**Short Report:**

**Topography of Wormian Bones in Cadaveric Dry Skulls**

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**Abstract:** Apart from the normal cranial bones, a few supernumerary/wormian bones can be seen in dry skulls. This study intends to find the presence of wormian bones in the skulls pertaining to the coastal region of south India. Eighty-eight dry adult skulls were observed for the wormian bones. The results show that sixty-two skulls had wormian bones. Majority of these were observed at the lambdoid suture. The presence of such bones are of great clinical importance to the radiologists and the neurosurgeon.

**Key Words:** Asterion, Lambda, Pterion, Skull, Wormian bones

**Introduction:**
Wormian bones [sutural bones or supernumerary bones], are considered to be the accessory bones, that are developed within the sutures of the skull bones. They are frequently observed in the lambdoid suture.(1) However, a few of these bones are also seen in pterion, where these are known as pterion ossicle or epipetric bone.(2-5) A few are also are seen at the lambda, where they are known as Inca bones since they are frequently sighted at this site in the mummified Peruvian skulls.(6,7)

Although their formation is controversial, a few authors claim that they are developed from external influences, genetically determined, detached portion of the primary ossification centres of the adjacent membrane bones.(8-10) Wormian bones are commonly seen in healthy individuals. However, their number increases in certain conditions like cleidocrania dysostosis, rickets, osteogenesis imperfect.(11) It is also claimed that the presence and number of these bones differ in different races and hence can be used in forensic medicine.(12)

Due to all these significances, the present study is aimed to note the topographical presence and the number of these bones in dried human cadaveric skulls.

**Materials and Method**
Eighty-eight dry human adult skulls of unknown age and sex, were used for this study. Disarticulated skulls were excluded. All the cranial sutures were observed for the presence of the wormian bones.

Out of the eighty-eight skulls, wormian bones were seen in 45 skulls and in the rest of the skulls they were absent. The results are tabulated in Table 1. It can be noted that no wormian bones were observed at the coronal suture and the sagittal suture.

<table>
<thead>
<tr>
<th>Location of wormian bones</th>
<th>Number of skulls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lambdoid suture</td>
<td>43</td>
</tr>
<tr>
<td>Lambda</td>
<td>8</td>
</tr>
<tr>
<td>Pterion</td>
<td>3</td>
</tr>
<tr>
<td>Asterion</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
</tr>
</tbody>
</table>

**Table 1: Results of the Study**

A total of nine wormian bones were observed at the lambdoid suture in one skull (Fig. 2). In thirty skulls (54%), the wormian bones were present at the lambdoid suture (Fig. 2). One among these thirty skulls, showed as many as nine wormian bones along the length of the lambdoid suture (Fig. 3). In twenty-three skulls (42%), the wormian bones were present at the asterion (Fig. 4) and in two skulls (4%), the wormian bones were seen at the pterion (Fig. 5).

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*Figure 1: Chart showing the presence of wormian bones*

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Discussion

Wormian bones are a common finding. Their location, size and number vary largely. According to Bergman et al., lambdoid suture is the most common site of sutural bones in about 40% of the skulls. This was followed by asterion [former posterolateral fontanelle] and the lambda. But according to Chambellan, the second commonest site of wormian bones is the coronal suture. However, according to Nayak, the second commonest site is the pterion [epipteric bone].

Parker, way back in 1905 suggested that the number of wormian bones is directly proportional to the length of the suture. It is postulated that the formation of wormian bones is unknown. However, mechanical or genetic factors are responsible for the sutures to move apart and hence, the wormian bones would arise in the sutures and the fontanelles, rather than within any other individual bone. The incidence of occurrence of wormian bones may be used to detect any anomalies associated with the central nervous system. It is also shown that small-sized, fewer wormian bones would be found in a normal individual, however, an individual with more than ten wormian bones needs to be thoroughly investigated for any underlying pathology.

The present study, one skull with nine wormian bones were seen in the lambdoid suture.

Embryological Significance: It may be noted that these wormian bones are located at the vicinity of the parietal bones. The ossification of the parietal bone begins from the center and radiate towards the periphery in the form of needle-like bone spicules. This would further close the suture and subsequently, the fontanelles. Hence, the formation of these wormian bones would be attributed to insufficient rate of closure of the suture. These bones further articulate with the surrounding bones by sutures and thus would be of variable shapes and sizes. Wormian bones may also develop as a result of abnormal ossification centers in the cranium.

Clinical Importance: The wormian bones may pose serious complications for radiologist in differentiating them from a skull fracture, that may be as a result of trauma, accident or physical abuse. This would further cause delay in administering the appropriate treatment. Owing to the less thickness of bones, the pterion acts as a keyhole for numerous intracranial surgeries, thereby permitting access to frontal and temporal lobes. Hence, the presence of wormian bones at this site may cause complications in making burr holes.

Therefore, the findings of the present study have added additional information to the existing findings.

References

Andrade LS, Kalthur SG. Topography of Wormian Bones in Cadaveric Dry Skulls.