



Comparative study: Morphological changes of mandible in human compared with great ape in both the sex.

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ABSTRACT:

Mandible is the strongest and only movable bone in the skull. Sex difference can be accurately determined after puberty, the sex difference are well marked in hipbone and skull. Next to this mandible in human remains will help us to identify the age, sex and race. We were examined on 100-dry human mandible in middle age groups. We are interested to compare our modern mandible with great apes particularly difference between male and female. Difference in male and female variances was tested; in gorilla, height of ramus (male-119.9/11.8, female-101.6/7.3) and bicoronoid breath (male- 120.5/9.2, female-104.1/6.8) has high value of variation between male and female variants where as in human height of ramus (male-68.1/4.5, female-56.2/4.9 and bicoronoid breath (male-94.1/3.3, female-84.7/3.3). The lowest value in Symphyseal height of both Gorilla (male-53.3/6.4 ad female-41.1/3.7) and human are male-28.9/3.3 ad female-22.8/3.8). Difference of male and female means were tested using studnts t test for significance, from this results males are significantly high values of measurements, compared with female.

KEYWORDS: Mandibular measurements, sex difference of mandible, Mandibular index, great apes.

I. INTRODUCTION:

Mandible is the strongest and only movable bone in the skull. Mandible has horizontally curved body, which is convex forward and two rami ascends posterior end of the mandibular body, between that is angle of mandible. Tongue shaped bony projection in the inner aspect of mandible is called lingual, which leads to mandibular canal, later opens in mental foramen. Identification of mandibular sex difference and different parameters compared with other animals is important for medico-legal issues, as well as for anthropologist. Sex difference can be accurately determined after puberty, the sex difference are well marked in hipbone and skull. Next to this mandible in human remains will help us to identify the age, sex and race

(M. Punarjeevan Kumar and S. Lokanadham, 2013). In this study we have interested to evaluate the mandibular length, to calculate the height of ramus, to study about bicoronid and bilingual length breath are compared with other animals will be helpful in anthropological diagnosis, it gives extra knowledge to dental students as well as to forensic science.

II. MATERIALS AND METHODS:

The present study was carried out in the Department of Anatomy, JKKN dental college, Tamil nadu, India. We were examined on 100-dry human mandible in middle age groups. Out of 100-mandible, 58 are male and 42 are female mandible. In this study we compared human mandible included both male and female mandibles with great ape. We are interested to compare our modern mandible with great apes particularly difference between male and female.

Mandibles were measured by using a vernior caliper, the parameters are:

- 1) Height of ramus: distance from the highest point on the mandibular condyle to gonion.
- 2) Mandibular length: distance of the anterior margin of the chin from a centre point on the protected straight line placed along the posterior border of the two mandibular angles.
- 3) Sympheal height : it measures the straight distance between infradentale and gnathion
- 4) bilingual breath: distance between tip of two lingual process of mandible.
- 5) bicoronoid breath: the perpendicular distance between the most lateral points on the two coronoid process.

Mandibular index (Thomson criteria): Length of lower jaw/Bicondylar Breadth X 100 (Anupam Datta et al,2015), patient screening regarding signs of osteoporosis as a considerable proportion of population, thickness of the inferior border of the mandible below the mental foramen has often been measured as the panoramic mandibular index (PMI) either directly or as a ratio



of the thickness to the distance of the mental foramen from the inferior border (L. Khojastehpour, SH. Shahidi 2009). In this study we have included panoramic mandibular index as a parameter to describe the bony status of what we have used. The measurements of male and female mandible are compared with great apes, which is proposed by L.

T. HUMPHREY et al,1999 (L. T. HUMPHREY et al,1999).

III. RESULTS:

In 100-dry human mandible, including both the sex were studied and recorded, the frequently used parameters are as follows:

TABLE: DETAILS OF OBSERVATION (MM/SD)

S.no	Details of measurement	Great apes*(mm/SD)		Human(mm/SD)	
		Male	Female	Male	Female
1.	Ramus height	119.9/11.8	101.6/7.3	68.1/4.5	56.2/4.9
2.	Mandibular length	178.8/10.4	143.6/6.1	76.5/4.2	70.5/4.8
3.	Symphyseal height	53.3/6.4	41.1/3.7	28.9/3.3	22.8/3.8
4.	Bilingual breath	94.2/8.7	79.5/5.1	76/3.8	69.3/5.4
5.	Bicoronoid breath	120.5/9.2	104.1/6.8	94.1/3.3	84.7/3.3

*L. T. HUMPHREY, M. C. DEAN AND C. B. STRINGER, Morphological variation in great ape and modern human Mandibles, *J. Anat.* 195, pp. 491-513,1999.SD- standard deviation
Mandibular index of male mandible varies from 42.67 – 62.86 with an average of 52.40 ± 4.00 and that of female mandible varies from 40.23 – 60.56 with an average of 50.39 ± 5.02 .

IV. DISCUSSIONS :

The jaws and teeth of homo-sapiens have evolved from ancestor of chimpanzee. The jaws and teeth of humans are smaller than the today's great apes, decreasing size of masticatory system was mostly due to changes in the dietary habit as well as for developing speech. Morphological difference that separates the modern human from living apes, for example canine teeth of apes are sexually dimorphic when compared to modern humans. Determination of sex and analyzing the morphological aspects depends on the expert's ability (J.Sarvesh Kumar and Yuvaraj Babu.K, 2016). Human jaws are smaller, gracile and less projected than equivalent sized living apes. In nowadays mandibular studies are not aimed to documenting and sex difference of mandibular morphology few were extended to comparisons, human mandibles compared with other non-human mandible (L. T. HUMPHREY et al.,1999). In our study, mandibular size of human were calculated for each bones individually using normal statistics of mean and standard deviation. We compared Mandibular measurements of great apes were used gorilla mandibular measurement from L. T. HUMPHREY et al,1999.

From our results, gorilla has high values of measurements for mandibular length, height of

ramus and bicoronoid breath and minimum values in symphyseal height. In modern human have highest values of bicoronoid breath, mandibular length, bilingual breath and minimum values in symphyseal height. Difference in male and female variances was tested; in gorilla, height of ramus (male-119.9/11.8, female-101.6/7.3) and bicoronoid breath (male- 120.5/9.2, female-104.1/6.8) has high value of variation between male and female variants where as in human height of ramus (male-68.1/4.5, female-56.2/4.9)and bicoronoid breath (male-94.1/3.3, female-84.7/3.3).The lowest value in Symphyseal height of both Gorilla (male-53.3/6.4 ad female-41.1/3.7) and human are male-28.9/3.3 ad female-22.8/3.8). Difference of male and female means were tested using students t test for significance, from this results males are significantly high values of measurements,compared with female.

V. CONCLUSION:

In this paper, we have documented the difference in the mandibular morphology of great ape and modern human including sexually dimorphism.these differences in the shape and size of mandible,influenced by genetic and environmental adaptation.In-opening speech and mastication movements of mandible has same velocities but later maximum velocities and durations are greater in mastication and then in speech (D. J. OSTRY and J. R. FLANAGAN,1989). Large coronoid process, well marked massentric fossa,short chondyloid process,canoe shaped body characteristics of carnivorous - animal eating group population where as slender coronoid process, shallow messentric fossa, tall condylar process and tapering



body are plant eating – phytophagous group (Hiroshi Hoshi,1971)

Comparison of human mandibular morphology with other ancestors results that, human has short mandible shows in both measurements of mandibular length as well as breadth of ramus. Overall size of mandibular measurements, human mandible shows little wide particularly the intercondylar breath where as apes mandible are comparatively long. we have concluded that human mandibular size and shape are completely influenced by dietary habits. Many experimental studies of mandible shown that relationship between structural and functional changes, but macroscopic view is rarely available.

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