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## Original Article

# Anatomical variations of paranasal air sinuses – A CT scan study

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## ABSTRACT

**Introduction:** The variations of paranasal air sinuses are not uncommon and often pose a risk during a sinus surgery therefore knowledge of these variations is of great significance to rhinologist and E.N.T surgeons. The present study deals with these variations by computerized tomography scanning (CT scan) in adult individuals.

**Methods:** CT scans of 100 patients were procured from Department of Radiology, Kamineni Institute of Medical Sciences, Narketpally, Andhra Pradesh. The scans were studied in both coronal and axial planes.

**Results:** The variations found include deviated nasal septum, concha bullosa, paradoxical middle concha, Haller cells, agger nasi cells, Onodi cells and pneumatized inferior concha. A higher incidence of agger nasi cells was found followed by Haller cells and deviated nasal septum. The least variant was inferior concha anomaly followed by Onodi cells.

**Discussion:** The precise details of variations of paranasal sinuses can now be visualized by CT scan imaging. These observations are of paramount significance to prevent unnecessary complications during sinus surgery.

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## 1. Introduction

A precise knowledge of normal and variant anatomy of the paranasal air sinuses is essential for rhinologist to prevent potential hazards during an endoscopic surgery of the sinuses. This information is not possible by conventional radiography, however now possible by computerized tomography scanning (CT scan).<sup>1–3</sup>

In the present study the anatomical variations related to paranasal sinuses were observed in 100 adult patients (between 18 and 60 years) using CT scans in coronal plane complemented by axial plane. The population studied showed great anatomical variability with a high percentage related to nasal septum, middle concha, inferior concha, Haller cells, Onodi cells, agger nasi cells. The observations were taken, tabulated and compared with earlier studies to find the regional and ethnic variations.

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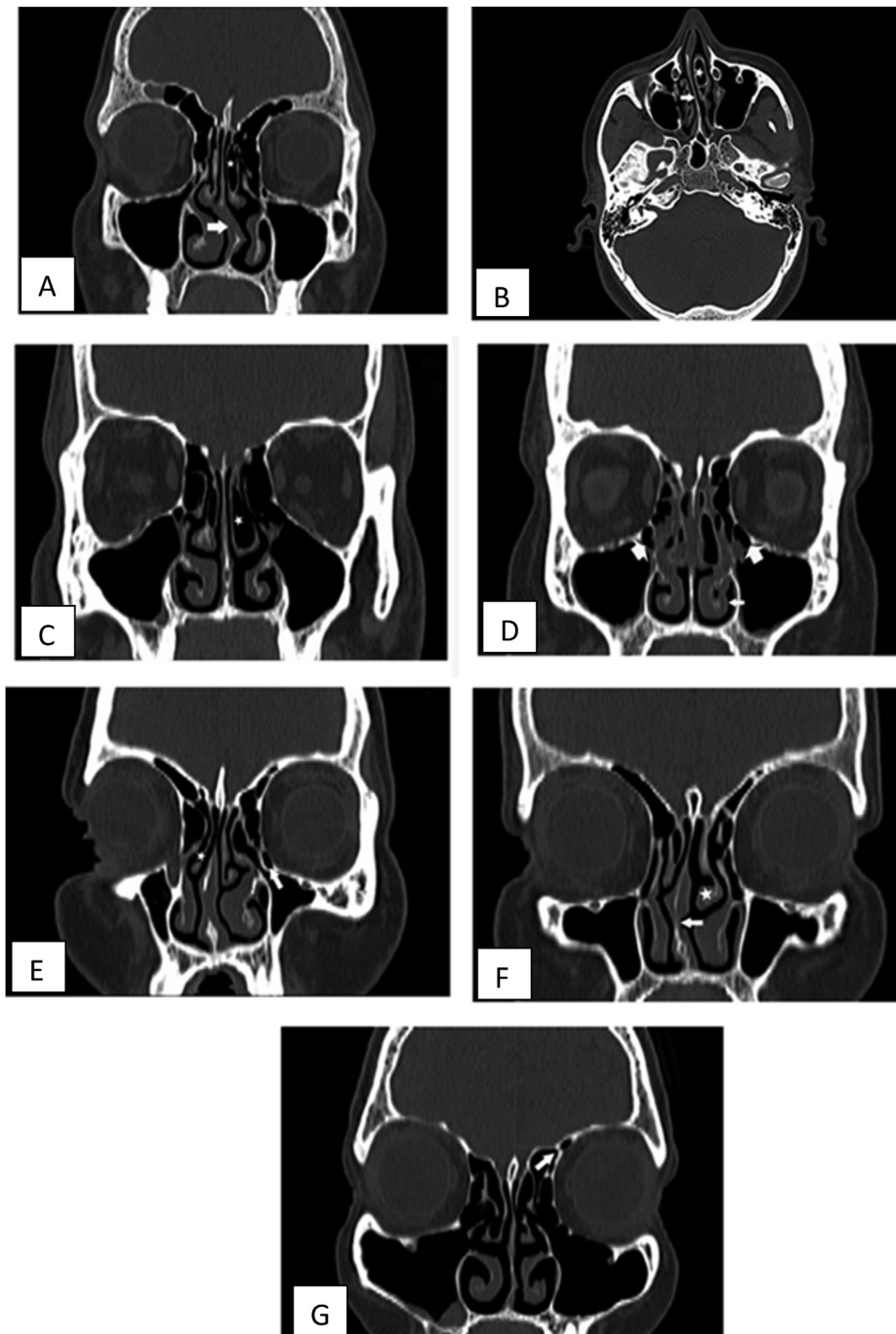
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## 2. Materials and methods

The computerized tomography scans (CT scans) of paranasal sinuses of 100 patients, 54 females and 46 males with suspected nasal pathology (i.e., with complaints of rhinitis or sinusitis) referred to Department of Radiology in Kamineni Institute of Medical Sciences, Narketpally, Andhra Pradesh

were procured for the study. The scans were of both axial and coronal planes.

These CT scan images were taken at a thickness of 3 mm which later were made to 1 mm thickness for the reconstruction models resulting in 150–300 images for each patient, for better visualization of the variants. The scans were evaluated along with the help of a radiologist. While studying the



**Fig. 1** – Anatomical variations of paranasal air sinuses. A: CT scan, coronal plane with deviated nasal septum (arrow) and concha bullosa (star). B: CT scan axial plane with deviated nasal septum (arrow) and concha bullosa (star). C: CT scan coronal plane with concha bullosa (star). D: CT scan coronal plane with pneumatized inferior nasal concha (small arrow) and Haller cells (larger arrow). E: CT scan coronal plane with Haller cells (arrow). F: CT scan coronal plane with paradoxical middle concha (star) and deviated nasal septum (arrow). G: CT scan coronal plane with agger nasi cells (arrow).

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