference in mandibular angle (male:female= 124° : 121°); those values are lower than that of our study. Mobin & Vathsalya¹⁴ observed the mandibular angle 130° in both male and female, which is much higher than our finding. Surprisingly, the lowest measurement of the mandibular angle was observed by Sreelekha *et al.*¹⁵, as they found 106° in male group.

Conclusion

Our data suggests that the mean angle of the mandible on right side was $125.56^{\circ} \pm 6.5^{\circ}$ and on the left side the mean was $125.69^{\circ} \pm 6.5^{\circ}$. Measurement of mandibular angle bears a great importance in respect of age, sex and race. The resulting data can be used in various forms of reconstructive surgeries or forensic odontology. It can also be used in evaluation and treatment of facial fractures, and assessment of facial asymmetry.

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