

# Evaluation of Vermian Fossa and Internal Occipital Crest in Dry Adult Human Skulls: An Institutional Based Study

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## ABSTRACT

**Background:** The present study was conducted for assessing Vermian Fossa and Internal Occipital Crest in Adult Indian Human Skulls.

**Materials & Methods:** A total of 40 normal adult human cranial bases and 20 occipital bones were included for the present study. All the specimens with anatomic deformities were excluded from the present study. Initial screening of human skulls included evaluation of presence or absence of Vermian fossa. After assessment, evaluation of the shape of the Vermian fossa was done- Triangular in shape, Quadrangular in shape or atypical in shape. Assessment of shape of internal occipital crest was done- Rounded or ill-defined. Length of internal occipital crest was also evaluated.

**Results:** Incidence of Vermian fossa was 80 percent of the specimens. Shape of Vermian fossa was triangular, quadrangular and atypical in 55 percent, 25 percent and 20 percent of the specimens. Internal occipital crest was rounded in 60 percent of the specimens. Mean length of internal occipital crest was 2.81 cm.

**Conclusion:** Knowledge of anatomy of Vermian fossa and internal occipital crest is necessary for diagnostic and therapeutic purposes.

**Key words:** Vermian Fossa, Internal Occipital crest.


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## INTRODUCTION

The development of the posterior fossa and its contents takes place during the process of ventral induction in embryogenesis. Several steps occur based on genetic and molecular pathways which result in the normal anatomical structures recognized on imaging. Errors and defects during the development of these structures will lead to congenital malformations of the posterior fossa, including the brainstem, cerebellum, and cranial vault.<sup>1-3</sup> The naming of veins in the posterior fossa provides an almost bewildering number of possibilities when one considers that the cerebellum is composed of nine vermian and eight paired hemispheric lobules, and that there are fissures and subdivisions of each lobule which might be used to further refine the name.<sup>4-6</sup> The falx cerebelli is a small crescentic fold of dura mater below the tentorium cerebelli, which projects forward into the posterior cerebellar notch. Its base is directed upwards and attached to the posterior part of the inferior surface of the tentorium cerebelli in the midline; its posterior margin is attached to the internal occipital crest and contains the occipital sinus; the apex frequently dividing into two small folds which disappear at the sides of foramen

magnum.<sup>5, 6</sup> Hence; the present study was conducted for assessing Vermian Fossa and Internal Occipital Crest in Adult Indian Human Skulls.

## MATERIALS & METHODS

The present study was conducted with the aim of for assessing Vermian Fossa and Internal Occipital Crest in Adult Indian Human Skulls. A total of 40 normal adult human cranial bases and 20 occipital bones were included for the present study. All the specimens with anatomic deformities were excluded from the present study.

Initial screening of human skulls included evaluation of presence or absence of Vermian fossa. After assessment, evaluation of the shape of the Vermian fossa was done- Triangular in shape, Quadrangular in shape or atypical in shape. Assessment of shape of internal occipital crest was done- Rounded or ill-defined. Length of internal occipital crest was also evaluated. All the results were recorded in Microsoft excel sheet followed by statistical analysis using SPSS software.

**Table 1: Vermian fossa**

Vermian fossa	Number	Percentage
<b>Incidence</b>	32	80
<b>Shape</b>	<b>Triangular</b>	55
	<b>Quadrangular</b>	25
	<b>Atypical</b>	20

**Table 2: Internal occipital crest**

Internal occipital crest	Number	Percentage
<b>Rounded</b>	12	60
<b>Ill-defined</b>	8	40
<b>Total</b>	20	100
<b>Length</b>	Mean: 2.81 cm SD: 0.66	

**RESULTS**

Incidence of Vermian fossa was 80 percent of the specimens. Shape of Vermian fossa was triangular, quadrangular and atypical in 55 percent, 25 percent and 20 percent of the specimens. Internal occipital crest was rounded in 60 percent of the specimens. Mean length of internal occipital crest was 2.81 cm.

**DISCUSSION**

Anatomical variation is a normal flexibility in the morphology of body structures. Variations generally have little effect on body function under normal circumstances, although these may alter patient management. It has been postulated that clinical malpractice is partly attributable to ignorance, in an era of advanced radiology and minimally invasive surgical procedures, of anatomical variations. Indeed, these authors have further stated that “medical progress needs a more accurate knowledge of the variability of the human morphology to improve diagnosis and therapeutic performance”.<sup>5- 8</sup> A prominent internal occipital crest descends from the internal occipital protuberance, for attachment of the falx cerebelli, and bifurcates near the foramen magnum; the occipital sinus, sometimes double, lies in the attachment.<sup>9,10</sup> Hence; the present study was conducted for assessing Vermian Fossa and Internal Occipital Crest in Adult Indian Human Skulls.

In the present study, Incidence of Vermian fossa was 80 percent of the specimens. Shape of Vermian fossa was triangular, quadrangular and atypical in 55 percent, 25 percent and 20 percent of the specimens. Internal occipital crest was rounded in 60 percent of the specimens. Mean length of internal occipital crest was 2.81 cm. Pushpalatha M et al, in a previous study, included 20 cranial bases (vault removed) and 15 occipital bones, which were obtained from the human neuroanatomy laboratory of our institution. The inner aspects of the posterior cranial fossa were examined for the presence of the VF. The skulls and occipital bones which were found broken were excluded from the present study. The fossae were macroscopically classified as triangular (type 1) and quadrangular shapes (type 2). The Vermian fossa was observed in 25 specimens (71.4%) and was found absent in the remaining 10 skulls. The Vermian fossa was triangular shaped in 19 specimens (76%) and quadrangular in 2 (8%). In 4 (16%) specimens it was having unusual morphology

and was considered as atypical (type 3). Among the atypical types, one specimen had deepened fossa at the lower part, one was having partitioned Vermian fossa, two of them had widened Vermian fossa. The mean length and width of the fossa were 13.6±4.4 mms and 11.9±3.3 mms respectively.<sup>11</sup> Ranjan RK et al, in another study, determined the incidence, morphology and morphometry of the vermian fossa in adult human dry skull. The study was carried out in 110 dry bones, among them 65 were separate occipital bone and 45 were cranial base. All the bones were examined for the existence of a fossa on the inner surface of squamous part of occipital bone, just posterior to the foramen magnum. Height and width of each fossa were measured by a digital vernier caliper. The fossa was macroscopically examined and classified as triangular (type 1), quadrangular (type 2) and atypical (type 3). The fossa was observed in 88 (80%) bones and its shape was triangular in 62 (70.45%) specimens, quadrangular in 7 (7.95%) specimens and atypical in 19 (21.59%). The incidence of vermian fossa was higher in our study as compared to previous study and majority of them were of triangular in shape.<sup>12</sup> In another study conducted by Kale A et al, authors assessed the frequency of Vermian fossa (VF) and to measure length and width of the determined VF’s and to classify them according to their shapes. Totally 129 separate occipital bones and 29 basicraniums were inspected. We searched for the existence of a fossa on the inner surface of the squamous part of the occipital bone, posterior to foramen magnum and determined the frequency of VF. They measured the height and width of each VF by a digital caliper and calculated mean values of them. They classified the VF’s determined in two groups according to their shapes. The VF’s which resembled a triangle were classified as type 1, and the VF’s which resembled a quadrangle were accepted as type 2. They found that 13 of the 158 (8.22 %) occipital bones had a VF. The average height and width of VF were determined as 27.8 mm and 18.4 mm, respectively. Type 1 and type 2 were determined in 7 and 4 cases, respectively. Two VF’s were atypical. As there is not enough information about frequency of VF in literature and as there is no information about its size and shape, we believe that our results will provide additional information.<sup>13</sup>

## CONCLUSION

Knowledge of anatomy of Vermian fossa and internal occipital crest is necessary for diagnostic and therapeutic purposes.

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