STUDY OF INCIDENCE OF METOPISM IN HUMAN DRY SKULLS OF NORTH KARNATAKA REGION

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ABSTRACT

AIMS AND OBJECTIVES
The present study is concerned with presence of completeness or incompleteness of metopic suture in human dry skull which when present extends from nasion to bregma. This metopic suture creates an academic interest and radiologist should know about metopic before diagnosing the frontal bone fractures.

MATERIAL & METHODS
The present study was conducted in Navodaya Medical and Dental College, Raichur, Karnataka by collecting the dry human skulls from first year medical and dental students. Totally 140 skulls were selected and fractured, deformed, unclean skulls were taken out from the study. The selected skulls were observed for presence of metopic suture, and when present observed for completeness or incompleteness of suture and noted accordingly.

RESULTS
Out of 140 skulls studied 3 skulls [2.14%] showed metopism [Fig. 1] and rest of the skull showed normal frontal bone.

CONCLUSION
The present study showed 2.14% of metopism, this shows that metopic suture is present in few skulls. This is compared with the studies done by earlier authors who have done on various different populations. It creates an academic interest among Anatomy teachers. The radiologist should be aware of this incidence of metopic suture so that he should not misdiagnose the frontal bone fractures. Neurosurgeons should also be aware of such incidence of metopic suture before doing craniotomy surgeries, so that there will be no post-op complications.

KEYWORDS
Human Dry Skulls, Metopic Suture, Incidence.


INTRODUCTION
The frontal bone forms the skeleton of forehead articulating inferiorly with the nasal bone and zygomatic bone. Metopic suture is the midline suture present in frontal bone extending from the bregma to nasion. The metopic suture may be complete or incomplete. It is complete means extending from nasion to bregma it is known as metopism.1

If the suture is not present throughout and occupies a small area between nasion and bregma they are considered as incomplete metopic sutures, they are also called as median frontal sutures and usually present between two supracylilary arches. In foetal skull, the two halves of the frontal bone are separated by the frontal suture and they remain separate until approximately 6 years of age.

There are various studies in literature regarding exact period of closure of metopic suture, the period of maintenance of sutures has been suggested as a precondition for the continuous growth of the bones and that early closure may result in cranial morbid deformities known as scaphocephaly.2 In some adults it persists as metopic suture. Collins3 has stated in his textbook that metopic suture appears in the foetus and closes in the childhood of 6-8years. Physiological closure of metopic suture varies from birth to 8years of age and accepted time of closure is around 2 years as said by bademci.4 Premature closure of metopic sutures occurs in 10% of patients with craniosynostosis.5 A persistent metopic suture may not be mistaken for a fracture line by radiologist.

This persistence of metopic suture is also important for paleodemography and forensic medicine.6 According to anatomic literature available; there are different incidences when ethnic groups are compared. The incidence of metopic suture in alpine skulls is 63.2%, the largest reported, while smallest was described in Australian and Scottish skulls [1.0%].7

MATERIAL AND METHODS
For the purpose of study, Dry human skulls were collected from first year medical and dental students of Navodaya medical college, Raichur, Karnataka. Total of 140 skulls were collected. Any deformed, broken unclean skulls were excluded from the study. These skulls were observed for the appearances of complete or incomplete metopic suture and the skulls showing metopic suture were separated. The skull showing metopism was photographed and the results were tabulated and compared with earlier studies.

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OBSERVATIONS AND RESULTS

The skulls showed complete metopism in only 3 skulls [2.14%], all other skulls showed normal frontal bone with no remnant of suture. The complete metopic suture can be seen in Fig. 1.

DISCUSSION

Metopism is the complete persistent suture from nasion to bregma. At 9th week of intrauterine life small ossification centers appear in the middle of each supraorbital part of frontal bone. By 11 weeks there appear eyebrow like thickenings in the frontal bone. There is a progressive radial bone expansion in the second trimester and delineation of metopic suture occurs. In third trimester there is closure of metopic suture commencing from glabella and ascending upwards towards anterior fontanelle.

Table 1: Incidence of metopism in present study and its comparison with earlier authors

<table>
<thead>
<tr>
<th>Authors</th>
<th>Population or Race</th>
<th>Incidence [%]</th>
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<tbody>
<tr>
<td>Bryce7</td>
<td>European</td>
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</tr>
<tr>
<td>Bryce7</td>
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<td>5.1</td>
</tr>
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<td>Bryce7</td>
<td>Negro</td>
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<td>Breathnach8</td>
<td>Scottish</td>
<td>9.5</td>
</tr>
<tr>
<td>Romanes4</td>
<td>Europeans</td>
<td>0-8</td>
</tr>
<tr>
<td>Das10</td>
<td>Indians (UP)</td>
<td>3.31</td>
</tr>
<tr>
<td>Agarwal et al11</td>
<td>Indians</td>
<td>2.66</td>
</tr>
<tr>
<td>Ajmani et al12</td>
<td>Nigerian</td>
<td>3.4</td>
</tr>
<tr>
<td>Bilodi et al11</td>
<td>South Indian</td>
<td>9.37</td>
</tr>
<tr>
<td>Pankaj R et al13</td>
<td>Indian [Maharashtra]</td>
<td>1.25</td>
</tr>
<tr>
<td>Present study</td>
<td>Indian [North Karnataka]</td>
<td>2.14</td>
</tr>
</tbody>
</table>

Table 1: Incidence of metopism in present study and its comparison with earlier authors

Calvarial suture obliteration is associated with increased osteoblast proliferation and reduced suture cell apoptosis which is induced by growth factors such as Fgf2, BMP4, Tgf β 2. Conversely the cause of metopic suture in human might stem from growth factor beta 3. A previous study revealed in vivo Tgf β 3 delayed fusion of posterior interfrontal suture in spraque-Dowley rats.14-17

Rau et al reported the incidence of metopism to be 4% in Dravidians of Madras. Inderjit and Shah19 studied Punjabi skulls, the incidence was 5%, Woo et al recorded as high as 10% in mongoboids. By above table we can compare the present study with earlier authors like Bryce7 who studied different region skulls where European skulls showed 8.7%, Mongolian skulls showed 5.1%, negro [1.2%] Australian [1%].

This shows that the same author studied above said regions skull which showed variation in the incidence of metopism. Whereas studies done by Indian authors like Das et al10 studied Uttar Pradesh region skulls where it showed 3.31% metopism, Agarwal et al11 got 2.66% metopism, Ajmani et al12 studied Nigerian skulls and got the incidence of 3.4% metopism. Bilodi et al11, Pankaj et al13 studied south Indian skulls and incidence was 9.37%, 1.25% respectively.

The present study [Table no 1] showed the incidence of metopism in 3 skulls [2.14%] which is compared and it is close to the studies done by previous authors like Bryce[Nigerian skulls].7 Agarwal et al11 Ajmani et al12 Pankaj et al13

CONCLUSION

The present mainly aimed at incidence of metopism which appeared to be 2.14% and is of anatomical importance and showed varied results in different regions of the world with different habitat population and genetic differences. This is very important for Anatomist as academic importance, to radiologist to keep in mind about the incidence of metopism in different regions and vertical frontal bone fracture should not be confused with metopism. This result of the study of metopism is also important for neurosurgeons while conducting frontal craniotomy surgical interventions.

REFERENCES

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