Research Article

A STUDY OF WORMIAN BONES IN SOUTH INDIAN POPULATION

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ABSTRACT

Wormian bones or Sutural bones are small, irregular ,worm like bones found along the sutures of the skull .In the present study,66 adult human skulls were meticulously analysed for the presence and distribution of the sutural bones. In the present study the incidence of wormian bones was 34.84 %. Many skulls had combination of wormian bones at different sites. The incidence was 18.1% at the lambdoid suture, 9.09% at asterion and 3.03% at pterion. Wormian bone at lambda was observed in 12.12% of skulls .In the present study, it was found that incidence of inca bones were more when compared to previous studies on sutural bones. The knowledge of prevalence of wormian bones and their topographical distribution is important for medical personnel like radiologists and neurosurgeons and anthropologists.

Keywords: Asterion, Inca bones, lambdoid suture, Wormian bones.

INTRODUCTION

Wormian bones or Sutural bones are small, irregular ,worm like bones found along the sutures of the skull.¹They can have different irregular shapes (round, oval, oblong, triangular, quadrilateral and polygonal) and vary from under 1mm in diameter to 5x9cm or 1-2 inches in diameter.²They are first described by Olaus Worm,a Danish anatomist (1588-1654) and named by Bartholin as Ossa Wormiana.³ Wormian bones articulate with the adjoining bones of the skull by sutures with indentations which are more complex on the outer surface of the skull than on the inner aspect.²

The etiology of formation of sutural bones is obscure. Most of the skulls shows this as a normal variant. It may be due to presence of accessory ossification centres.⁴Some authors opine that it may be due to congenital disorders like hydrocephalus, osteogenesis imperfecta, cleidocranial dysostosis or due to nutritional defects like cretinism,rickets,hypophostasia.⁵

Wormian bones are named according to their site of formation, in most cases, derivative of the suture or sutures they are in contact with or with the centres of ossification or fontanel where they are formed. A small bregmatic bone ossifies in the frontal fontanel in some species and occur as an anomaly in human beings. Paracelsus called it the antiepileptic bone because he believed it served as a pop-up valve for relieving pressure in the head.⁶ Pterion ossicles are named as epiteric bones.⁷ Wormian bones occurring at lambda is called as Inca bone or Goethe ossicles. Tschudi(1844) labeled this as Os inca.⁸ The postparietal bone is called as Inca bones because it is common in Inca Indians.⁶The bones occurring at lambda may be preinterparietal,true interparietal or composite.

The present study aims at analyzing the frequency of occurrence of wormian bones and their topographical distribution in South Indian adult skulls.

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MATERIALS AND METHODS

The skulls used for the present study were procured from the Anatomy Department, Karpaga Vinayaga Institute of Medical Sciences, Madhuranthagam. A total of 66 human adult dry skulls were examined to determine the frequency of incidence of sutural bones in south Indian population along with their topographical distribution. The age and sex of the skulls were not determined as they out of scope of this study. The skulls were analysed for pattern of sutural bones and photographed.

RESULTS

Sutural bones were seen in 23 out of 66 skulls. The present study showed the sutural bones were more common in the lambdoid suture with the incidence of 18.1%. The next common site was lambda (Inca bones) with incidence of 12.12%. Asterion showed wormian bones in 9.09% of skulls and at pterion, it was 3.03%. Wormian bone is present in the saggital suture in only one skull (1.51%).

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Sutural bones present	Number of skulls	Frequency
Lambdoid suture	12	18.1%
Lambda (Inca bones)	8	12.12%
Asterion	6	9.09%
Pterion	2	3.03%
Saggital suture	1	1.51%
Coronal suture	0	0%

Table-1:Topographical incidence and frequency of sutural bones



Fig 1:Skull showing wormian bones at A)Lambdoid suture B)asterion C)Pterion and D)Lambda(Inca bones)

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DISCUSSION

Wormian bones or sutural bones can occur in both normal and pathological skulls. Their cause is still undefined, nevertheless it has been related to genetics, in terms of population, as well as external forces, such as stress conditions.⁹The sutural bones are due to imbalance between cranial changes in size and shape during ontogenesis.¹⁰ The number of wormian bones increases with the capacity of skull, regardless of the cause of enlargement.³

Normally the number of wormian bones does not exceed two or three in a normal skull but they present in large number in hydrocephalus.⁷

The overall incidence of wormian bones in the present study was 34.84% which was lower than that reported by muralimanju et al $(73.1\%)^{11}$ and manjula patil et al $(52.21\%)^{12}$.

Most of the studies showed that the incidence of sutural bones were more common along the lambdoid suture. It was reported to be 40% by bregman et al^{10} and 56.4% by muralimanju et $al^{.11}$ The present study also coincides with this finding with the incidence of 18.1%.

The incidence at pterion in the present study is 3.03% which was lower than that reported by muralimanju et al $(11.5\%)^{11}$ saxena et al $(11.9\%)^{13}$ and higher than that by shivleela et al(1.85%).¹⁴ Epiteric bones complicates in making burr holes at the pterion.¹⁵

The occurrence of wormian bones at asterion is 9.09% in the present study is lower than that reported muralimanju et al(17.9%).¹¹

The incidence of Inca bones is higher in this study with the frequency of 12.12% which is more than that reported by vivek nirmale et al $^{16}(4.054\%)$,Robet gazel et al $(1.9\%)^{17}$ and singh BJ et al (0.4%).¹⁸

The occurrence of inca bones are postulated due to the fact that the squamous part of the occipital bone above the highest nuchal line, is developed in a fibrous membrane and is ossified from two centers and this part of the occipital bone remain as the interparietal bone of the cranium.⁷ The awareness about the occurrence of sutural bones and their topographical distribution will guide the radiologists and neurosurgeons to avoid misdiagnosis. It is matter of academic interest to the anatomists.

From the present study, it was concluded that even though the occurrence of wormian bones is low in south Indian population compared to other regions, but the incidence of Inca bones were more. This may be considered as a pilot study, for a follow up study with more number of samples is planned.

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