

# Occipital Knob-Morphological Variations in Human Dried Skulls and Clinical Perspectives

Dr. Neelima. P<sup>1</sup>, Dr. R. Ravi Sunder<sup>2</sup>

<sup>1</sup>Professor & HOD, Department of Anatomy, NRIIMS Sangivalasa, Visakhapatnam, Andhra Pradesh, India

<sup>2</sup>Professor & HOD, Department of Physiology, GIMSR, GITAM deemed to be University, Visakhapatnam, Andhra Pradesh, India

## ABSTRACT

Prominent external occipital protuberance is called occipital knob or spur or occipital bun. Though it was a persistent feature of early modern Europeans, it is extremely rare in the present modern era. Occipital spur was found to be one of the characteristic features of the ancestral Neanderthal trait. Variant anatomy of occipital region forms differential diagnosis in conditions associated with unexplained occipital pain. The present study has been done to evaluate the different morphological forms of occipital knobs. 56 skulls including partial and complete skulls were examined in the department of Anatomy. Broken and incomplete skulls were excluded from the study. 5 (8.92%) skulls were found to exhibit different forms of occipital knobs. 3 skulls had type 1 (flat) occipital knob. Type 2 (crest) and type 3 (spine) variants have been observed in one skull each. An inca bone was found coincidentally in a skull with flat type of occipital knob which also had three accessory emissary foramina located near foramen magnum. The skull with crest type of occipital knob had two accessory emissary foramina-at the external occipital crest and near foramen magnum. Knowledge of variant occipital knobs is an example of application of basic sciences in clinical correlation, one of the goals of the new competency based medical education. Though asymptomatic, discomfort in the occipital region due to occipital spur has to be notified in the differential diagnosis. When symptomatic it could be one of the etiology of occipital headache, mandating surgical excision. To conclude, our study presents occipital knob which is a rare variant of occipital bone near external occipital protuberance that exhibited three forms- flat, crest and spine. Coincidentally inca bone and accessory emissary foramina near foramen magnum also have been observed.

**KEYWORDS:** *Enlarged external occipital protuberance, occipital knob, occipital pain, accessory emissary foramina*

## INTRODUCTION

External occipital protuberance is a midline ridge or a distinct process in occipital bone which can become well developed in males <sup>(1)</sup>. The protuberance may become prominent contributing to unexplained neck pain or discomfort. A study by Srivastava et al <sup>(2)</sup> explains that pain at the base of the skull may be due to occipital spurs which may extend to shoulder and neck restricting their movements. Though reported rarely, three types have been described by Varghese et al <sup>(3)</sup> -flat (type-1), crest (type-2), spine (type-3). A study by Shahar et al <sup>(4)</sup> reports the frequent finding of

occipital spurs in males which is often used in forensic investigations to determine the gender. Though seen occasionally, occipital spur may show growth spurts during late adolescence. Singh R <sup>(5)</sup> reported the occipital tenderness due to subperiosteal stretching in adolescents due to the growth spurt. It may be presented as a painful exostoses that can be resected as narrated by Marshall et al <sup>(6)</sup>. Variant anatomy at the external occipital protuberance is helpful to understand the unexplained neck pain or tenderness due to occipital spur. The present study

**How to cite this paper:** Dr. Neelima. P | Dr. R. Ravi Sunder "Occipital Knob-Morphological Variations in Human Dried Skulls and Clinical Perspectives" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-5 | Issue-6, October 2021, pp.247-249, URL: www.ijtsrd.com/papers/ijtsrd46377.pdf



Copyright © 2021 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



has been done to analyze the dried skulls for occipital spurs.

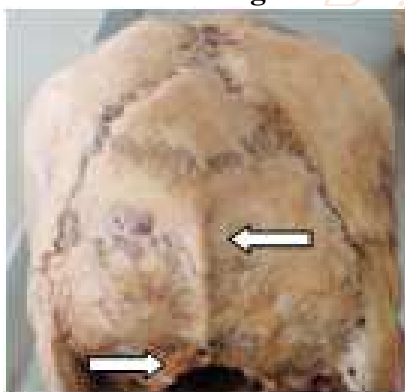
## MATERIALS & METHODS

Human dried skulls from the department of Anatomy were examined. Broken and incomplete skulls were excluded from the study. Norma occipitalis of 56 skulls were observed for occipital spur. Photographs were captured. Occipital spur has been compared with normal external occipital protuberance.

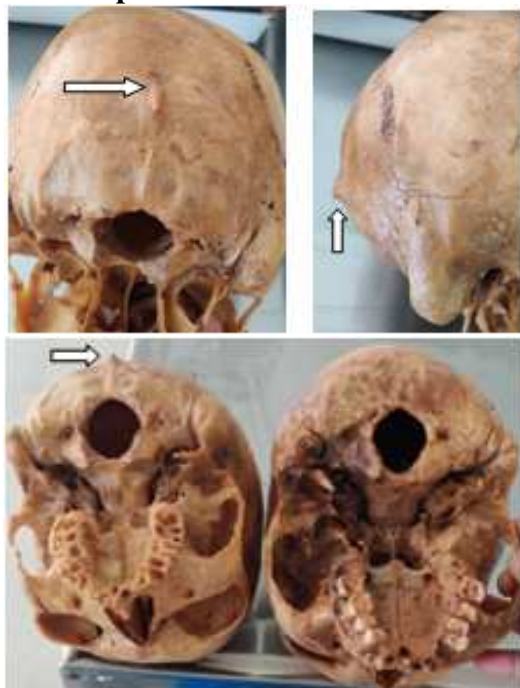
## RESULTS

5 skulls out of 56, exhibited occipital knobs in three different forms. 3 skulls showed flat type. Crest and spine forms were observed one in each skull respectively. One skull was found to have an inca bone incidentally. In addition, accessory emissary foramina were found near foramen magnum. The following photographs represent the types of occipital knob associated with other variations.

**Fig 1: Human dried skull with flat type occipital spur coincidentally showing inca bone and supernumerary emissary veins located near foramen magnum**



**Fig 2: Spine type of occipital knob and its comparison with normal skull**



**Fig 3: Crest type of occipital knob associated with supernumerary emissary foramina at external occipital crest and near foramen magnum.**



## DISCUSSION

Enlargement of external occipital protuberance is called occipital spur or occipital bun. It was considered as feature of Neanderthal triat who rarely exist in this new era. Occurrence of occipital bun is on the rise according to literature. This seems to be increasingly seen in males. Postural changes due to use of smartphones have also been linked to the prevalence of occipital spur according to Jacques<sup>(7)</sup>. Dragging pain, tenderness may be due to this anatomical variant. Occipital spur may rupture due to growth spurt in adolescents leading to exostoses. This has to be surgically operated. Sattur etal<sup>(8)</sup> explains about the traumatic occipital spur fracture. Uncommon subcutaneous scalp pseudotumour in adolescents has been reported by Gomez etal<sup>(9)</sup>. A morphological study has been done by Srivastava etal illustrating various forms<sup>(10)</sup>. Gülekon etal<sup>(11)</sup> described on gender determination basing on the occipital spur. Though the literature is scanty, clinical presentation due to such an unusual variant needs to be emphasized. The present study has been done to determine the various forms of occipital spurs occurring in the human dried skulls of the present era and their clinical perspectives. Three types of occipital spurs according to the literature were observed in this study. In addition, these were associated with other features like the inca bone and accessory emissary foramina near foramen magnum.

## CONCLUSION

Three types of occipital spurs- flat, crest and spine have been observed in the human dried skulls. Incidentally, they also presented with uncommon variations like inca bone and accessory emissary foramina near foramen magnum.

## REFERENCES

- [1] Standing S. The Back. In: Standing S, editor. Gray's anatomy: The anatomical basis of

- clinical practice. 40th ed. London, UK: Churchill Livingstone Elsevier Publishers; 2008. p. 411-412.
- [2] Srivastava, Monika MS; Asghar, Adil MS; Srivastava, Nitya Nand MS; Gupta, Nandkishore MSc; Jain, Anuj MS; Verma, Jayant MS An Anatomic Morphological Study of Occipital Spurs in Human Skulls, *Journal of Craniofacial Surgery*: January 2018 - Volume 29 - Issue 1 - p 217-219 doi: 10.1097/SCS.0000000000004205
- [3] Varghese E, Samson RS, Kumbargere SN, et al Occipital spur: understanding a normal yet symptomatic variant from orthodontic diagnostic lateral cephalogram *Case Reports* 2017; 2017:bcr-2017-220506.
- [4] Shahar D, Sayers MG A morphological adaptation? The prevalence of enlarged external occipital protuberance in young adults. *J Anat* 2016;229:286–91. doi:10.1111/joa.12466
- [5] Singh R Bony tubercle at external occipital protuberance and prominent ridges. *J Craniofac Surg* 2012;23:1873–4. doi:10.1097/SCS.0b013e31826c7d48
- [6] Marshall RC, Abela C, Eccles S Painful exostosis of the external occipital protuberance. *J Plast Reconstr Aesthet Surg* 2015;68:e174–e176. doi:10.1016/j.bjps.2015.06.013
- [7] Jacques, T., Jaouen, A., Kuchcinski, G. et al. Enlarged External Occipital Protuberance in young French individuals' head CT: stability in prevalence, size and type between 2011 and 2019. *Sci Rep* 10, 6518 (2020). <https://doi.org/10.1038/s41598-020-63554-y>
- [8] Sattur, M., Korson, C., Henderson, F. & Kalhorn, S. Presentation and management of traumatic occipital spur fracture. *The American Journal of Emergency Medicine* 37, 1005.e1–1005.e2 (2019).
- [9] Gómez Zubiaur, A., Alfageme, F., López-Negrete, E. & Roustan, G. Type 3 External Occipital Protuberance (Spine Type): Ultrasonographic Diagnosis of an Uncommon Cause of Subcutaneous Scalp Pseudotumor in Adolescents. *Actas Dermosifiliogr*, <https://doi.org/10.1016/j.ad.2018.04.015> (2019).
- [10] Srivastava, M. et al. An Anatomic Morphological Study of Occipital Spurs in Human Skulls: *Journal of Craniofacial Surgery* 1, <https://doi.org/10.1097/SCS.00000000000004205> (2017).
- [11] Gülekon, I. N. & Turgut, H. B. The external occipital protuberance: can it be used as a criterion in the determination of sex? *J. Forensic Sci.* 48, 513–516 (2003).