

## INCIDENCE OF METOPISM IN ADULT HUMAN SKULLS

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### Abstract

**Background:** The metopic suture is found in the skulls of infants and children and connects the two halves of the frontal bone. Typically, this suture disappears at the age of 6–8 years. However, if it persists beyond this age, it is called metopism. This study aimed to ascertain the prevalence of metopic sutures in the adult skull. **Materials and Methods:** The study involving 100 adult dry skulls categorised the metopic suture into complete suture or metopism and incomplete sutures- linear, V-shaped, or U-shaped. **Result:** The incidence of metopism was 1%, and incomplete sutures were observed in 23.2% of the examined skulls. Examination of skulls revealed diverse patterns of metopism. Among the observed skulls, only one displayed a complete suture or metopism extending from the nasion to bregma. In contrast, incomplete metopic sutures were identified more commonly. Specifically, 14 skulls exhibited a linear pattern, six displayed a V-shaped pattern, and three showed a U-shaped pattern. **Conclusion:** Metopism was found to be 1%, involving only two out of 82 skulls. 2D and 3D CT are strongly recommended to avoid incorrect emergency diagnoses.

## INTRODUCTION

"Metopic" originates from Greek, signifying its location "in the middle of the face." The Frontal or Metopic suture is situated between two halves of the frontal bone along the midline. Typically, closure of this suture is initiated by the second year of life and entirely obliterated by the eighth year. However, there is the possibility of partial or complete failure of obliteration, leading to the persistence of the metopic suture in the adult cranial structure. This persistence can manifest partially or completely, extending from the nasion to bregma. The condition in which the metopic suture persists into adulthood is referred to as "Metopism".<sup>[1]</sup>

A metopic suture is a distinctive feature for identification purposes, especially in cases involving unidentified bodies. It can mimic the appearance of skull fractures when observed using X-rays. Optimal identification of the metopic suture is achieved through an anteroposterior (A-P) view of the skull, aiding differentiation from a vertical skull fracture. The prevalence of Metopism is reported to be within the range of 0-7.4%, as documented in Gray's Anatomy.<sup>[2]</sup> The frontal bone ossifies from two primary centres; therefore, two halves at birth are separated by a metopic suture extending from the nasion to the anterior angle of the bregma, which usually disappears within eight years of age. The

persistence of this suture in adults is termed metopism. According to Del et al., metopism can be caused by abnormal growth of the cranial bones, growth retardation, heredity, atavism, hydrocephalus, sexual influence, stenocrotaphia, plagiocephaly, scaphocephaly, mechanical causes, and hormonal dysfunction. The incidence of metopism is 0.7-4%.<sup>[3]</sup> This study aimed to ascertain the prevalence of metopic sutures in the adult skull.

## MATERIALS AND METHODS

This study involved a meticulous examination of 100 skulls sourced from Institute of Anatomy, Madras medical college. Inclusive of adult skulls from both sexes, the investigation prioritized demographic diversity for a robust analysis of complete metopic suture persistence. The primary focus was on complete rather than partial persistence, enhancing precision and clarity in findings. The metopic suture, a clinically significant cranial fibrous joint, underwent refined classification into complete suture (metopism) extending from nasion to bregma and incomplete suture, including linear, V-shape, and U-shape subtypes. This thorough examination aimed to reveal the prevalence, characteristics, and morphological diversity of metopic suture persistence in adults. The deliberate exclusion of

partial persistence underscores the study's commitment to an in-depth exploration of complete metopic suture patterns, contributing insights into cranial development, anatomical variations, and potential forensic applications. The methodology ensures a rigorous and systematic approach, laying the foundation for a nuanced understanding of metopic suture persistence in the studied population.

## RESULTS

The incidence of metopism was 1%, indicating a relatively low occurrence of persistent metopic sutures in adult human skulls. Incomplete sutures were more prevalent, observed in 23.2% of examined skulls. Examination of skulls revealed diverse patterns of metopism. Among the observed skulls, only one displayed a complete suture or metopism extending from the nasion to bregma. In contrast, incomplete metopic sutures were identified more commonly. Specifically, 14 skulls exhibited a linear pattern, six displayed a V-shaped pattern, and three showed a U-shaped pattern.

**Table 1: Type of metopism in human adult skulls**

Types of metopism		Number of skulls with suture
Complete suture/Metopism		1
Incomplete suture	Linear	14
	V shape	6
	U shape	3

## DISCUSSION

In the present study, the incidence of metopism was found to be 1% which is similar to the study reported by Herker et al,<sup>[4]</sup> as 1% and Bryce et al.<sup>[5]</sup> as 1% in Australians and 1.2% in Negros, Wadekar et al,<sup>[6]</sup> as 1.25% in North Indian skulls, but less than that reported by Inder Jit and Shah,<sup>[7]</sup> in Punjabi skulls as 5% and Chandrasekaran and Shastri,<sup>[8]</sup> in South Indian skulls as 5%. Similarly, in the present study, the incidence of incomplete metopic sutures was 23%, which is closer to the study conducted by Wadekar et al,<sup>[6]</sup> in North Indian skulls, reporting an incidence of 22.5%.

A study conducted by George and Thenmozhi observed incomplete Metopism in 7 skulls and complete Metopism in 2 skulls, constituting 4% of the 50 South Indian skulls examined.<sup>[9]</sup> Similarly, in a study by Vidulatha and Parthiban on skulls from Madurai, Tamil Nadu, 10 out of 300 skulls exhibited Metopism, representing a prevalence of 3.3%.<sup>[10]</sup> Nayakanati et al. conducted a comprehensive study involving 500 skulls sourced from various colleges in South India. Their findings revealed that the incidence of Metopism was 2.2%, with 11 cases identified out of the total sample size of 500.<sup>[11]</sup>

A study by Pilli and Sunder examined 180 adult skulls aged 30–60 years for metopic sutures. Among these, 103 skulls exhibited the absence of a Metopic suture, while nine skulls displayed the presence of a complete Metopic suture.<sup>[12]</sup> Basha and Sugavasi studied South Indian skulls, revealing that persistent Metopic sutures were completely observed in one out of 100 dried human skulls.<sup>[13]</sup> A complete Metopic suture incidence in our study was 1%.

## CONCLUSION

In the present study, the incidence rate of metopism was 1%. This study helps radiologists differentiate vertical frontal bone fractures from metopic sutures and neurosurgeons in treating patients with head injuries, especially during frontal craniotomy procedures. 2D and 3D CT are strongly recommended to avoid incorrect emergency diagnoses. The multiplanar reformat of CT scans provides valuable information regarding the metopic suture's shape, extent, and closure status. In addition, autopsy surgeons should be updated with the anatomical entity of persistent frontal suture while differentiating it from midline fissure fracture of the skull.

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