Introduction: The middle turbinate may be pneumatized and ballooned up. This is called a concha bullosa. The concha bullosa may show isolated involvement with the disease process. It may compromise ventilation and drainage of secretions to produce chronic infections of the paranasal sinuses. This study aimed at determining the prevalence of concha bullosa in the adult Eastern Indian Population.

Materials and Methods: This was a retrospective study being conducted on 150 patients who presented to the Department of Radiodiagnosis, Bangur Institute of Neurosciences, Kolkata. Their CT scans were analysed for the presence of Concha Bullosa. The results were analysed as percentage and ‘p’ value was calculated using Fisher’s Exact Test.

Results: Presence of Concha Bullosa was observed in 48 cases i.e. 32% in the present study, out of which 21 (14%) were present in males and 27 (18%) in females. ‘p’ value in this case was 0.162 on applying Fisher’s Exact test.

Conclusion: Anatomical variations of the paranasal sinus region like concha bullosa are quite common and they must be searched for by the surgeons before planning any endoscopic sinus surgery. This study attempted to provide the prevalence of the Concha Bullosa which will definitely help the FESS surgery and its outcomes.

Key Words: Middle Turbinate, Concha Bullosa, Functional Endoscopic Sinus Surgery.
It was a descriptive observational study conducted in the Department of Anatomy, IPGME & R, Kolkata. It mainly focused on the CT scan anatomy of the paranasal sinus region to find out the prevalence of concha bullosa. CT scans of 150 patients who attended the Department of Radiodiagnosis, Bangur Institute of Neurosciences, Kolkata were taken after studying their history and complaints. The CT scans of the patients fulfilling the inclusion and exclusion criteria were then collected for the present study to determine the variations.

Inclusion criteria: Patients with sinonasal symptoms who underwent CT scan.

Exclusion criteria: Patients whose CT plates revealed - Nasopharyngeal tumors, polyp, any other sinonasal disease causing bony deformity or bony destruction, H/O previous surgeries involving nasal cavity and paranasal sinuses (as obtained from the records), H/O trauma or injury (as obtained from the records). The scan was performed by keeping the patient in prone position. Axial sections were taken from tip of the nose to the roof of the frontal sinus. Coronal sections were taken from tip of the nose to the roof of sphenoid sinus perpendicular to the hard palate.

Prevalence of Concha Bullosa was seen on the CT scans and the results were analysed as percentages. Chi Square Tests were applied to calculate the ‘p’ value to find out any statistically significant difference between males and females.

RESULTS
We observed concha bullosa in 32% of cases, out of which 14% were present in males and 18% in females.

| Gender | Study cases with CB (%) | Study Cases without CB (%) | Total (%) |
|--------|------------------------|----------------------------|-----------|
| Male   | 21 (14%)               | 58 (38.67%)                | 79 (52.67%)|
| Female | 27 (18%)               | 44 (29.33%)                | 71 (47.33%)|
| Total  | 48 (32%)               | 102 (68%)                  | 150 (100%)|

‘p’ value in this case was 0.162 on applying Fisher’s Exact test.

DISCUSSION
Concha Bullosa or the pneumatized middle turbinate was observed in 32% of the scans studied in the present study. Mazza D et al [3] in 2007 performed a 64-slice CT evaluation of some important anatomic variants of paranasal sinuses. 100 patients were selected among all those that had undergone a paranasal sinuses CT examination.
They were 45 caucasian women and 55 men, all aged between 18 and 70 years, mean age 46 years. This study was conducted using a 64-slice Siemens Somatom Volume-Zoom multidetector Spiral CT. CT examination was performed through a thin axial acquisition; the patient was lying on his back and the images were processed with multiplanar reconstruction. They noted concha bullosa in 29% cases. Liu X et al [4] in 1999 tried to find out the relation between the anatomic variations of osteomeatal complex and chronic sinusitis. They studied coronal CT scans of 297 individuals. They observed concha bullosa in 34.85% cases.

Benjaporn et al [5] conducted their study on a population of Thailand and noted concha bullosa in 34% cases. Robinson M et al [6] in 2010 observed the variations in the paranasal sinuses in a non-random sample of museum skulls of Melanesians. This racial group was not previously studied in this respect. They observed concha bullosa in 41.5% cases. Priyanko Chakraborty et al [7] in 2016 performed a study in Department of Otorhinolaryngology, Sir Sunderlal Hospital, Banaras Hindu University, Varanasi. 82 patients were included in the study. They were diagnosed as a probable case of chronic rhinosinusitis on the basis of history and nasal endoscopy and then subjected to CT scan. Thin slice coronal, axial and sagittal films were obtained both in soft tissue window and bone window for optimum visualization of all the structures. They noted concha bullosa in 30.48% cases.

Nitin V Deosthale et al [8] in 2014 conducted a cross sectional study at NKP Salve Institute of Medical Sciences, Nagpur to detect the prevalence of anatomical variations of nose and paranasal sinuses in Chronic Rhinosinusitis (CRS) on ‘Nasal Endoscopy’, and ‘Computed Tomography’ and correlated the two investigations modalities and studied association of anatomical variations of nose and paranasal sinuses in Chronic Rhinosinusitis. Diagnostic Nasal Endoscopy (DNE) and Computed Tomography of nose and Paranasal Sinuses of 122 patients of chronic rhinosinusitis were studied and results were statistically analysed using z-test and chi-square test. They observed concha bullosa in 27.87% cases. Arslan et al [9] in 1999 studied the CT scans for anatomic variations of paranasal sinus in patients who had to undergo endoscopic sinus surgery for chronic rhinosinusitis. CT scans of 200 patients with chronic sinusitis were analysed to determine the prevalence of anatomic variants. They noted concha bullosa in 30% cases.
the anatomical abnormalities and the mucosal changes in patients with chronic rhinosinusitis (CRS) and the reliability and validity of CT scan in the management of CRS. A time bound cross sectional study was conducted. 45 patients with CRS underwent pre-operative CT PNS, followed by FESS. According to them, it was observed in 77% cases. Leipzig JR et al [20] in 1996 noted it in 76% cases, Chaitanya et al [21] in 2015 in 47% cases.

Table 2: Prevalence of Concha Bullosa in different population studied by different authors.

| Authors                  | Prevalence of Concha Bullosa (%) |
|--------------------------|----------------------------------|
| Present study            | 32%                              |
| Mazza D et al [3]        | 29%                              |
| Liu X et al [4]          | 34.85%                           |
| Benjaporn et al [5]      | 34%                              |
| Robinson M et al [6]     | 41.50%                           |
| Chakraborty P et al [7]  | 30.48%                           |
| Nitin V Deosthale et al [8] | 27.87%                          |
| Arslan H et al [9]       | 30%                              |
| Chandel NS et al [10]    | 32.50%                           |
| Perez Pinas et al [11]   | 24.50%                           |
| Kayalioglu et al [12]    | 26.83%                           |
| Mohammad Adeel et al [13]| 18.20%                           |
| Shiplberg KA et al [14]  | 26%                              |
| Ahmed W et al [15]       | 26%                              |
| Kate Sarika P et al [16] | 23%                              |
| K Dua et al [17]         | 16%                              |
| A R Talaiepour et al [18]| 35%                              |
| Sheetal et al [19]       | 77%                              |
| Leipzig JR et al [20]    | 76%                              |
| Chaitanya et al [21]     | 47%                              |

CONCLUSION

In the growing field of Functional Endoscopic Sinus Surgery (FESS), the knowledge of normal anatomical variations has become very important. The surgeon cannot take a single step without knowing the different types of variations because that may lead to inadvertent injury to some of the vital structures. This study has attempted to find out the prevalence of a very important variation of paranasal sinus region i.e. Concha Bullosa. This may get infected and may show isolated involvement of disease process. It may compromise ventilation and drainage of secretions to produce chronic infections of the paranasal sinuses. Thus, it can be concluded that this study will provide a baseline data for the prevalence of concha bullosa and will help the surgeons to plan for the surgery accordingly. It can also be concluded that the prevalence differs in the different parts of the country including different populations and ethnicities.

Conflicts of Interests: None

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