

Sexual Dimorphism of Cranial Sutures in Maharashtra and North-Karnataka Region

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ABSTRACT

112 dried non-pathological adult crania of known sex were studied from Maharashtra and North Karnataka cranial sutures were traced by sketch pen then transparent butter paper was fixed and suture was traced by micro tipped pen. Each suture was studied in three equal segments and classified into closely widely and straight type of sutures.

Widely serrated sutures were common in male crania of coronal suture and in female crania closely and straight type of suture was common while sagittal suture of male crania also had widely serrated suture but female crania of sagittal suture had only closely serrated type of sutures. Lambdoid suture of male crania had widely and straight type of suture and female crania had closely serrated sutures. The angle between two halves of lambdoid was highly significant ($P < 0.01$) in Female crania. This study will certainly help the Anatomist, Anthropologist and Medico Legal Expert because Morphometric Values of Dermal Bones are uncertain.

Keywords: (1) Closely Serrated, (2) Widely serrated, (3) Straight Type, (4) Butter Paper

INTRODUCTION

"Suture" is a Latin word (Sutura=Seam) which is restricted to skull it has mainly three functions Unite the bones while still allowing slight moments. Act as growth areas to absorb mechanical stress. During growing period these sutures contain connective tissues, blood vessels, osteogenic cells to facilitate the oppositional growth of the bone margins to meet at the suture⁽¹⁾ and obliterate at certain age.

Many Criteria are available to differentiate sex of the crania after puberty like length of mastoid process, prominence of glabella, superciliary arches, width of

zygomatic arches, diameter of foramen magnum, depth of digastric groove but least data is available regarding sexual dimorphism of cranial sutures. Moreover evolutionary point of view also sutures developed in the armored jawless fishes since then no mammals show evolutionary progress of sutures⁽²⁾ As our ancestors were cannibolic they approached the tasty brain through normaverticalis. ⁽³⁾ Hence attempt was made to study the sexual dimorphism of the sutures. Medico-legally serrations of the sutures are anomalous to estimate the age of the subject but in our study serrations of the sutures have great significance for sexual Dimorphism.

MATERIAL AND METHOD

112 adult, non-pathological crania of known sex were studied from medical colleges of Sholapur and Bijapur. Out of 112, 67 crania were male and 45 were female. Each cranium was put in anatomical position

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the coronal, sagittal and Lambdoid sutures were traced by color sketch pen then transparent butter paper was fixed on the crania with the help of rubber band and sutures were traced by micro tipped pen. Each cranial suture was studied in three equal segments from right to left but in sagittal suture anterior to posterior to observe the maximum serrations morphologically and metrically. Sutures were classified under three headings closely serrated, widely serrated and straight type. Breadth of the suture was measured by the vernier caliper. Length and Breadth of the crania was measured by measuring (tailors tape).

OBSERVATIONS AND RESULTS

a=widely serrated, b=closely serrated, c=straight type

Table No. 1 Comparison of coronal suture in both sexes in all three segments.

Segment-I

a= in Males 25 (37.5%) in Females 17 (37.70%)
 b=in Males 34 (50.7%) in Female 24 (53.42%)
 c=in Males 8 (11.8%) in Female 4 (8.88%)

Segment-II

a= in Males 15 (22.4%) in Females 6 (13.4%)
 b=in Males 10 (14.9%) in Female 8 (17.8%)
 c=in Males 42 (62.7%) in Female 31 (68.88%)

Segment-III

a= in Males 32 (47.7%) in Females 15 (33.3%)
 b=in Males 26 (38.8%) in Female 20 (44.4%)
 c=in Males 9 (13.5%) in Female 10 (22.3%)

Table No. 2 – Comparison of Sagittal Suture in both sexes

Segment-I

a= In Males 28 (41.7%) and Female 15 (33.3%)
 b= In Males 21 (31.5%) and Female 14 (31.2%)
 c= In Males 15 (22.4%) and Female 16 (35.5%)

Segment-II

a= In Males 31 (46.3%) and Female 16 (35.5%)
 b= In Males 21 (31.5%) and Female 14 (31.2%)
 c= In Males 15 (22.4%) and Female 15 (33.3%)

Segment-III

a= In Males 45 (67.6%) and Female 27 (60%)
 b= In Males 12 (17.9%) and Female 8 (17.7%)
 c= In Males 10 (14.5%) and Female 10 (22.3%)

Table No. 3. Comparison of lambdoid suture in both sexes

Segment-I

a= In Males 35 (52.2%) and Female 21 (46.6%)
 b= In Males 23 (34.4%) and Female 19 (42.2%)
 c= In Males 9 (13.4%) and Female 5 (11.2%)

Segment-II

a= In Males 38 (58.7%) and Female 26 (57.7%)
 b= In Males 23 (34.3%) and Female 13 (28.8%)
 c= In Males 6 (9%) and Female 6 (13.5%)

Segment-III

a= In Males 23 (49.3%) and Female 22 (48.8%)
 b= In Males 21 (31.3%) and Female 18 (40.6%)
 c= In Males 13 (19.4%) and Female 5 (11%)

Table-4 Comparison between lengths of Nasion to Gonion which was insignificant ($P > 0.01$) pterion to Gonion was insignificant ($P > 0.001$) and length between Gonion to Bitemporal width was also insignificant ($P > 0.01$)

Table-5 The angle between coronal and sagittal and lambdoid sutures were insignificant ($P > 0.01$) but angle between two limbs of lambdoid sutures was highly significant ($P < 0.01$).

Table 1. Comparative study of coronal suture segment in both sexes with %

| Segment | Male Crania (67) | | | Female Crania (45) | | |
|---------|------------------|-----------|-----------|--------------------|------------|-----------|
| | a | b | c | a | b | c |
| I | 25(37.5%) | 34(50.7%) | 8(11.8%) | 17(37.7%) | 24(54.42%) | 4(8.88%) |
| II | 15(22.4%) | 10(14.9%) | 42(62.7%) | 6(13.4%) | 8(17.8%) | 31(68.8%) |
| III | 32(47.7%) | 26(38.8%) | 9(13.5%) | 15(33.3%) | 20(44.4%) | 10(22.3%) |

a= widely serrated

b= closely serrated

c= straight type

Table 2. Comparative study of sagittal sutural segment in both sexes with %

| Segment | Male Crania | | | Female Crania | | |
|---------|-------------|-----------|-----------|---------------|-----------|-----------|
| | a | b | c | a | b | c |
| I | 28(41.7%) | 21(31.5%) | 18(26.8%) | 15(33.3%) | 14(33.3%) | 16(33.5%) |
| II | 31(46.3%) | 21(31.3%) | 15(22.4%) | 16(33.5%) | 14(31.2%) | 15(33.3%) |
| III | 45(67.6%) | 12(17.9%) | 10(14.9%) | 27(60.0%) | 8(60.0%) | 10(22.3%) |

Table 3. Comparative study of lambdoid suture segment in both sexes with %

| Segment | Male Crania (67) | | | Female Crania (45) | | |
|---------|------------------|-----------|-----------|--------------------|-----------|-----------|
| | a | b | c | a | b | c |
| I | 35(52.2%) | 23(34.4%) | 9(13.4%) | 21(46.6%) | 19(42.2%) | 5(11.2%) |
| II | 38(56.7%) | 23(34.3%) | 6(9.0%) | 26(57.7%) | 13(28.8%) | 6(13.5%) |
| III | 33(49.3%) | 21(31.3%) | 13(19.4%) | 22(48.8%) | 18(40.8%) | 15(11.2%) |

Table 4. Comparison between (a) length of Inion to Nasion. (b) Pterion to Pterion. (c) Length between bitemporal width in both sexes.

| Sl No | Observations | Male crania (67) | | Female Crania (45) | | |
|-------|--------------------|------------------|------|--------------------|-------|-----------|
| | | Mean | SD | Mean | SD | 'P' value |
| a | Inion to Nasion | 317.16 | 20.6 | 316.55 | 18.46 | P> 0.01 |
| b | Pterion to Pterion | 182.01 | 17.5 | 182.33 | 18.7 | P> 0.01 |
| c | Bitemporal width | 221.41 | 18.4 | 224.44 | 20.9 | P> 0.01 |

All the values are insignificant (P > 0.01)

Table 5. Comparison of angle between two limbs of lambdoid suture in both sexes

| Male Crania 67 | Female Crania 45 | | | T Test Value | P Value | Results |
|--------------------|------------------|------------|--------|--------------|---------|---------|
| | S1 | Mean Value | S1 | | | |
| Mean Value | 117.31 | 16.39 | 128.66 | 25.24 | 1.98 | P<0.01 |
| Highly significant | | | | | | |

DISCUSSION

In this present study of coronal suture in (Table-1) had more number of widely serrated sutures observed in the male crania, closely serrated and straight were common in female. In sagittal suture (Table-2) widely serrated sutures were common in male crania and closely serrated sutures were common in female crania. In lambdoid suture (Table-3) widely serrated and straight type of suture was common while closely serrated sutures were common in female crania. These findings are more or less in agreement with previous studies but they classified the sutures of the crania into nine types viz closely, more closely, widely,

more widely etc...⁽⁴⁾No English Literature is available to compare the findings of present study. The probable reasons of these finding could be due to gravity of masticatory differences between both sexes because masticatory stress play vital role in the morphology of sutures⁽⁵⁾The regional and genetic factors, might be responsible for such type of sutural development, TWIST and BMP genes enhances the serration of sutures, FG F gene accelerates the closure and suture.⁽⁶⁾but sexual dimorphism and these genes is yet to be established, moreover earlier closure of the sutures in female crania ⁽⁷⁾Could be one of the factor for closely serrated suture in female. Moreover growth of the

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cranial suture is influenced by the muscular attachments independently.⁽⁸⁾Hence influence in the weaker muscles of female might have resulted into closely serrated suture. Intracranial contents, intracranial volume and intracranial pressure decide the pattern of suture.⁽⁹⁾Pattern and position of suture is determined before completion of ossification.⁽¹⁰⁾Regarding the pattern of suture it can be hypothesized that, brain was not last organ to evolve, rather brain was clearly a focus for important and stage setting selective postures early in hominoid evolution associated with changes in erect posture.

The angle between the two limb of lambdoid suture significant (Table-5) was highly significant ($P < 0.01$) studied in 1900.⁽¹¹⁾This significance value could be due to migration of neutral crest between the formation of caudal part of sagittal and whole part of lambdoid suture in the Intra uterine life which juxtaposes the two limbs of lambdoid suture to facilitate the normal growth of the brain⁽¹²⁾.

SUMMARY AND CONCLUSION

These significance incidences of widely serrated suture common in male crania and closely serrated in female crania and significant of lambdoid angle in female crania will certainly help the anatomist, anthropologist and medico legal expert but these inferences demand further genetic, Hormonal, Embryological, histological, environmental, nutritional studies because exact mechanism, factors of formation and closure of sutures in both sexes is yet to be established. Due to early obliteration of cranial sutures least attention is paid in the literature, so far.

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