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ORIGINAL RESEARCH

To study the variations of Various parameters of the mandible

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ABSTRACT

Background: Mandible is the strongest bone in the face region required for the process of mastication. The inferior alveolar nerve travels inside the bone in the mandibular canal to supply the lower teeth. The measurement of various parameters of mandible allows the proper localization of nerve for anaesthetic block. Also, the ratios between factors assists during surgeries.

Aim and objective: To study the variations of Various parameters of the mandible.

Material and method: The study was conducted on 122 adult dry human mandibles in the Department of Anatomy, Index Medical College Hospital & Research Centre, Indore. The different Parameters was measured using vernier callipers.

Results: The gonial angle of the male mandible was between 116° and 141° with an average of 126.41°. The average gonial angle of the female mandible is 137.5 °. The mandibular angle was less than 162 °in men and > 110 °in women.The maximum angle of the mandible was 134 °, which was correctly estimated in 84 % of men and 67 % of women.The mean mandibular angle values for men and women were significantly different ($p < 0.001$) for the mandible.

Conclusion: Male mandible shows triangular type commonly. Among the various types of coronoid processes, triangular process is the most prevalent.

Keywords: Mandible, ramus, lingula

INTRODUCTION

The mandible is the largest,strongest bone in the face. It has a horizontally curved body that is convex forwards, and two broad rami that ascend posteriorly. The rami bear the coronoid and condyloid processes [1] . The lingula is the tongue shaped bony prominence which overlies the mandibular foramen which leads to the mandibularchannel. This channel goes from the ramus to the body, below the alveoli. Since the inferior alveolar nerve enters the mandibular foramen to supply the structures of the lower jaw, the relationship of lingula to the inferior alveolar nerve is of clinical significance to dental surgeons. While performing mandibular osteotomy it is imperative that these vital structures should not be injured. It becomes a necessity to know the morphology of lingula so as to preserve the important structures during surgical interference of mandible around the lingula region.

Mental foramen is situated on the anterolateral aspect of the body of mandible. It gives path to mental nerve and vessels. Variations of the mental foramen are encountered ranging from difference in shape and positions to presence of accessory foramen or even complete absence in some cases. Knowledge of its position, shape, and size is important for performing anesthetic block prior to clinical procedures in lower anterior teeth and to preserve integrity of the mental nerve trunk in surgical interventions [2]. It is the only movable bone present in the skull, mandible provide sockets for the teeth, that are present horizontally on both halves of the mandible [3.4]The knowledge of these parameters is important for various fields such as forensic science, orthodontics, and maxillofacial surgery. In forensic science, the morphologic and morphometric parameters of the mandible can be used to establish the identity of an individual9.In orthodontics, the knowledge of the morphologic and morphometric parameters of the mandible is important for the diagnosis and treatment of various dental and skeletal malocclusions [5].

The mandible is a unique bone with a variety of morphologic and morphometric parameters that differ

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among individuals based on their age, gender, and ethnicity. The morphologic features of the mandible such as shape, size, and position are essential for its proper functioning. The morphometric parameters such as the angle of the mandible, ramus height, and body length are also critical in understanding the variations in the mandible among different populations. The knowledge of these parameters is important for various fields such as forensic science, orthodontics, and maxillofacial surgery. In forensic science, the morphologic and morphometric parameters of the mandible can be used to establish the identity of an individual [6] Earlier studies described lingual characteristics depending on its location [7], Triangular shaped lingulae have been described as the most prevalent type by various leading authors6 . Different textbooks illustrate truncated7 , nodular and assimilated type. Researchers analysed the morphological characteristics of the mandibular foramena and lingula and they arrived at a conclusion that such structure variability would account for failure to block the inferior alveolarnerve [8-9] Among human bones, the pelvis and skull are the most reliable source for sex determination. In absence of complete pelvis, then mandible becomes important source for sex confirmation. The mandible is the most durable facial bone that retains its shape better than others. Mandible is the strongest and movable part of the skull and forms the chief articulating segment of skull. Its morphological features show changes with reference to age, sex and race. It is the platform for dental surgeons to work with [10].The present study aims to make detailed morphometric measurements on mandibular bones. .

MATERIAL AND METHOD

Study design: Observational study.

Place of study: The study was conducted on 122 adult dry human mandibles in the Department of Anatomy, Index Medical College Hospital & Research Centre, Indore. The different Parameters was measured using vernier callipers.

Inclusion criteria

All adult (mandible with presence of bilateral molar teeth; prominent alveolar sockets; intact condylar and coronoid processes; well developed bone), intact and well-formed mandible were taken.

Exclusion criteria

Broken, deformed, pathological bones were excluded

Instrument

All the above mentioned measurements was made using a digital varnier caliper.

Statistical analysis

Was performed using SPSS software. The P value $< .05$ were considered as significant.

RESULTS

The study was conducted on 122 adult dry human mandibles in the Department of Anatomy, Index Medical College Hospital & Research Centre, Indore.

Table 1: Variations in the shapes of lingual of 122 mandibles (244 sides)

Gender	Triangular			Truncated			Nodular			Assimilated		
	Right	Left	Total	Right	Left	Total	Right	Left	Total	Right	Left	Total
Male	120	70	95	30	20	25	40	12	26	13	17	15
Female	65	25	45	20	10	15	18	8	13	8	12	10

Table 2: Variations in the shapes of coronoid process of 122 mandibles (244 sides)

Variable	Male	Female	Total
Triangular	95	45	140
Hook Shaped	40	25	65
Rounded	26	13	39

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Figure 1: Variations in the shapes of coronoid process of 122 mandibles (244 sides)

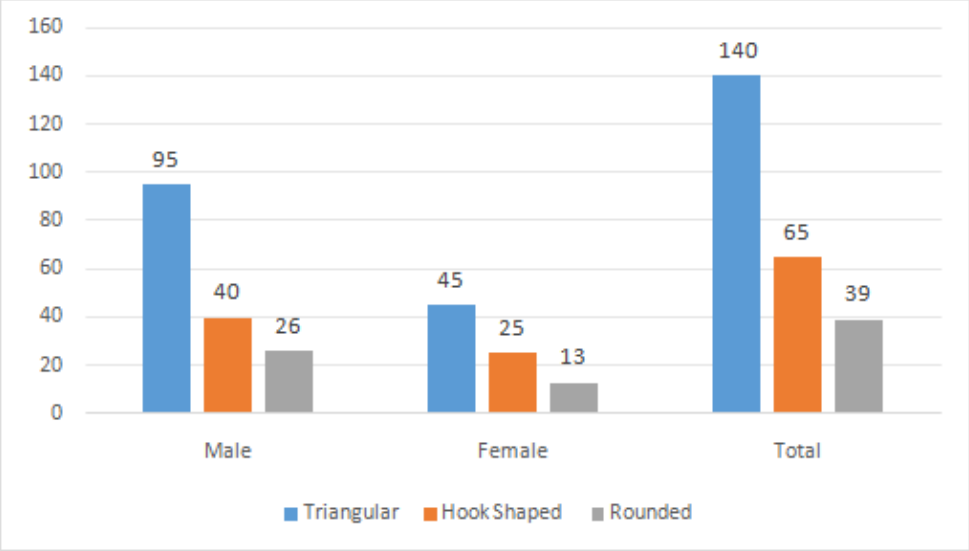
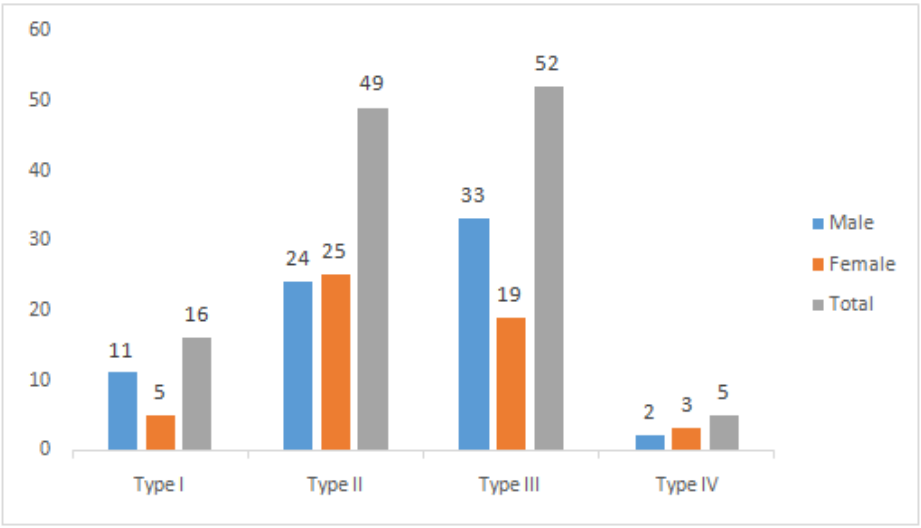


Table 3: Distribution of patterns of genial tubercles

Gender	Type I	Type II	Type III	Type IV
Male	11	24	33	2
Female	5	25	19	3
Total	16	49	52	5

Figure 2: Patterns of Genial Tubercles in the study population Mandibles



The most common lingula is triangular, or 57.37%. Males are more likely to have it (38%). The truncated kind (10%) is the least common. Bilaterally, in 95 mandibles, unilaterally in 27 bones on the right side, and in 21 bones on the left, triangular ligulae were discovered. Just 11 mandibles on both sides and 13 bones on the right and left were found to have truncated types. The most common type of genial tubercles were Type II (42.62%), while the least common type was Type IV (4.09%).

DISCUSSION

Present study conducted in Index Medical College and Hospital, Department of Anatomy in Indore, Madhya Pradesh, India. Bones from male and female human jaws, dried, and unidentified. Among all the morphological features selected lingulae shows sexual dimorphism. Lingula was described by Johannes-Baptist Spix in 1815 and was therefore named `Spix's ossicle or spine' [11]. Various standard textbooks mention only triangular shaped lingulae. Nicholson [12], Among the various morphological characteristics, specific lingulae exhibit sexual dimorphism[13].The triangular shape is found in a greater number of bones, specifically 278 (132 bilateral and 29 unilateral). The results presented in the table above indicate that our findings surpass those of the study [14]. The prevalence of truncated

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lingula was highest among the Thai populace [15], followed by nodular, triangular, and assimilated lingula.

Practical knowledge concerning the morphological configurations of the coronoid process is advantageous for the maxillary surgeon. An ideal donor graft site for the reconstruction of orbital floor deformities is the coronoid process [99]. (The Mintz Group, 1998) 19. Four elevations on the interior surface of the mandible, known as genial tubercles, are responsible for supplying the genioglossi and stylohyoid muscles on either side with their origin. They exhibit a discernible pattern of variation in both form and size. The most common lingula is triangular, or 57.37%. Males are more likely to have it (38%). The truncated kind (10%) is the least common. Bilaterally, in 95 mandibles, unilaterally in 27 bones on the right side, and in 21 bones on the left, triangular ligulae were discovered. Just 11 mandibles on both sides and 13 bones on the right and left were found to have truncated types. The most common type of genial tubercles were Type II (42.62%), while the least common type was Type IV (4.09%).These distinctions may have some ethnic significance, which requires additional research.

In numerous standard textbooks, only triangular lingulae are discussed. However, while a study [16] documented the existence of diverse shapes, they failed to offer specific information regarding the categories and frequencies of these phenomena. An additional category of lingulae, known as the truncated 7 type, was delineated in one study [17], while another study [18] identified the assimilated type and the nodular type [19-20].Regarding the triangular, hook-shaped, and rounded coronoid process shapes, our research reveals that 57.38% of the processes are triangular, 26.64% are hook-shaped, and 15.98% are rounded. The triangular shape is, on average, more commonly observed in males.

CONCLUSION

In the present study various nonmetrical qualitative features of mandible were evaluated. Lingula of mandible is one of the sexually dimorphic feature and can be used effectively in sexing of mandible. Male mandible shows triangular type commonly. Among the various types of coronoid processes, triangular process is the most prevalent. Pattern of genial tubercles should be analysed thoroughly on very large sample of bones for its racial differences.

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