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Original Research Article

Morphometry of the Ramus of the Mandible - Predictive Variable in Sexual Dimorphism

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Abstract

Background: The morphometric parameters of mandibular ramus play an important role in predictive variable in sex determination of mandible. ***Aim:*** to study the morphometric predictability of mandibular ramus in sex determination of mandible. ***Materials and Methods:*** 40 dry human mandible bones of unknown sex were utilized to study the height and breadth of the ramus of mandible and its accuracy factor in sex determination. The dry mandible bones were collected from the Department of Anatomy as well as from the undergraduate students of Santhiram Medical College & Hospital, Nandyal. The parameters like height, breadth of the mandibular ramus were measured by using sliding calipers. ***Results:*** The height of the ramus of mandible on the right side was 108.85 $\pm$ 9.84 and on the left side, it was 108.82 $\pm$ 9.89 in the present study. The maximum breadth of ramus was 43.62 $\pm$ 5.09. The minimum breadth of ramus was 57.85 $\pm$ 8.08. ***Conclusion:*** Morphometric variations of mandibular ramus may be an important anatomic factor for sex determination and unfavorable anatomic factor in difficult laryngoscopy.

Keywords: Mandible, ramus, sex determination.

INTRODUCTION

The determination of sex in the human skeleton is not a simple task. Age estimation is one of the important duties of medico-legal officers in recent time as crimes of varied nature are increasing [1, 2]. Mandible is next to the pelvis in human remains and will help us in the identification of age, sex, and race [3]. The ramus of the mandible is quadrilateral and possesses two surfaces, two processes, and four borders. For reconstruction of small bone defects in oral and maxillofacial regions, the anterior part of the ramus can be used as one of the best donor site [4, 5]. The mandibular ramus suffers morphological alteration associated with tooth losses [6, 7]. The present study aimed to study the morphometric predictability of mandibular ramus in sex determination of mandible.

MATERIALS AND METHODS

40 dry human mandible bones of unknown sex were utilized to study the height and breadth of the ramus of mandible and its accuracy factor in sex determination. The dry mandible bones were collected from the Department of Anatomy as well as from the under graduate students of Santhiram Medical College & Hospital, Nandyal. The parameters like height, breadth of the mandibular ramus were measured by using sliding callipers. The height of the ramus was measured as straight distance between gonian and highest point on the mandibular capitulam (Figure-1). Maximum breadth of ramus was measured as distance between the most anterior point on the mandibular ramus and the line connecting the most posterior point on the condyle and the angle of the jaw. Minimum breadth of ramus was measured as smallest antero-posterior diameter of the ramus (Figure-2).

Fig-1: Height of the ramus measuring from straight distance between gonian and highest point on the mandibular capitulam

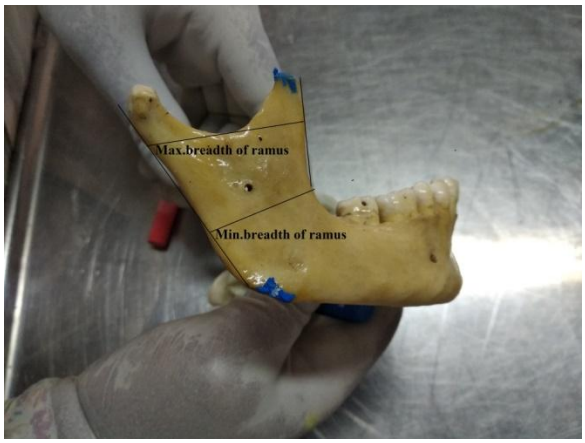

Fig-2: Maximum breadth of ramus - distance between the most anterior point on the mandibular ramus and the line connecting the most posterior point on the condyle and the angle of the jaw

RESULTS

The height, maximum breadth and minimum breadth of the ramus were measured (Table-2) to the nearest millimeter and statistically analyzed. The height of the ramus of mandible on the right side was 108.85 ± 9.84 and on the left side, it was 108.82 ± 9.89 in the present study. The maximum breadth of ramus was measured as the distance between the most anterior point on the Mandibular ramus and the line connecting the most posterior point on the condyle and the angle of the jaw was 43.62 ± 5.09. The minimum breadth of ramus was measured as the smallest anteroposterior diameter of the ramus was 57.85 ± 8.08 (Table-1).

Table-2: Statistical analysis of ramus of mandible

Parameters of ramus	Mean ± Sd	P value
Height of the ramus	Right 108.85 ± 9.84	*P <0.05
	Left 108.82 ± 9.89	
Maximum breadth of ramus	43.62 ± 5.09	
Minimum breadth of ramus	57.85 ± 8.08	

Table-1: Measurements of human mandibular ramus

Bone No	Height of the ramus (mm)		Maximum breadth of ramus(mm)	Minimum breadth of ramus (mm)
	Right	Left		
1	93	92	36	46
2	110	110	38	54
3	118	119	41	59
4	94	94	44	48
5	96	96	40	48
6	97	98	37	51
7	92	91	39	47
8	99	99	39	49
9	121	120	39	67
10	123	123	41	73
11	107	108	43	52
12	109	108	49	54
13	112	112	51	55
14	120	120	52	69
15	107	107	50	49
16	107	107	48	51
17	112	111	42	54
18	115	115	49	56
19	107	106	46	50
20	109	109	44	52
21	103	103	39	54
22	107	107	40	57
23	118	118	46	61
24	122	121	49	68
25	104	104	35	54
26	102	102	37	51
27	108	108	38	56
28	106	106	47	59
29	106	106	44	57
30	124	124	49	70
31	126	126	53	73
32	94	94	50	54
33	96	97	53	58
34	99	99	47	58
35	124	125	44	72
36	121	121	43	73
37	119	119	39	65
38	106	106	41	58
39	103	103	39	63
40	118	119	44	69
Mean	108.85	108.82	43.62	57.85
Standard Deviation	9.84	9.89	5.09	8.08
P value	P<0.05	P<0.05	P<0.05	P<0.05

DISCUSSION

The mandible shows higher and narrower ramus in white races where as in the black races the ramus is lower, wider and more vertical [8]. There was greater breadth of the ascending ramus compared to 15 female mandibles [9]. Male mandibles had broader and longer ascending ramus [10]. The ramus was more vertical in males than females [11]. Right side mean value of the height of the ramus showed a slight higher value compared to left side. The ramus metric parameters were higher in males than females and showed significant sexual dimorphism. The mandibular ramus dimensions were significantly higher for male samples compared to female samples like maximum ramus height: 67.42±4.31 and 61.46 ±3.63, maximum breadth: 44.2 ±3.89 and 41.23±3.76, minimum breadth: 31.26±2.94 and 28.36 ±2.15 for male and female samples respectively [12]. A study on Jordanian dentate subjects found that male subjects had higher values of ramus height compared to female counterparts [13]. The height of the ramus of the male mandibles showed a significant difference than that of the female

mandibles on human dentate dry mandibles in Indian population [14]. The findings in the present study suggesting that the role of breadth, the height of the ramus of the mandible are predictive variables in sex determination of the mandible are in agreement with the previous literature.

CONCLUSION

Morphometric variations of mandibular ramus may be an important anatomic factor in sex determination and in laryngoscopy.

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