Original article:

A comparative study of male and female mandibles in West Bengal population

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ABSTRACT:

INTRODUCTION: Numerous studies, done in India and Abroad, have established that certain metric parameters of dry adult human mandibles have significant gender differences.

AIMS AND OBJECTIVE: In the present study analysis of gender differences in the mandibles of West Bengal population have been done**.**

MATERIALS AND METHODS: 200 dry, adult human mandibles from different medical colleges of West Bengal were chosen for the study. They were divided into 120 males and 80 females according to morphological features. Then, 4 metric Parameters **- a)** Ramus height (bilateral), **b)** Gonial angle(bilateral), **c)** Bigonial distance and **d)** Minimum Ramus breadth(bilateral) were measured with calliper and protractor.Two different master charts were made on Microsoft excel one for male and another for female .The measurements of different parameters with mean and standard deviation (SD) , were calculated. Comparison between different variable was done by independent t test (EPI INFO version 7.1).

RESULTS AND ANALYSIS: In case of Ramus Height and Gonial Angle, statistically significant differences were found among genders on both right and left sides. Difference of Bigonial distance was also found to be statistically significant among genders. But Minimum Ramus Breadth is not a reliable parameter to differentiate between genders.

CONCLUSION: Ramus Height (bilateral),Gonial Angle(bilateral)and Bigonial Distance of adult,dry mandibles are reliable sexual dimorphic morphometric features in West Bengal population. However Minimum Ramus Breadth is not a reliable parameter to differentiate between male and female population.

KEY WORDS: Mandible, ramus height, gonial angle, bigonial distance, minimum ramus breadth.

INTRODUCTION:

Bones often survive the process of decay and provide major evidence of age and sex after death .The mandible is the strongest bone of facial skeleton and best preserved after death [**1**].In cases where intact skull is not found , mandible may play a vital role in sex determination, as it is the most dimorphic bone of the skull **[2]** . Dimorphism in the mandible is reflected in its shape and size (morphologically) **[3].**Similarly, morphometric dimorphism is also described in many studies. .

Parameters of the present study -

1]Gonial angle: The inferior border of the ramus is continuous with the mandibular base and meets the posterior border at an angle **[4]** .This is mandibular angle or gonial angle.

2]Ramus height: It is the height between the most superolateral point and the most inferolateral point on the ramus of mandible.

3] Minimum ramus breadth: It is the minimum antero-posterior breadth of ramus.

4]Bigonial distance: Gonion is the most inferior, posterior and lateral point on the external angle of mandible. Bigonial distance is the distance between both gonia **[5].**

MATERIALS AND METHODS

Dry, adult male and female mandibles available in the department of Anatomy, North Bengal Medical college, North Bengal Dental college , Malda Medical College, NRS Medical college, Calcutta Medical College, National Medical college and I.P.G.M.E.R were chosen. Also, mandibles in possession of 1st year MBBS and 1st year BDS students from North Bengal Medical College and North Bengal Dental colleges were considered.

FIGURE.1. MEASURING BIGONIAL DISTANCE WITH CALLIPER

FIGURE .2. MEASURING RAMUS HEIGHT WITH CALLIPER

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FIGURE. 3. MEASURING MINIMUM MANDIBULAR RAMUS BREADTH

FIGURE. 4. MEASURING GONIAL ANGLE WITH A PROTRACTOR.

Criteria for selection were-

a) Presence of permanent teeth or sockets at least 7* or more on each side.

* Third permanent mandibular molar appears at 17-21 yrs **[6],** but it may be absent in 1/5 th of the population **[7].**So, 7 is considered instead of 8.

b) Mental foramen mid - way between upper and lower borders.

c) Condylar process is above the level of the coronoid process.

So, all were adult mandibles.

Mandibles , which were edentulous and showing uncertain gender difference or temporary (deciduous) teeth, were discarded. Total 200 mandibles were selected. Then they were divided into120 male and 80 female ,according to the following morphological criteria

a) Gonial angle is typically everted in males but frequently inverted in females **[4].**

b) male mandibles are longer,female ones are slender **[8].**

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Now all the four parameters were measured one by one using Vernier calliper and protractor. Three parameters (ramus height , minimum ramus breadth and gonial angle) were bilateral, one (bigonial distance) was single. Two separate master charts were made on Micro soft excel one for male and one for female.Mean and standard deviation [SD] were calculated separately. Statistical analysis was done in the following stages by independent t test (EPI INFO VERSION 7.1)

1) Comparing mean of each parameter among male and female mandible for right side.

2) Comparing mean of each parameter among male and female mandibles for left side.

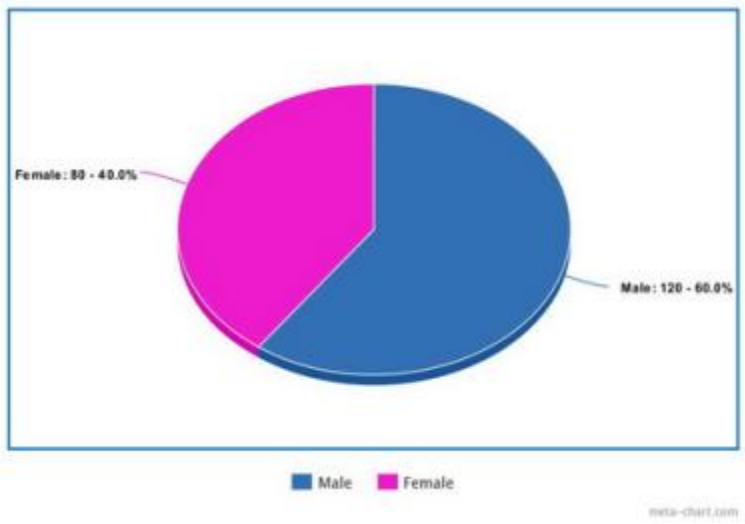
RESULTS

In the first step of analysis, based on morphological features mandibles were categorized into male and female .In the present study 120 male and 80 female mandibles were examined.

Distribution of study subjects according to gender, age group and number: Table:1

Gender	Age group	Number (n=200)
Male	18 -60 yr	120
Female	18 -60 yr	80

PIE CHART OF TABLE 1:



The measurements of different parameters with mean and standard deviation [SD] were calculated .Comparison between different variable by independent **t** test was done (by EPI INFO version 7.1)

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Results of measurement for different mandibular parameters with mean,standard deviation and stasistical significance(p values) . Except gonial angle all parameters were measured in cm.and angles in degree.

Table:2

	Male (n=120)		Female (n=80)			
Variables	Mean	SD	Mean	SD	P value	Inference
Rt.ramus Height	6.15	0.56	5.43	0.71	0.00	Significant
Lt.ramus Height	6.16	0.54	5.36	0.69	0.00	Significant
Rt.min.ram .breadth	3.16	0.49	3.05	0.52	0.13	Non-significant
Lt.min.ram Breadth	3.15	0.46	3.07	0.53	0.20	Non-significant
Bigonial Distance	9.02	0.76	8.27	0.75	0.00	Significant
Rt.gonial angle(degree)	120.04	5.82	128.41	4.54	0.00	Significant
Lt.gonial angle(degree)	121.25	5.78	128.60	5.08	0.00	Significant

So, statistically significant differences between male and female mandibles regarding ramus height and gonial angle on both sides were found. Then significant differences was found between bigonial distance among male and female mandibles.But, minimum ramus breadth was statistically non-significant among male and female on both sides.

DISCUSSION

Ramus height- In this present study mean ramus height on right side of male is 6.15 cm, standard deviation is 0.56 while that of the left side is 6.16 cm, standard deviation is 0.54. In female ramus height on right side is 5.43cm , standard deviation 0.71, and that of the left side is 5.36cm, standard deviation 0.69.By conventional criteria ,this difference is considered to be extremely statistically significant.Rai R et al(2007) **[9],** in their research work, found similar result in Indian population . Among Uttarakhand population, Thakur K C et al (2013) **[10],** also demonstrated the same results.

Gonial angle- In the present study gonial angle on right side among male mandibles is 120.04^0, SD5.82, and in female mandibles 128.41^0, SD 4.54 .On left side mean gonial angle in male is 121.25^0, SD 5.78, that of the female 128.60^0, SD 5.08.this result is considered as extremely statistically significant. Vinay G et al (2013) **[11]** showed that statistically non- significant difference existed among mean values of male and female gonial angles in South Indian [Bengaluru] population .While in 2014 Sharma et al **[12] ,**found similar result in Punjab

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like the present study. Mondal T and Chaterjee S in 2017 **[13],** published their research paper on dimorphism of mandibles in Bengali population .They also found significant difference in anatomical (gonial) angle.

Bigonial distance: In the present study which is done on West Bengal population , mean bigonial distance in male mandibles is 9.02cm and in female mandibles 8.27 cm.The difference between male and female mandibles is very much significant (p=0.0001) . Kawale D N et al (2015) **[14],** found similar result in Maharastra population . Dutta et al (2015) [2], calculated the mandibles in Karnataka population and showed similar result .Mondal T and Chatterjee S, 2017[13],also found significant difference in linear distance (bigonial distance) among genders in Bengali population.

Minimum ramus breadth: In the present study, mean minimum ramus breadth on right in male is 3.16 cm, SD 0.49 .While that of the left side is 3.15 cm, SD 0.46. Mean minimum ranus breadth on right in female is 3.07 cm, SD 0.52 .Difference among variables between male and female is not statistically significant. Saini V, in 2013**[3],** found almost similar result in Uttarakhand population. But Vinay G et al (2013) **[11]** , found in Karnataka population that statistically significant difference existed between male and female mandibles.

CONCLUSION

In conclusion, the present study established that Ramus height (bilateral),gonial angle (bilateral)and bigonial distance are reliable sexual dimorphic mophometric features of mandibles in West Bengal population. This study will be of help in the fields of dentistry like orthodontics, maxillo-facial surgery, in general surgery like orthopaedics, plastic and re-constructive facial surgery, in ENT surgical procedures and also in identification of individual in Forensic medicine. In addition this study may provide information to anthropometry, evolution of chin and sexual dimorphism.

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