

# Morphometric Analysis of Ethmoidal Foramen in Adult Dry South Indian Skulls.

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## Abstract

**Aim:** To observe the morphometric analysis of ethmoidal foramen

**Objective:** To study the morphology of the ethmoidal foramen in dry skulls and highlight the surgical implications on anatomical landmarks on orbits.

**Background:** Ethmoidal foramina on the medial orbital wall show a higher incidence of variation. Surgeons performing endonasal, anterior cranial fossa and medial orbital wall surgeries must be aware of these variations as they are a source of hemorrhage and also serve as landmark in proximity to the orbital apex.

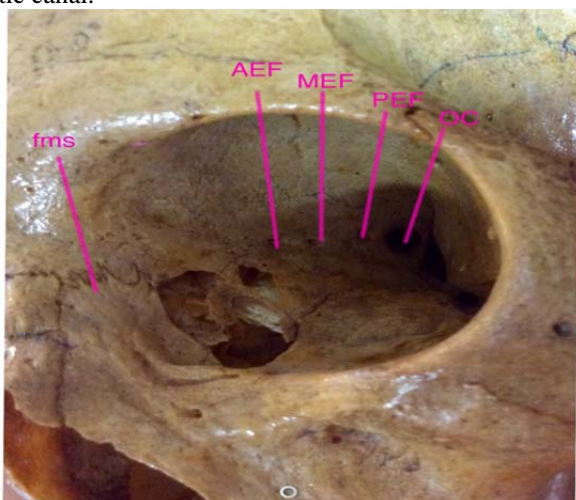
**Materials and method:** The study was done on 30 adult dry human skulls. The distance of Ethmoidal foramina from anterior lacrimal crest to optic canal was measured with the help of ruler, probe and magnifying glass.

**Result:** These observations may help to ensure the safe and precise performance of medial orbital wall surgeries to avoid injuries.

**Keywords:** Ethmoidal foramen, orbital surgery, orbit, optic canal.

## INTRODUCTION:

Anatomical landmarks within orbital cavities are very essential during orbital surgeries especially, the trans ethmoidal sphenoidotomy and sphenoidal hypophysectomy, management of medial wall fractures. The walls of the orbit protect the eye from various injuries and help to fix an accurate visual axis. The medial orbital plate is very important because it is primarily formed by ethmoid as well as contributions from the frontal process of maxilla, the lacrimal bone and a small part of sphenoid. It is evidenced by pneumatized ethmoidal cells. Surgically, the medial orbital plate is very important because it separates the contents of the orbit from the ethmoidal labyrinth[1]. Anterior ethmoidal and posterior ethmoidal foramina are located along the frontomaxillary suture and posteriorly optic canal.



Key words to photo:

1. Anterior ethmoidal foramen-AEF
2. Posterior ethmoidal foramen-PEF
3. Optic canal-OC
4. Middle ethmoidal foramen-MEF
5. Frontomaxillary suture-FMS

The distance between the anterior ethmoidal foramen (AEF), from it to posterior ethmoidal foramen and from it to the optic canal are 24mm, 12mm & 6mm respectively[2]. The ethmoidal vessels and the nerves pass through these foramina and study about these foramina will help us to expose and ligate the vessels during hemorrhages or in treating in case of optical decompression and anterior ethmoidal nerve syndrome[1]. Both the anterior ethmoidal artery and posterior ethmoidal artery, is a branch of ophthalmic artery which enters through nasal cavity of cribriform plate supplies a portion of nasal septum.

The present study was conducted to examine the distances between ethmoidal foramina in South Indian dry skulls, which will be useful not only for orbital surgeries and for other approaches.

## MATERIALS AND METHODS:

30 skulls were collected from the department of anatomy. The distance between ethmoidal foramina and optical canal were observed on both sides. The following measurements were done with help of vernier caliper, scale and probe.

It is calculated by measuring the distance between the frontomaxillary suture and the optical canal. Then, the distance between frontomaxillary suture and the ethmoidal foramen also measured. It can be calculated the distance between the middle ethmoidal foramen and the posterior ethmoidal foramen by subtracting the distance between the frontomaxillary sutures to the middle ethmoidal foramen from the frontomaxillary sutures to the posterior ethmoidal foramen. Similarly, the distance between the posterior ethmoidal foramen and the optic canal was measured by subtracting the distance between the frontomaxillary sutures to the posterior ethmoidal foramen from the frontomaxillary suture to the optic canal. It measured the distance between the anterior ethmoidal foramen to the

optic canal by subtracting the distance between the frontomaxillary sutures to the anterior ethmoidal foramen from the frontomaxillary suture to the optic canal.

**DISCUSSION:**

Orbital morphometry is an very essential during orbital surgeries which help us to restore the lost functional capacity or to improve cosmetic appearance[5]. It also helps us to avoid further surgical complication by knowing these measurements. The anterior and the posterior ethmoidal arteries are important anatomical structures which have to be concentrate more during endoscopic sinus surgery.

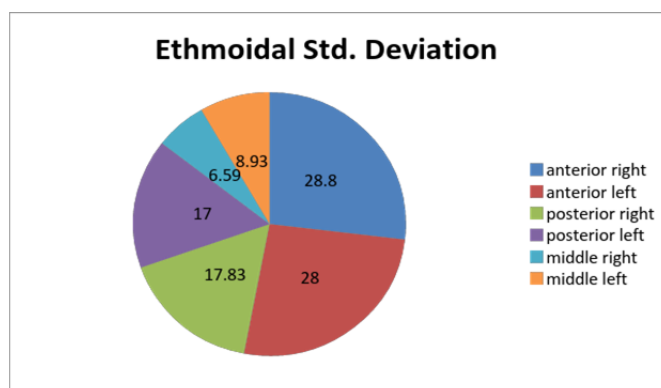
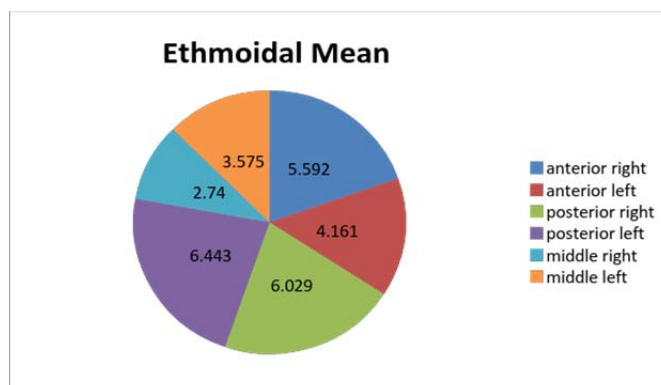
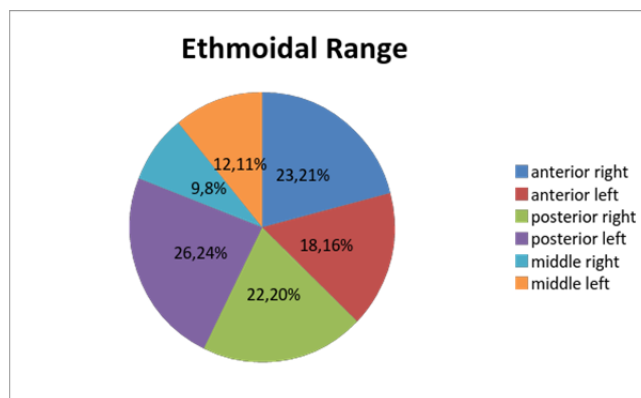
The distance between the anatomical structures on the medial orbital wall provide essential navigational information for surgeons to prevent injury of the important neurovascular bundles of particular clinical significance is the primarily PEF to OC. The mean OC-PEF distance ranges 4.3mm, where the mean OC-PEF distance ranges from 4.6 to 9.15mm[3].

In takahashi studied 54 orbits and found from them that the mean distances from anterior lacrimal crest to anterior and posterior ethmoidal foramina and the optic canal are 19.6mm, 33.5mm, 41.9mm respectively. In another study among 84 orbits, he found accessory ethmoidal foramina in 32 orbits, one AEF was identified in 30 orbits and 2 foramina in 2 orbits.

In a study which was conducted by ashwini mutalik, the distance between the AEF to PEF ranged from 3-18mm and the distance between PEF to optic canal ranged between 2-18mm[2].

**RESULT:**

Anterior ethmoidal foramen is present in 30 skulls, middle ethmoidal foramen is observed in 17 on right side and 15 on left sides. Posterior ethmoidal foramen is present in 30 skulls. Here is tabular form with mean , standard deviation.



	N	Range	Minimum	Maximum	Mean	Std. Deviation
Anterior right	30	23	14	37	28.80	5.592
Anterior left	30	18	18	36	28.00	4.161
Posterior right	30	22	6	28	17.83	6.029
Posterior left	30	26	2	28	17.00	6.443
Middle right	17	9	2	11	6.59	2.740
Middle left	15	12	4	16	8.93	3.575

### CONCLUSION:

Morphometric analysis on ethmoidal foramen are very few, it helps to predict anatomical variations in the position of ethmoidal foramen with respective anterior and posterior lacrimal crest. It ensures the safe and precise performance of medial orbital surgeries to avoid injuries to the important neurovascular bundles passing through various foramen and fissures. These findings will guide the orbital surgeon to minimize complications during orbital surgeries.

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