

## MORPHOLOGICAL STUDY OF WORMIAN BONES IN CADAVER SKULLS

A. Vasanthi<sup>1</sup>, K. P. S. Adinarayana<sup>2</sup>, S. Pujitha<sup>3</sup>

### HOW TO CITE THIS ARTICLE:

A. Vasanthi, K. P. S. Adinarayana, S. Pujitha. "Morphological Study of Wormian Bones in Cadaver Skulls". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 12, March 23, 2015; Page: 1793-1800.

**ABSTRACT:** Wormian bones are accessory bones are not normally present in skull. They may or may not be associated with clinical abnormalities. In the present study a significant number of wormian bones were identified at the Department of Anatomy, Andhra Medical College, Visakhapatnam. Their incidence with other population were done in the present study.

**KEYWORDS:** Wormian Bones, Deformity, Lambdoid Suture Lucencie (thin) & serpegenous. (zig-zag).

**INTRODUCTION:** Sutural bones or wormian bones or super numarary bone or accessory bones are found in the cranium. They have no any irregularity with normal shape of the skull in some cases. In some skulls there is deformity of the normal shape of the skull. Their adoption to cranial enlargement, their relation to length, breadth and cranial deformity and genetic factors in the present study were discussed.

**MATERIAL AND METHODS:** A number of skulls of both sexes available at Department of Anatomy, Andhra Medical College, were taken for the present study. All skulls were washed with soda carb and dried up. Scale, thread, compass (divider) were utilized for measurement of length, width. Number of wormian bones (accessory bones) were identified manually and their position in relation to sutural lines and anatomical land mark were measured.

**DISCUSSION:** In the present study one adult skull without wormian bones is taken into consideration as normal. It has no any other abnormalities in the shape of skull and sutures. The sutural length and measurements of bone were taken as control. Among the skulls, containing wormian bones 10 skulls were identified, they are labeled from 1 to 10. In the present study all the wormian bones identified are irregular shape, and they are along suture lines. All skulls containing wormian bones are normal in shape. There are no any other anomalies in skull the presence of wormian bone reduces the size of neighboring bone. Majority of the wormian bones identified in the present study are frequently in the course of lambdoid suture.<sup>(1)</sup> The wormian bones may mimic fractures of skulls and may confuse medico legally.

Cephalic index (CI) of skull is identified as normal if less than 81 in skulls are identified. In the study of Sanchez – Lara PA<sup>1</sup>, Graham JM Jr, Hing AV, Lee J, Cunningham. M. There was an increase in number of wormian bones as the skull became more brachycephalic (Cephalic Index more than 93).<sup>(2)</sup>

In present study, it was identified that there is an increased incidence of wormian bones without alteration and deformity of the skulls. In previous studies presence of wormian bones is

# ORIGINAL ARTICLE

associated with premature fusion of sagittal suture and multiple lucencies in the skull bones. In the present study no premature fusion of sutural lines and lucencies in the skulls were found. Large wormian bone at lambda, which is otherwise called as Inca Bone (OS Inca)<sup>(3)</sup> was found in skull labeled as 10.

Increased incidences of wormian bones were reported in previous studies due to pathological, mechanical, environmental stress and genetic factors. The abnormal bones present in skulls named on the name of Professor Wormer. The embryological basis of wormian bones was compared with therapy side reptiles and mammalian skulls of dogs and cats. In the study of Sreekanth. Tallapaneni et.al<sup>(4)</sup> 2-3 in number in single skull. The presence of wormian bones increases the capacity of skull. In previous studies, the increased number of wormian bones is associated with increase of sutural length of skull. It suggested that sutural diastasis induces the formation of ectopic ossification centres. The formation and distribution of supernumerary ossicles may reflect different stress types (tension, pressure etc) Acting on the cranial vault during prenatal and early post natal periods of bone growth.<sup>(5)</sup> In the present study, no such sutural lengthening and distortion of skulls is identified. The genetic factors associated with wormian bones were stated as inherent dominant trait with incomplete penetrance (50% and variable expression).

**OBSERVATIONS:** In the present study, 100 skulls were observed. In 10 skulls wormian bones were found ranging from small to large were observed. The incidence is 10%.

The following observations were found skull wise and arranged in table form.

### Findings in normal skull:

Sagittal suture length – 12 cms.

Coronal suture length (right pterion to left pterion) – 21.5.

Lambdoid suture length (right asterion to left asterion) – 16 cms.

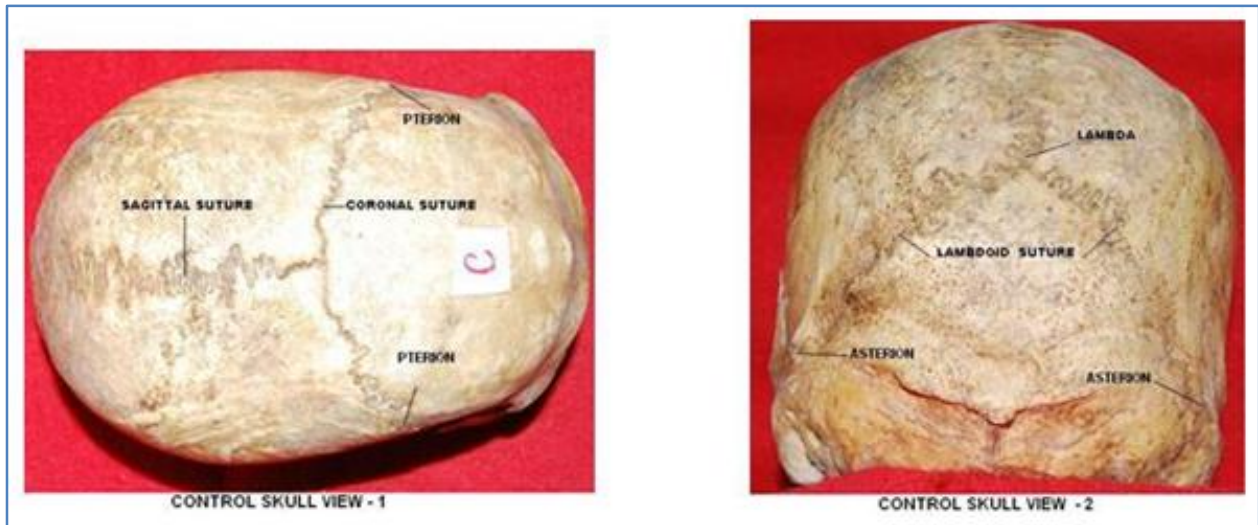
Skull no	Wormian bones present/absent	Location of wormian bone	Shape	Edges	Suture length		
					Sagittal suture	Coronal suture	Lambdoid suture
1.	One W B present	W B along sagittal suture near lambda	Irregular	Serpiginous	12.5 cms	20.5 cms	19cms
2.	One W B present	Small W B at left asterion	Tetrahydal	Irregular	12 cms	19 cms	19.5 cms
3.	2 W BS present	On either side near to asterion	Tetrahydal in shape	Serpiginous	13 cms	22.5 cms	20.5cms
4.	Small W B present another 2 W BS present	on either side at asterion	Oblong	Irregular	12 cms	22 cms	18.5 cms
		at lamda	Oblong	Irregular			
5.	7 W BS present	Along the lambdoidsuture on either side	Oblong	Irregular edges	11.5 cms	19.5 cms	17.5cms

## ORIGINAL ARTICLE

6.	One W B present	Lateral to the lambda on left side	Tetrahydal	Irregular	11 cms	22.5 cms	21.5cms
7.	5 W BSpresent	1) At left asterion 2) 1 cms above the left asterion 3) 3 cms lateral to lambda on left side 4) at lambda 1 cms x1cms in measurement 5) 1 cms lateral to lambda on Rt side 1.5 x 1 cms	Tetrahydal Oblong Small oblong Tetrahydal Oblong	Irregular Irregular Irregular Irregular Irregular	11.5 cms	21.5 cms	21cms
8.	6 W BSpresent	1. A large wormian present at lambdoid suture 2. medium size to the left lambda 3. 3cms lateral to lambda on left side 4. small wormian at left asterion 5. small WB present at rtasterion	Poloyhydal Tetrahydal Tetrahydal Irregular Tetrahydal	Irregular margins Irregular Irregular Irregular edges Irregular edges	11 cms	20 cms	21.5cms
9.	A small W B present	Immediately lateral to lambda on left side	Quadrilateral	Irregular edges	12 cms	20 cms	19cms
10	4 W BSpresent	1.A large W B (inca bone) present at the lambda 4x4 cms 2.another small W B present left side of inca bone 3. another W B ½ cms above the asterion on left side 4.another small W B, 1 cm above the asterion on right side	Tetrahydal in shape Elliptical Quadrilateral Oblong	Serpigenous Irregular edges Irregular Irregular	12 cms	23.5 cms	22cms

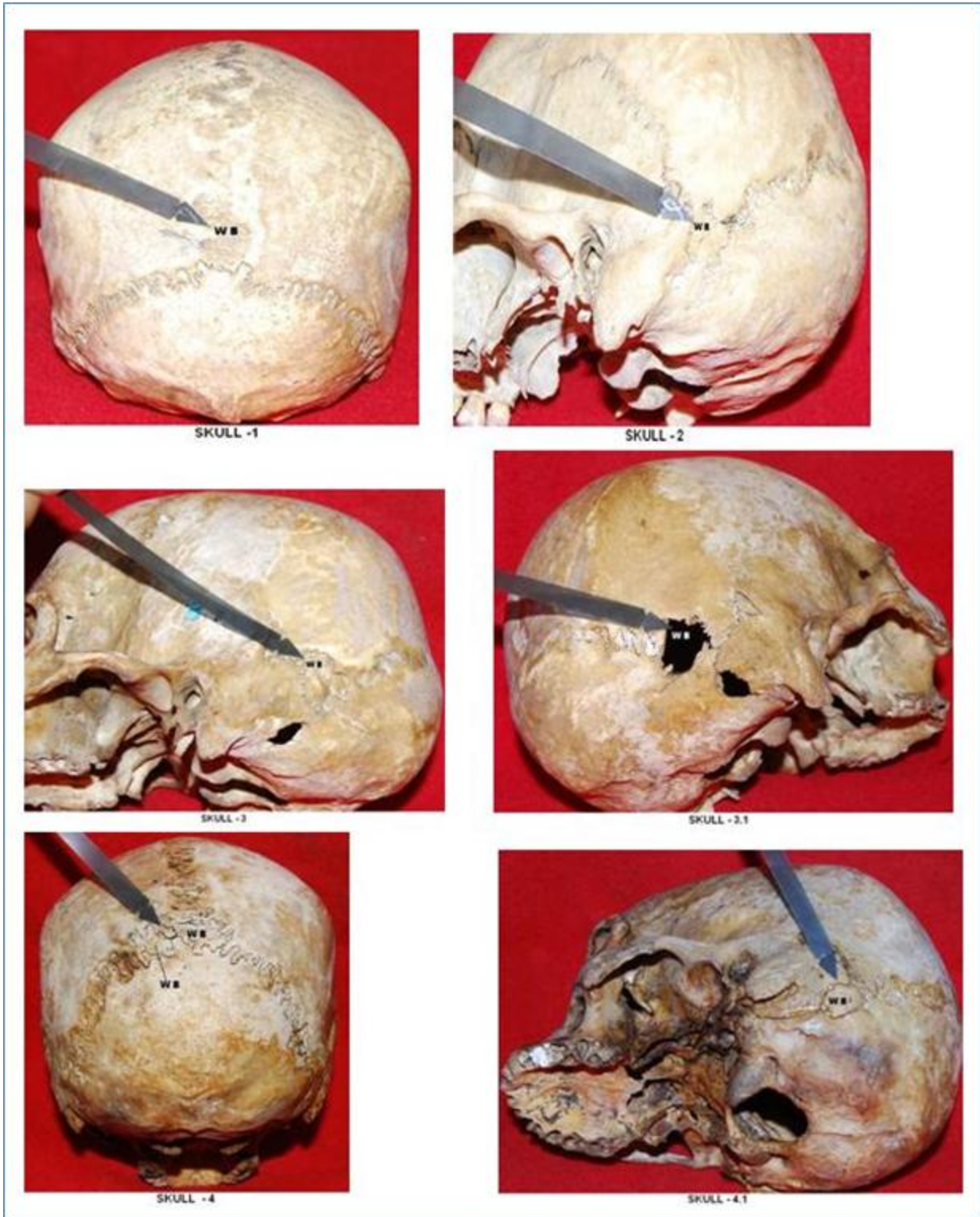
Table 1: Wormain Bones: (W B)

# ORIGINAL ARTICLE





# ORIGINAL ARTICLE



# ORIGINAL ARTICLE



SKULL - 4.2



SKULL - 5



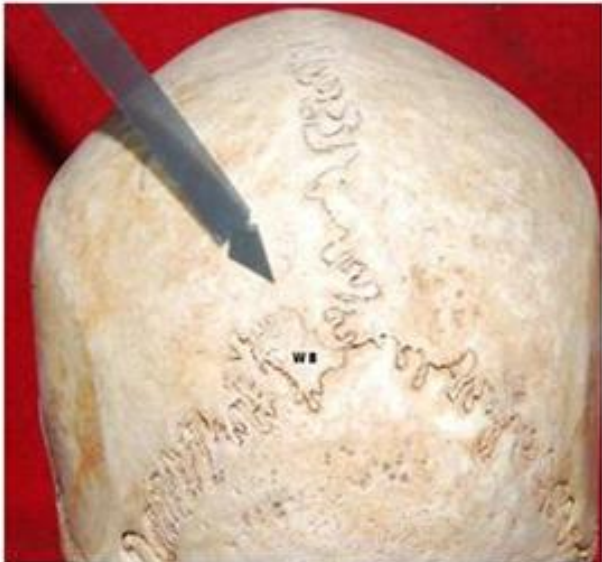
SKULL - 6



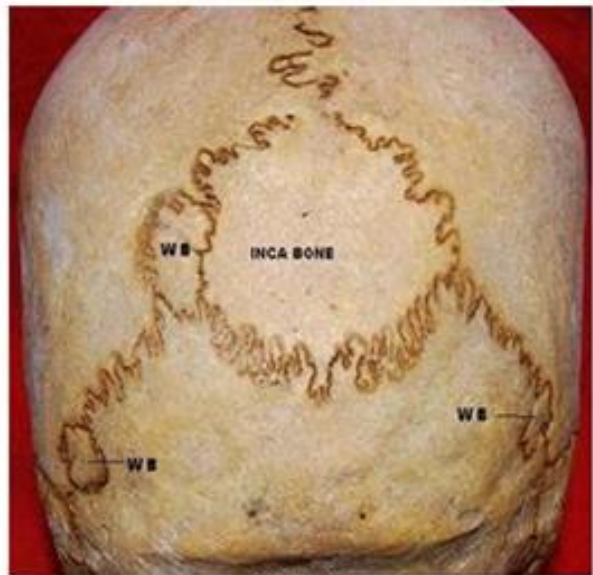
SKULL - 7



SKULL - 8



SKULL - 9



SKULL - 10



# ORIGINAL ARTICLE

---

**SUMMARY:** The maximum increase in the length of lambdoid suture in the skulls numbered 1 - 10 is as follows:

It is 5.5 cms in skull no. 3 and 8.

5 cms in skull no. 7 and 10.

4.5 cms in skull no.6.

3.5 cms in skull no. 2.

3 cms in skull no. 9.

2.5 cms in skull no. 4. and 1.5 cms in skull no. 1 and 5.

Hence, it is inferred that the presence of wormian bones and change of lambdoidsutural length are not associated with significant distortion of skull.

**CONCLUSION:** The present study of wormian bones and its incidence of 10% focus that the present population may have genetic drift in future. The present study focuses the Neuro Surgeons, Radiologists, and Clinicians not to ignore the occurrence of wormian bones during their clinical approach to the patients as a routine incidence. Further evaluation of wormian bones need to be done in further studies.

## REFERENCES:

1. Semler O, Cheung M. S, Glorieux F. H, Rauch. Wormian bones is Osteogenesis Imperfecta – correlation to clinical findings and genotype. *Am J Med Genet A.* 2010Jul; 152A (7): 1681-7.
2. SANCHEZ –LARA PA, GRAHAMJMJR, HIND A LEE J, CUNNINGHAM M, The morphogenesis of wormian bone a study of craniosynostosisand purpose cranial deformation. *American Journal of Medical Genetics Part A,* 134A (24): 3243-3251.
3. Parente k, Mercado – daene MG; Brummund, T (2001) "Radiological case of the month" *Archives of pediatrics and adolescent medicine* 155(6) 731-2  
doi: 10.1001/arch pedi.155.6.731 PMID 11386967. Retrieved 2008-11-02.
4. Sreekanth Tallapaneni, Chigurupati Namrata, Swathi Veliginti, Abishek Mogili, Shahzeb Zaman, Faraz AdilHashmi. Fourteen wormian bones in an adult Indian skull – A rare case report. *Medical Science,* 2013, 1(3), 55-59).
5. Barberini et al 2008, an unusually-wide human bregmatic wormian bone: anatomy, tomographic description, and possible significance, *Surgical and Radiologic Anatomy.* November 2008, Volume 30, Issue 8, pp 683-687.

# ORIGINAL ARTICLE

---

**AUTHORS:**

1. A. Vasanthi
2. K. P. S. Adinarayana
3. S. Pujitha

**PARTICULARS OF CONTRIBUTORS:**

1. Assistant Professor, Department of Anatomy, Andhra Medical College, Visakhapatnam.
2. Incharge Professor, Department of Anatomy, Andhra Medical College, Visakhapatnam.
3. Dental Surgeon & Physician, Department of Dentistry, Andhra Medical College, Visakhapatnam.

**NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. K. P. S. Adinarayana,  
# 49-9-33, Lalitha nagar,  
Visakhapatnam-530016.  
E-mail: kpsnarayana@rediffmail.com

Date of Submission: 02/03/2015.  
Date of Peer Review: 03/03/2015.  
Date of Acceptance: 17/03/2015.  
Date of Publishing: 19/03/2015.