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Original Research Article

INCIDENCE OF METOPISM IN EASTERN INDIA

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ABSTRACT

Background: The Metopic Suture is a suture seen between the two halves of frontal bones which ossifies in membrane from the two primary centres. The fusion of the metopic suture starts at around eighteen months after birth and completed by six years of age. Persistence of this suture in adult is called metopism. It may be misinterpreted as fracture in x-ray.

Materials and Methods: This study was conducted with 133 human adult dry skulls. They were inspected at norma frontalis for presence of metopic suture. They were classified as complete and incomplete. The incomplete ones were again classified as 'V','U','Y' and linear type.

Observation and Results: Out of 133 skulls 84 were found to have no metopic suture, one had complete suture (extending from glabella upto bregma),14 skulls were manifested to have 'V' shaped suture,11 skulls were discovered to have 'U' shaped suture,6 skulls were revealed to have 'Y' shaped suture and remaining 17 showed linear metopic suture in the midline.

Conclusion: The present study was conducted to note the incidence of metopism in adult skull which may be useful in the field of Neurosurgery, Radiology and Forensic Medicine.

KEY WORDS: Adult skull, Metopic suture, Metopism, Ossifcation.

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INTRODUCTION

Skull is made up of cranial bones which are held together by fibrous joint named suture. The frontal bone is unpaired bone of the skull forming the forehead. Glabella is the median elevation between two superciliary arches and bregma is the meeting point of sagittal and coronal suture. There is a suture line present between the two halves of frontal bone which generally fuses in childhood. When the suture line fails to close metopism persists in adult skull. When it extends from bregma to nasion it is called complete metopic suture and if not present throughout then it is known as incomplete.

According to Manzanares et al [1] the metopic suture was ossified in membrane from two

primary centres and fused with the inner surface of the skull by chondroid tissue.

Warwick and Williams reported that the metopic suture was usually obliterated by eight years. Piersol et al [2] concluded that the metopic suture was disappeared by the end of fourth year. But Moore, Dalley, Agur also supported the theory of closure of metopic suture by eight years [3].

Abnormal growth of skull bone is responsible for persistence of metopic suture in adult. This abnormality of growth of skull was due to hereditary influence, hormonal cause, atavism, cranial malformation and hydrocephalus. The incidence of metopic suture varies in different races-4-5% in Yellow races, 7-10% in Europeans and 1% in African skulls [4]. Das et al reported the incidence of metopism in Indian skulls was 27.98% [5] whereas according to agarwall 40.83% skulls showed metopism [6]. Incidence of metopism in Indian skulls were low compared to the Alpine skulls (63.2%) but much higher compared to Australian (1%) and Scottish skulls (9.5%) [7].

Study of Metopism is important for paleodemography and also for medico-legal issues in Forensic Medicine. It is also important for radiologists to avoid misinterpretation of metopic suture as fracture line.

MATERIALS AND METHODS

The study was conducted on 133 adult dry human skulls taking from the osteology museum of the Department of Anatomy , R. G. Kar Medical College. Fractured skulls were discarded and the study was carried out only on intact skulls. Each skulls was thoroughly inspected to find out the persistance of metopic suture. The skulls were divided into following groups-

1. Normal skull without metopic suture

2. Normal skull with metopic suture –

a)Complete, b) Incomplete

Incomplete suture were classified according to their shape such as Linear, U shaped, V shaped and Y shaped.

The incidence of complete and incomplete metopic suture were calculated and the data obtained were compared with the previous studies.

OBSERVATION AND RESULTS

Out of 133 dry human skulls studied 84 skulls were found to have no metopic suture. Complete suture was found in only one skull (0.82%), and rest showed incomplete sutures. Among them 14 skulls (11.47%) have 'V' shaped suture,11 skulls (9.02%) observed to have 'U' shaped suture, 6 skulls (4.92%) revealed 'Y' shaped and rest i.e 17 skulls (13.94%) have linear type of metopic suture.

Fig. 1: 'V' type Metopic Suture.

Fig. 2: 'U' type Metopic Suture

Fig. 3: 'COMPLETE ' type of Metopic suture.

Fig. 4: ' INCOMPLETE – LINEAR' type of Metopic Suture.

Fig. 5 : 'Y' Type Metopic Suture

Table 1: Occurrence of metopic suture in 133 skulls and their percentage.

S. No	Shape of Metopic suture	Number of skulls	Percentage
1	Absent metopic suture	84	63.15
2	Complete suture	1	0.82
3	V shaped	14	11.47
4	U shaped	11	9.02
5	Y shaped	6	4.92
6	Linear	17	13.94

Table 2: Variation in incidence of metopism in different regions of India.

S. No	Regions of India	Workers	Percentage
1	Punjab	Jit & Shah et al (1948)	5
2	Uttar Pradesh	Das et al (1973)	3.31
3	Kanpur	Agarwal et al (1979)	2.66
4	Maharastra and Western India	W R Pankaj et al (2014)	1.25
5	South India	Pilli N (2013)	4.25
6	Eastern India	Present Study	3.68

Table 3: Racial variation in the incidence of metopism.

S. no	Authors	Population	Incidence
1	Bryce	European	8.7
2	Bryce	Mongolian	5.1
3	Bryce	Negro	1.2
4	Bryce	Australian	1
5	Bryce	Scottish	9.5
6	Jit & Shah	Indian-Punjab	5
7	Woo	Mongolian	10
8	Woo	Negro	2
9	Breathnach	European	7-10
10	Breathnach	Yellow Race	4-5
11	Breathnach	African	1
12	Romanes	European	0-8
13	Das	Indian-UP	3.31
14	Agarwal	Indians	2.66
15	Ajmani	Nigerian	3.4
16	B.V.Murlimanju	Indians	1.2
17	Hussain Saheb S	Indian-South	3.2
18	Chanwit Maneenin	North-East, Thi	10.12
19	Present Study	Indian-East	3.68

DISCUSSION

The study revealed that incidence of metopism in East Indian adult population is 3.68% which was comparable to other parts of India. Infact the studies carried on Indian population have revealed that incidence of metopism in different region of country vary between 2.66-5% [5,6,8]. Murlimanju observed incidence of metopism in Indian population- 64.1% [9].Hussain Saheb S et al reported incidence of metopism in South Indian skulls as 29.6% [10].

Ajmani M.L.et al observed the presence of metopic suture in 34.97% in Nigerian populations [11].

Abnormal growth of cranial bones, hydrocephalus, growth retardation, sexual influence, hereditary, atavism, stenocrotaphia (abnormal narrowing of skull), plagiocephaly (cranial malformation causing a twisted and asymmetrical head due to synostosis of cranial suture), Scaphocephaly (deformed head projecting forward keel of boat), mechanical and hormonal dysfunction may be the contributory factors of metopism [12]. Apert syndrome may be associated with impaired closure of metopic suture [13].

CONCLUSION

The present study was carried out in 133 adult human dry skulls. Out of which no metopic suture was observed in 84 skulls,14 had 'V' shaped,11 with 'U' shaped,6 had 'Y' shaped and 17 with 'Linear' suture. Metopism was observed in 40.17% of skulls.

A linear vertical fracture of frontal bone may be misdiagnosed as persistant metopic suture. Thus anatomical knowledge of metopic suture is helpful for both Radiologists and Neurosurgeons for diagnosis and treatment of head injury patients. Previously no such study involving Eastern Indian population was carried out. So the present study is unique as it may provide useful information in both diagnostic and treatment purpose. More extensive study in future is required to get conclusive data.

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Conflicts of Interests: None

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