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Original Research

A study on usage a variety of metrics to assess the mandibular morphology

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ABSTRACT:

Background: Bone morphology analysis is the oldest method used in forensic sex determination situations. Goal: To use a variety of metrics to assess the mandibular morphology.**Materials and methods:**We computed averages and standard deviations and established the parameter ranges for both sexes. By using the formula "mean 3 standard deviations" on these results, the "calculated range" was determined. Anywhere between the two ranges, the limiting point—an absolute value—can be identified. The majority of female mandibles had values below the selected limiting threshold, whereas the majority of male mandibles had values beyond it. **Results:** Bilateral triangular ligulae were found in 134 mandibles, whereas unilateral triangular ligulae were found in 31 right-side bones and 29 left-side bones. Only 17 bones on the right and left sides and 16 mandibles on each side were shortened. Type II genial tubercles were the most prevalent (50%) while Type IV tubercles were the least frequent (4%). **Conclusion:** Several qualitative and non-metrical aspects of the mandible were investigated in this research. The lingula, a sexually dimorphic aspect of the mandible, is effectively used in mandible sexing. Male mandibles are usually triangular in shape. The great majority of coronoid processes are triangular in nature. Numerous bones should have their genial tubercle patterns closely examined in order to reliably determine racial variances.

Key words: Mandible; Lingual, Menti, Mylohyoid line, Sex determination, Mandibular foramen.

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INTRODUCTION

Because of its usage in forensic, anthropological, odonatological, and genetic research on living and dead people, the skeleton is a crucial part of these disciplines [1]. Because it establishes the foundation for more research, identifying human remains is a crucial initial step in forensic investigations [2].

The biggest and strongest bone in the face is the mandible. It has two wide rami that rise posteriorly and a horizontally curved body that is convex forward. The coronoid and condyloid processes are present in the rami [3]. The right and left halves of the mandible finish their development, and the joint that results is known as the symphysismenti. [4] The two sides came together to create a single bone [5]. The mandible is a U-shaped bone that resembles a horse shoe.

include two vertically orientated rami and a horizontal body [6]. It is the sole bone in the skull that can move, and the mandible accommodates tooth sockets on both of its horizontal sides [7, 8]. The inferior alveolar nerve and vessels enter via the mandibular foramen, which is located on the inside of the mandible and extends into a canal known as the mandibular canal. The mental foramen opens externally. The mylohyoid groove starts just below the mandibular foramen and runs forward and downward to reach the mandibular body under the posterior portion of the mylohyoid line [4]. The lingual is located on the inner side on the anterior border of the mandibular foramen.

In the event of an earthquake, a war, or an aeroplane accident, non-metric techniques are used to distinguish between sex, age, and race using the mandible [9]. Bone morphology analysis is the oldest method used in forensic sex determination situations. Male bones are typically bigger and more robust than female bones, and the size and form of the jaw reflect sex. Researchers have discovered that the chin shape may be utilised to differentiate between men and females using qualitative approaches [10]. Thus, the goal of the current research was to assess mandibular morphology using a variety of criteria.

MATERIALS & METHODS

The present study was approved by the Institutional Ethics Committee. This study was an observational study. This study was conducted in the Department of Anatomy

Inclusion criteria: All adults (mandible with bilateral molar teeth, prominent alveolar sockets, intact condylar and coronoid processes, and well-developed bone) with intact and well-formed mandibles were included.

The exclusion criteria were broken, deformed, or pathological. The following parameters were observed in the mandible: Ther morphologic parameters to observe are,

i. Variations in shapes of lingual: Different shapes of lingula were observed such as

A. Triangular: It is with wide base and narrow rounded or pointed apex and apex being directed postero-superiorly i.e., towards condyle or towards posterior border.

B. Truncated: somewhat quadrangular with superior, inferior, and posterior borders.

C. Nodular: the entire lingula, except for its apex, merged into the ramus.

D. Assimilated: in this type, the lingula is completely incorporated into the ramus.

ii. The different shapes of the studied coronoid process were triangular, hook-shaped, and rounded.

iii. The distribution of genial tubercles depends upon their number and configuration, and they are classified as follows: Various Patterns of genial tubercles

1.Type-I Four separate genial tubercles upper pair as superior, lower pair as inferior genial tubercles

2.Type II Superior genial tubercles on both sides separate, while inferior tubercles on both sides fuse to form a single crest or tubercle.

3.Type III Superior and inferior genial tubercles on either side.

4. Type IV: All four genial tubercles are fused to form a single crest or tubercle.

Statistical analysis

IBM SPSS Statistics 21 was used to statistically analyse the data after each measurement. The matched pairings were excluded from the t-test that we used. We computed averages and standard deviations and established the parameter ranges for both sexes. By using the formula "mean 3 standard deviations" on these results, the "calculated range" was determined. Anywhere between the two ranges, the limiting point—an absolute value—can be identified. The majority of female mandibles had values below the selected limiting threshold, whereas the majority of male mandibles had values beyond it. To guarantee correct categorisation, this was done. Because of this, a lot more mandibles could be identified at the limiting point than at the demarking point.

RESULTS

Table 1: Variations in the shapes of lingula of 299 mandibles (588 sides)

Gender	Triangular			Truncated			Nodular			Assimilated		
	Right	Left	Total	Right	Left	Total	Right	Left	Total	Right	Left	Total
Male	103	121	224	23	35	68	71	31	102	27	29	56
Female	43	31	74	15	11	26	33	41	69	13	21	34

Table 2: Variations in the shapes of coronoid process of 289 mandibles (578 sides)

Variable	Male	Female	Total
Triangular	225	154	379
Hook Shaped	103	63	166
Rounded	29	15	44

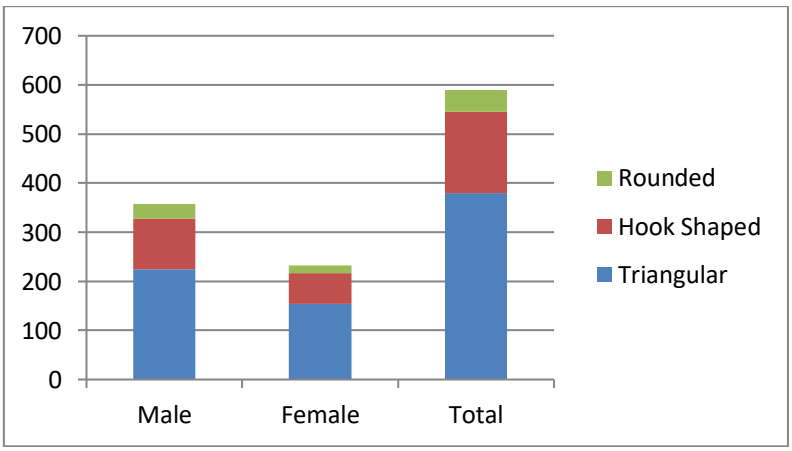

Figure 1: Variations in the shapes of coronoid process of 299 mandibles (588 sides)

Table 3: Distribution of patterns of genial tubercles

	Type I	Type II	Type III	Type IV
Male	40	83	57	5
Female	12	62	35	5
Total	52	145	92	10

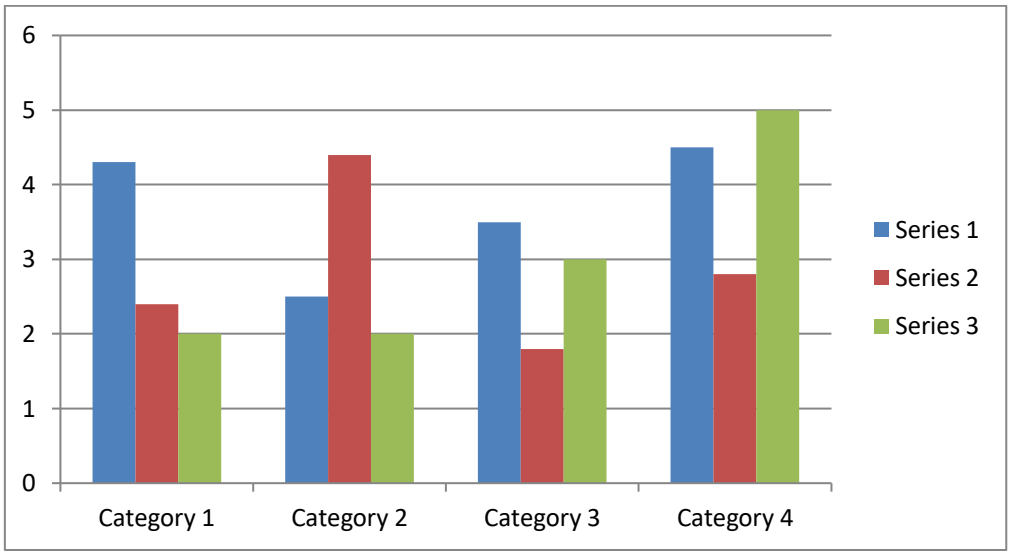

Figure 2: Patterns of Genial Tubercles in the study population Mandibles

Triangular lingulas were the most prevalent (49%). This disorder was more common in men (37%). The least prevalent kind was truncated (11%). Bilateral triangular ligulae were found in 134 mandibles, whereas unilateral triangular ligulae were found in 31 right-side bones and 29 left-side bones. Only 17 bones on the right and left sides and 16 mandibles on each side were shortened. Type II genial tubercles were the most prevalent (50%) while Type IV tubercles were the least frequent (4%).

DISCUSSION

After eliminating the mandibles that were unsuitable for reasons other than size, we kept 289 for further examination.

Certain lingulae have sexual dimorphism among the different physical traits [11]. There were more bones with the triangular shape—278 total—132 bilateral and 29 unilateral. As can be seen from the above table, our results outperform those of earlier research [12]. Thai people have the greatest occurrence of truncated lingula [13], followed by nodular, triangular, and assimilated lingula.

Maxillofacial surgeons benefit from having a practical understanding of the morphological configurations of the coronoid process. For the restoration of orbital floor abnormalities, the coronoid process provides a perfect onor graft site [14]. There are four altitudes on the

The genioglossi and stylohyoid muscles on each side get their origin from the mandibular inner surface, which is referred to as the genial tubercles. They showed a clear pattern of variation in size and shape. Four different genial tubercle patterns were found in the present investigation. In 142 (49 percent) of the mandibles, genial tubercle pattern type II was seen. Ninety Type III (33%) and forty-nine Type I (17%) instances were reported. With just eight bones (3 percent), type IV was the least common. More study is necessary to determine if these differences have any ethnic relevance.

Many conventional textbooks have only addressed the triangular lingulae. Although a research [15] confirmed the presence of various forms, it did not provide precise details on the types and occurrences of these events. One research [15] defined a new group of lingulae called the truncated 7 type, while another study [16] distinguished between nodular and assimilated forms [15,16].

Our study found that, with respect to the forms of coronoid processes, 65% of the processes were triangular, 28% were hook-shaped, and 7% were rounded. On average, guys are more likely to have the triangle form.

CONCLUSION

Several qualitative and non-metrical aspects of the mandible were investigated in this research. The lingula, a sexually dimorphic aspect of the mandible, is effectively used in mandible sexing. Male mandibles are usually triangular in shape. The great majority of coronoid processes are triangular in nature. Numerous bones should have their genial tubercle patterns closely examined in order to reliably determine racial variances.

Conflict of interest

The authors declare that they have no conflict of

interest.

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