Original Article

Incidence of Metopic Suture in Adult Human Crania in Uttar Pradesh

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Abstract

Introduction: Failure of ossification in the vertical direction between the two halves of the frontal bone is called a metopic suture; this suture is present in between the superciliary arch and tubers of the frontal bone so it is also called a median frontal suture. At birth, the frontal bone present is two half, in the 1st year they contact each other, and within the 7th to 8th year, they fused together. Sometimes, bones may not be fused completely and it becomes metopic fontanelle. **Materials and Methods:** The goal of the current study was to determine the prevalence of metopic suture in adult human skulls in Uttar Pradesh. One hundred and fifty macerated skulls of undetermined age and sex were used for this. The anatomical departments of Teerthankar Mahaveer Medical College and Research Center (Moradabad), King George Medical College (Lucknow), SRMS Institute of Medical Science (Bareilly), Govt. Medical College Kannauj, and Govt. Medical College Saharanpur provided these skulls. **Results:** This study has found the incidence of metopic sutures of about 12.90%. The two types of metopic sutures were found in this study, namely complete metopic suture 4.52% and incomplete metopic suture 8.38% in which found 0.64% "V" shape metopic suture. **Conclusion:** The morphological study of metopic sutures on adult crania is useful for anatomists, experts in forensic medicine, and neurologists for performing surgical procedures in this area.

Keywords: Anterior cranial fosse, frontal bone, metopic suture, metopism, plagiocephaly, scaphocephaly, stenocrotaphia, suture

Introduction

The skull is derived from the skull which mean head;[1] bone of the skull articulate with each other by a fixed joint but mandible is detachable.[2] Metopic suture is regarded to be a normal variety of the cranial sutures since it develops as a result of the two frontal bones failing to unite during intraembryonic development.[3] The failure of ossification in the vertical direction between two half of the frontal bone is called metopic suture [Figure 1]. This suture present in between supercillary arch and tubers of the frontal bone[4] so that it also called median frontal suture.[5] At birth, the frontal bone present is two half, in 1st year, they contact with each other, and within 7th to 8th year, they fused together. Sometimes, bones may not be fused completely and it becomes metopic fontanelle. Sometimes, wormian bones may also be present.[6] When suture is extend from nasion to bregma called metopism [Figure 2], it is more common in higher races and in flatten back of the skull called brachycephalics.[7] When the metopic suture is closed early is called scaphocephaly,[8,9] it is observed that metopic suture endures well into old age, long after other sutures have failed[10] which is called metopism [Figure 3].[11] The remaining cranial sutures begin to close between the ages of 26 and 30 years. There are subsequent activity intervals by the age of 50 years, and the sutures are fully closed by the end of the seventh decade.[12] The structure of the metopic suture is crucial because radiological scans can use it to spot the cranial fractures.[6] In addition, forensic medicine and paleodemography also depend on it. The examples of metopism include sexual influence, genetics, development stoppage, stenocrotaphia (abnormal narrowing of the temporal region of the head) [Figure 4], plagiocephaly (cranial deformity),

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Figure 1: The arrow showing complete metopic suture (metopism) from nasion to bregma

Figure 2: The arrow showing complete metopic suture (metopism) continue with sagittal suture

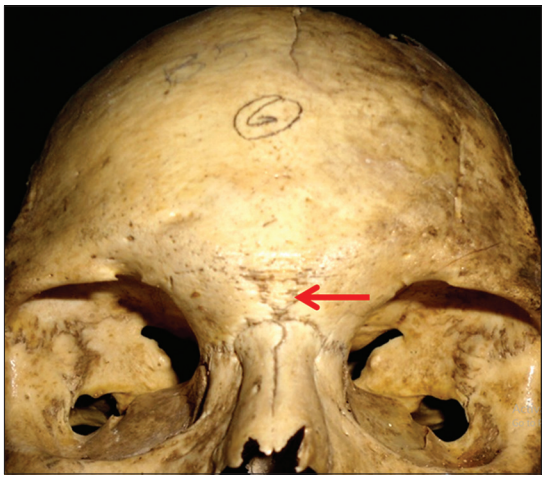

Figure 3: The arrow showing "V" shape metopic suture

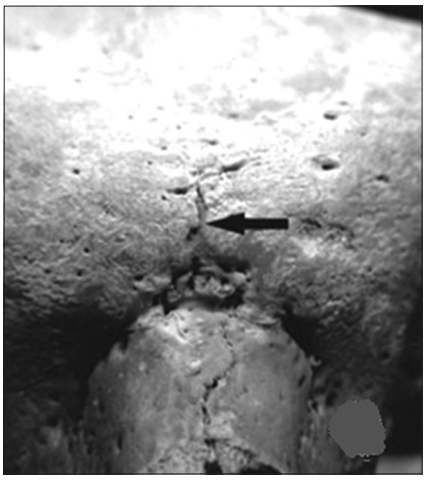

Figure 4: The arrow showing linear metopic suture

and atavism is the appearance of a characteristic thought to have existed in a distant ancestor as a result of random gene recombination or environmental factors that favor its expression in the embryo), and atavism. It is found in abnormal growth of the cra currently, the component that the scientific community accepts as having the greatest influence is genetics.[6] Objectives: (1) To estimate how often metopic sutures occur. 2. To divide full and imperfect metopic sutures into categories. 3. To group the imperfect variety based on how it looks. 4. To compare the results with earlier research. 5. Go over the characteristics and significance of the metopic suture.

Materials and Methods

Study design

The current research was observational study

Study setting

Performed in the anatomy department of SMMH Government Medical College Saharanpur and sample was collected from different medical colleges in Uttar Pradesh such as Govt. Medical College Kannauj, Teerthankar Mahaveer Medical College and Research Center Moradabad, King George

Table 1: Comparison of present study with others studies for Incidence of Metopic suture and Metopism

Author	Incidence of metopic suture (%)	Incidence of metopism (%)
Das *et al*.	24.56	3.31
Inderjit and Shah	32.5	5
Ajmani *et al*.	34.4	3.4
Linc and Fleischman	11	-
Yadav *et al*.	18.04	3.5
Agarwal *et al*.	38.17	2.66
Santhosh CS *et al*.	13	6
Present study	12.90	4.52
Rau	-	4
Woo	-	10
Fakhruddin	-	2
Dixit and Shukla	-	2.53
Present study	-	4.52

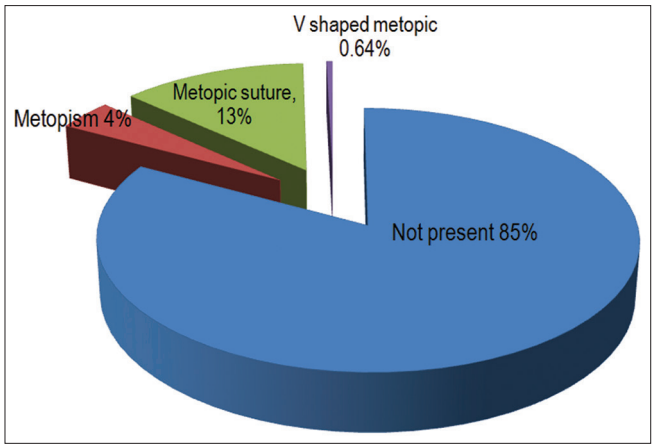

Figure 5: Pie chart shows Incidence of Metopic suture and metopism

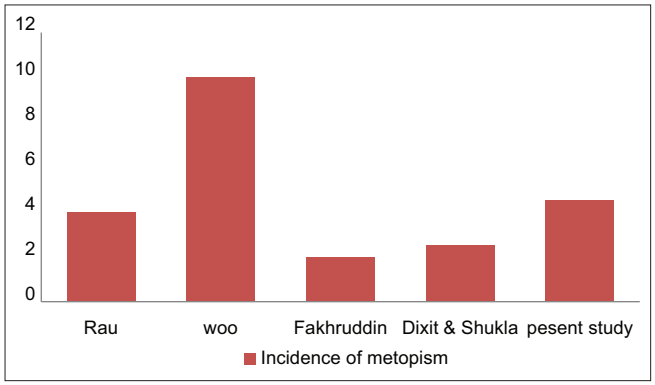

Figure 7: Bar diagram shows the comparison of the present study with others for complete metopic suture

Medical College, Lucknow, SRMS Institute of Medical Science Bareilly, and MVASMC collected. The study was performed after taking institutional ethical clearance, and then, the skull was wipes with clean, dry soft cloth and the incidence of metopic suture was observed at different level.

Sample size

Total 155 sample was collected

Exclusion criteria

Exclude damaged skulls and skulls with the signs of diseases were excluded from the study.

Results

This study has shown an incidence of metopic sutures 12.90% [Figure 5] Two type of metopic sutures were found in this study namely complete Metopic suture 4.52% [Figures 1 and 2] and incomplete Metopic suture 8.38% in which found 0.64% "V" shape Metopic suture [Figures 3 and 8].

Statistical analysis

The results are presented in frequencies, percentages and mean±SD. The Chi-square test was used to compare categorical variables. The Unpaired t-test was used to compare continuous variables. The p-value<0.05 was considered significant. All the analysis was carried out on SPSS 16.0 version (Chicago, Inc., USA).

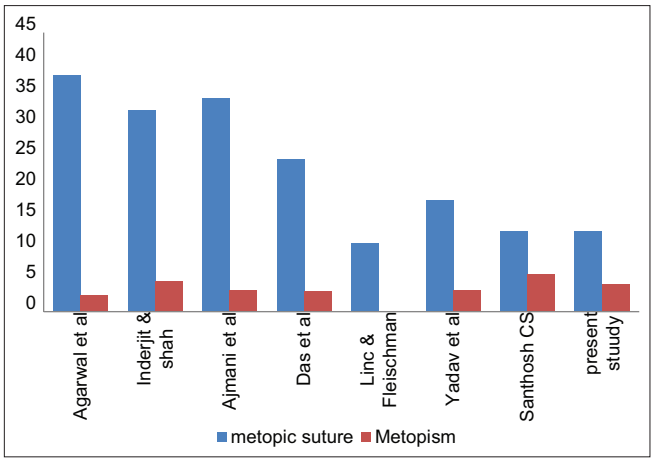

Figure 6: Comparison of present study with others Author for Incidence of Metopic suture and Metopism

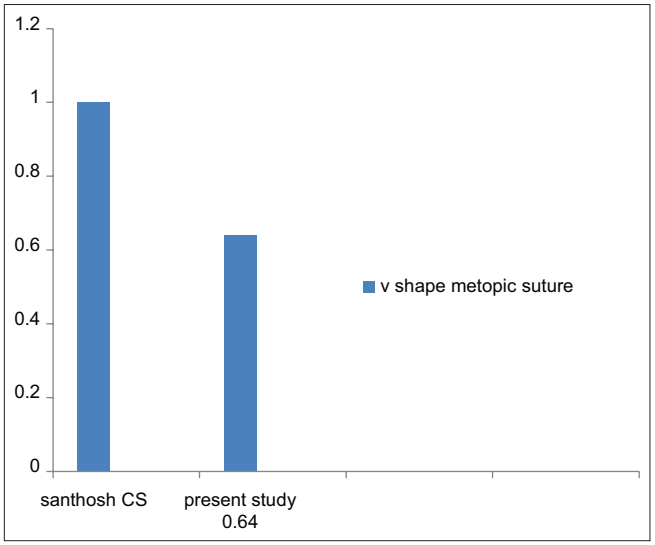

Figure 8: Comparison of present study with others for "v" shape Metopic suture

Table 2: Comparison of present study with others for "V" shape metopic suture

Author	V shaped metopic suture (%)
Santhosh CS	1
Present study	0.64

Discussion

We found that confliction between so many literature that concern the exact time duration of closure and fusion between infant and early toddler years stated by Keith.[1] This study found the incidence of metopic suture was 12.90% of adult Indian crania which is low when compared to the other study accept Linc and Bilodi *et al*.[22] Fleischman study. The incidence of metopism in

this investigation was observed 4.52% in Indian skulls, which is quite higher then Fakharuddin & Bhalerao[19] Dixit & Shukla, Das *et al*.[20] Agarwal *et al.,*[10] Ajmani *et al*.,[15] and Del Sol *et al*.[16] Yadav *et al.*, accept Inderjit & shah,[21] Woo and coincide with Rau and less then Santhosh CS *et al*.[17] In these study, "V" types of metopic sutures were found only in one skull which is about 0.64% in North Indian human skull which is less than Santhosh *et al*.[17] who found 1% in South Indian human skulls [Figures 6 and 7]. In adults, a radiographic finding is the metopic suture's persistence with clinical importance. Persistent metopic suture may conceal a frontal bone fracture as well as other clinically relevant anatomical alterations, such as anomalies in the frontal air sinus. The prevalence of metopism has not yet been determined in a number of craniofacially and geographically diverse populations. Metopic suture has been linked to cleft lip, cleft palate, and frontal sinus anomalies among other craniofacial deformities. According to the majority of studies, women are more likely than men to experience metopism.[18] We found that confliction between so many literatures that concern the exact time duration of closure and fusion between infant and early toddler years stated by Keith.[1] This study found the incidence of metopic suture was 12.90% of adult Indian crania which is low when compared to the other study accept Linc and Bilodi *et al*.[22] Fleischman study. The incidence of metopism in this investigation was observed 4.52% in Indian skulls, which is quite higher then Fakharuddin & Bhalerao,[19] Dixit & Shukla, Das *et al*.,[20] Agarwal *et al.,*[10] Ajmani *et al*.[15] and Del Sol *et al*.[16] Yadav *et al.*, accept Inderjit & shah,[21] Woo and coincide with Rau and less then Santhosh CS *et al*.[17] In these study "V" types of metopic sutures was found only in one skull which is about 0.64% in nourth Indian human skull which is less then Santhosh CS et al17 who found 1% in south Indian human skulls [Figures 6 and 7]. In adults, a radiographic finding is the metopic suture's persistence with clinical importance. Persistent metopic suture may conceal a frontal bone fracture as well as other clinically relevant anatomical alterations, such as anomalies in the frontal air sinus. The prevalence of metopism has not yet been determined in a number of craniofacially and geographically diverse populations. Metopic suture has been linked to cleft lip, cleft palate, and frontal sinus anomalies among other craniofacial deformities. According to the majority of studies, women are more likely than men to experience metopism [Tables 1 and 2].[18]

Conclusion

The morphological study of adult Indian Crania I considered the incidence of metopic suture, this study has found the incidence of metopic sutures about 12.90%. The two types of metopic sutures were found in this study, namely complete metopic suture 4.52% and incomplete metopic suture 8.38% in which found 0.64% "V" shape metopic suture. The differences found in the parameter in this study may be due to racial and numerical variations. The morphological study of metopic suture on adult crania is useful for anatomists, experts in forensic medicine, neurologists and radiologists for performing surgical procedures in this area. Therefore, when viewing the X-ray, computed tomography, or magnetic resonance imaging films, one should consider the occurrence of metopic sutures to avoid misunderstanding and to prevent the erroneous diagnosis in emergencies.

Anatomical information on the metopic suture's durability and alterations in the adult population of India and its relationships with anthropometric types of skull were provided in this study to contribute to the scientific literature.

Study limitations

The low number of examined skulls was the main limitation of the present study, which resulted in a limited number of observations for some kinds of the incomplete metopic suture. The limited number of observations concerning the sutures type did not allow the investigation of gender impact on the incomplete metopic suture different morphological patterns.

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Conflicts of interest

There are no conflicts of interest.

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