

Clinical Study of Septal Deviation and Its Association with Sinusitis

Mahesh Mishra¹, Sumit Sharma²

¹Postgraduate Junior Resident Second Year, ²Professor & Head,
Department of E.N.T., Mayo Institute of Medical Sciences, Barabanki, UP, India.

Corresponding Author: Mahesh Mishra

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ABSTRACT

Introduction:

Aim: To establish association between Septal deviation and sinusitis along with the clinical profile of Chronic Rhinosinusitis in Deviated nasal septum.

Methodology: A cross sectional study of 50 patients attending ENT department of VIMS, Bellary with symptoms of chronic rhinosinusitis were included. Nasal trauma, Nasal polyposis, Septal perforation, Allergic rhinitis, Aggressive fungal infections, Odontogenic sinusitis, Neoplasia, Patients <15 yrs of age, Immunodeficiency and mucociliary disorders, Prior history of nasal or sinus surgery, Other anatomic abnormalities were excluded. Included patients underwent detailed clinical examination, Diagnostic nasal endoscopy, X-ray or computed tomography of Paranasal sinuses.

Results: Among 50 patients with chronic rhinosinusitis, 36 patients were found to have Deviated nasal septum. Male preponderance was observed in both sinusitis and septal deviation population. Bilateral maxillary sinus (28%) was the most common presentation in CTPNS. We found that significant association was found between anterior and posterior ethmoid sinusitis with Left sided S shaped obstructed or impacted type of deviated nasal septum.

Conclusion: Chronic rhinosinusitis is most common rhinological problem encountered worldwide which has greater propensity to cause morbidity. Deviated nasal septum can be associated with significant sinonasal disease, especially a S-shaped obstructed and impacted type of DNS which showed statistically significant correlation with sinus disease in our study. Also, DNS to left, in general, was

associated with higher incidence of sinuses disease than central and DNS to right. This study brings to light various presentations of DNS implicated in causation of chronic sinusitis which will influence the treatment decisions and also reduce the morbidity caused by it.

Key words: Chronic Rhinosinusitis (CRS), Deviated nasal septum (DNS)

INTRODUCTION

Rhinosinusitis (RS) is a significant health problem which results in a large financial burden on society. It affects 1 in 7 adults resulting in about 50 million individuals diagnosed with sinusitis every year world over. More than 1 in 5 antibiotics prescribed in adults are for sinusitis, making it the fifth most common diagnosis for which antibiotics are prescribed^[1]

Rhinosinusitis is a broad umbrella term covering multiple disease entities, including acute RS (ARS), CRS with nasal polyps (CRSwNP) and CRS without nasal polyps (CRSsNP) Rhinosinusitis is defined as “a group of disorders characterized by inflammation of the mucosa of the paranasal sinuses.”^[2]

Any anatomical, physiological or pathological features which obstructs free drainage from the sinuses permits the stasis of secretion and thus predisposes to infection. These factors include allergy, asthma, dental disease, nasal polyps, Immunodeficiency, mucociliary disorders, trauma, medications, surgery, noxious

chemicals and micro-organisms (viral, bacterial and fungal), anatomic abnormalities such as a septal deviation, concha bullosa, septal spur or paradoxical turbinate^[3]

Variations in intranasal and sinus anatomy have been implicated in the aetiology of chronic and recurrent sinusitis, and CT imaging has become an important diagnostic tool.^[4] During the past two decades, the concepts of sinusitis and its management have undergone a tremendous change. The three important factors on to which the pathophysiology of the sinus disease is related are the:

1. Patency of the Ostia,
2. The function of the cilia and
3. The quality of the nasal secretions.

Alteration in any one of these factors, alone or in combination, can change the Physiology and lead to sinusitis. Of the three factors, the patency of the Ostia is the most important factor in the development of Chronic Rhinosinusitis. The Osteomeatal complex is the key area for the pathogenesis of Chronic Rhinosinusitis^[5]. Deviated nasal septum is a common disorder that presents in 62% of the population, and its role in the pathogenesis of chronic sinusitis remains uncertain^[3]. Within the nasal cavity, a straight septum enables laminar airflow, allowing the inspired air to be warmed, cleaned and humidified and thus optimized for gas exchange. Conversely, a deviated nasal septum can contribute to various degrees of nasal obstruction and altered nasal respiration^[4]. Septal deviation may either cause Osteomeatal obstruction or may interfere with proper airflow and results in sinusitis.

The rhinogenic causes such as nasal allergy, deviated nasal septum, polyp etc. are important factors towards the etiology of chronic rhinosinusitis. At times it may be difficult to arrive at an etiological factor as the pathogenesis is not well defined. It is becoming clearer that CRS is an

inflammatory disease and it may or may not involve pathogenic Microbes. The purpose of this study is to observe the correlation between deviated nasal Septum (DNS) and CRS

MATERIALS AND METHODS

Source Of Data: The study was conducted in the department of ENT, Mayo Institute Of Medical Sciences, Barabanki, UP for a period of 2 years from December 2020 to March 2022.

Inclusion Criteria:

Adult patients >17 yrs with complaints suggestive of chronic sinusitis for a period more than 12 weeks including those with acute exacerbation of chronic sinusitis.

Patients who fulfil the criteria for chronic sinusitis clinically

Persistent chronic sinusitis despite medical therapy (requiring surgical management).

Exclusion Criteria: Patients with acute sinusitis

- Patient with mass or polyp obstructing the nasal cavity.
- Patients who were previously operated.
- Patient with facial anomalies.

OBSERVATIONS AND RESULTS

Chronic rhinosinusitis is most common rhinological problem encountered Worldwide which has greater propensity to cause morbidity? Deviated nasal septum can be associated with significant sinonasal disease, especially a S-shaped obstructed and impacted type of DNS which showed statistically significant correlation with sinus disease in our study. Also, DNS to left, in general, was associated with higher incidence of sinuses disease than DNS to right. This study brings to light various presentations of DNS implicated in causation of chronic sinusitis which will influence the treatment decisions and also reduce the morbidity caused by it.

SOCIO DEMOGRAPHIC CHARACTERISTICS OF THE STUDY SUBJECTS

Age & Gender Distribution of The Study Subjects

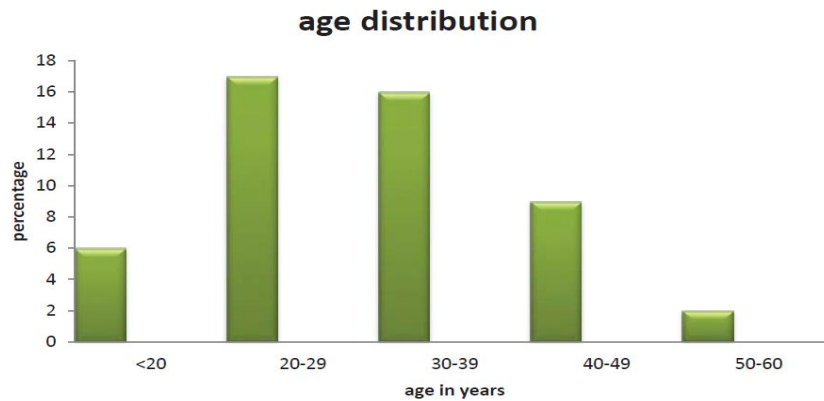


Figure 1: Age Distribution

In this study, the age of patients ranged from 16 to 60. The commonest age group to have chronic rhino sinusitis was 20-29 years. And the least common age group is above 50 years

In this study, nasal obstruction was seen in 39 patients accounting to 78% of the study population, of which right sided nasal obstruction was seen in 4 patients (4%), which included only males and left sided nasal obstruction was seen in 6 patients (16%), of which 4 were males and 2 were females. 29 patients had bilateral nasal nasal obstruction (74%) of which 15 were males and 14 were females.

sex distribution

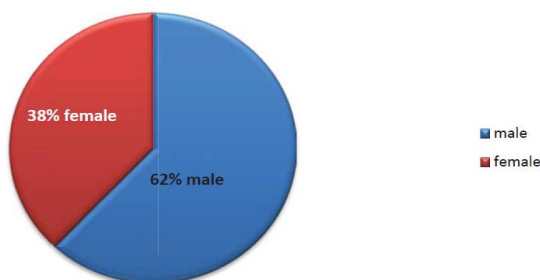
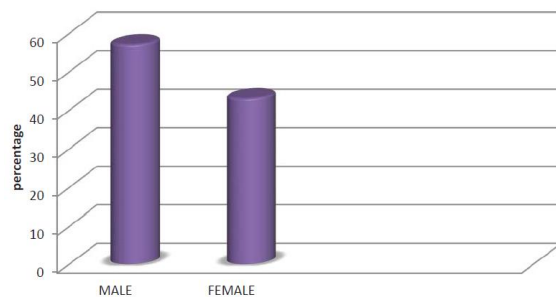


Figure 2: Gender Distribution

In this study, among the 50 patients, 31 were males accounting to 62% and 19 were females which accounts to 38% and the male to female ratio is 1.6 : 1.

NASAL DISCHARGE

Nasal discharge



In this study, 21 patients complained of bilateral nasal discharge, among them 12 were male (57%) and 9 were females (43%).

CLINICAL CHARACTERISTICS OF THE STUDY SUBJECTS

NASAL OBSTRUCTION

Nasal obstruction

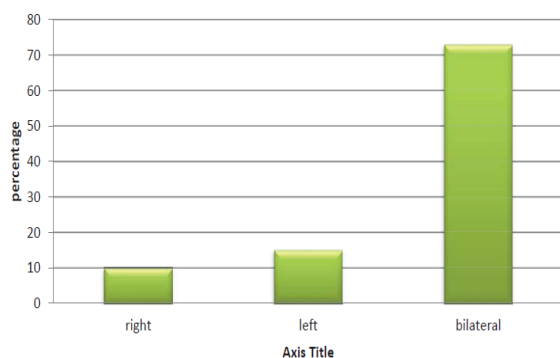
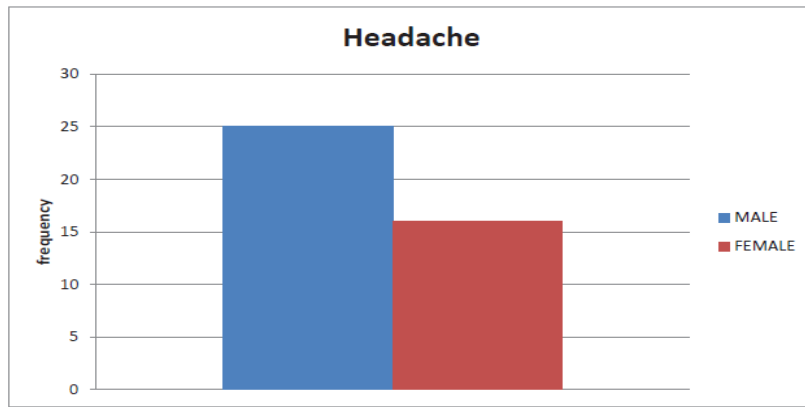


Figure 3: Laterality of Nasal Obstruction

HEADACHE

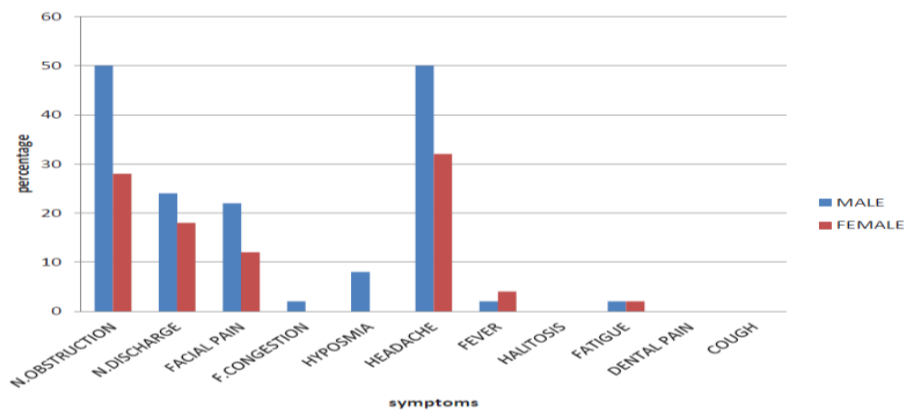
GENDER DISTRIBUTION OF HEADACHE

Gender	Frequency	Percentage
Male	25	61%
Female	16	39%
Total	41	100%



In this study, 41 patients (82%) presented with headache, of which 25 (61%) were males and 16 (39%) were females.

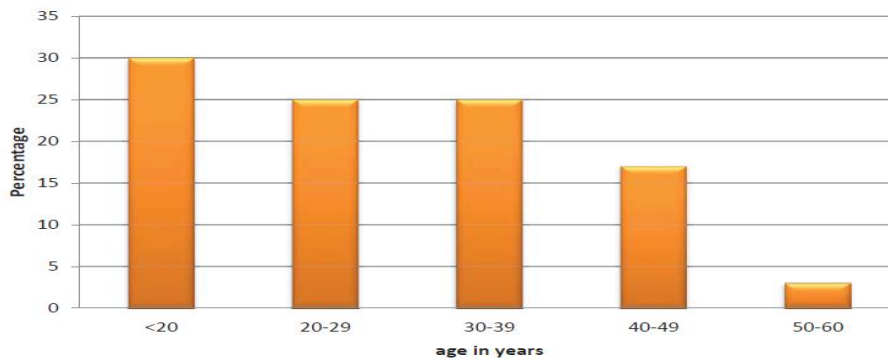
CLINICAL FEATURES OF PATIENT STUDIED



Headache is the most commonest presentation in this study (82%) which includes 25 males (50%) and 16 females (32%) followed by nasal obstruction (78%) which includes 25 males (50%) and 14 females (28%). Next common presentation observed was nasal discharge (42%) in

which 12 were males (24%) and 9 were females (18%). Followed by facial pain (34%) which accounts to 11 males (22%) and 6 females (12%). Hyposmia accounts to 6%, facial congestion was seen in 2%. Least observed symptoms were halitosis, dental pain and cough.

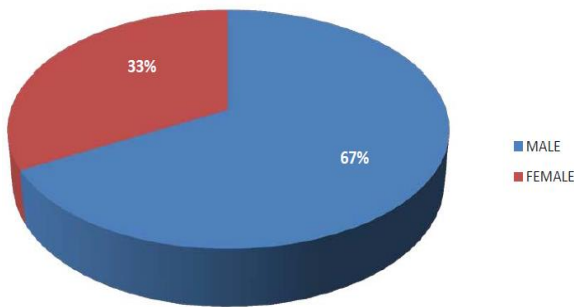
AGE DISTRIBUTION OF DNS IN YEARS



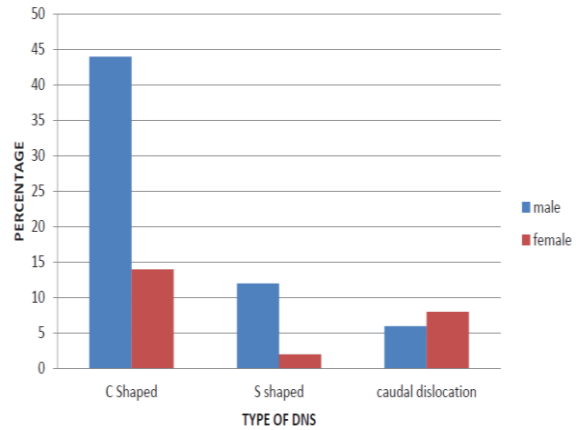
In this study, 36 patients (72%) of the study population had deviated nasal septum and it was common in the <20 age group (30%)

and least common group was between 50-60 (2%)

SEX DISTRIBUTION OF DNS

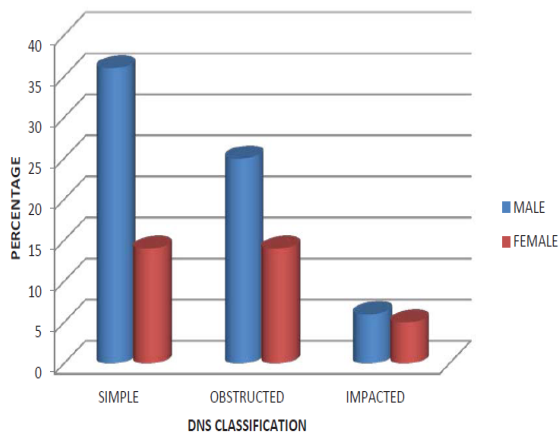


In this study, deviated nasal septum is more prevalent in males (67%) than females (33%)



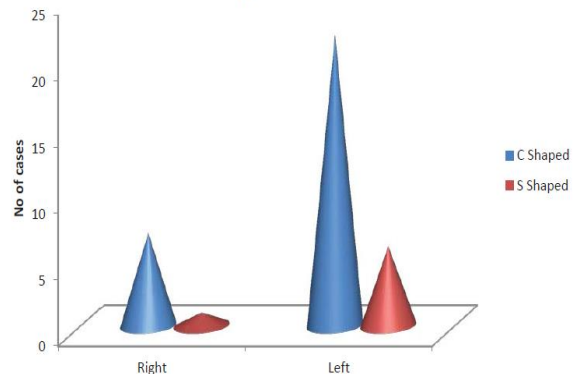
In this study, C shaped DNS was found common among 58% of study population, which includes 22 male (44%) and 7 females (14%). S shaped DNS was found in 7 patients (14%) of which 6 were males (12%) and 1 female (2%). Caudal dislocation was found in 14 % of the study population which includes 6% males and 8 % females.

COTTLE’S CLASSIFICATION OF DNS



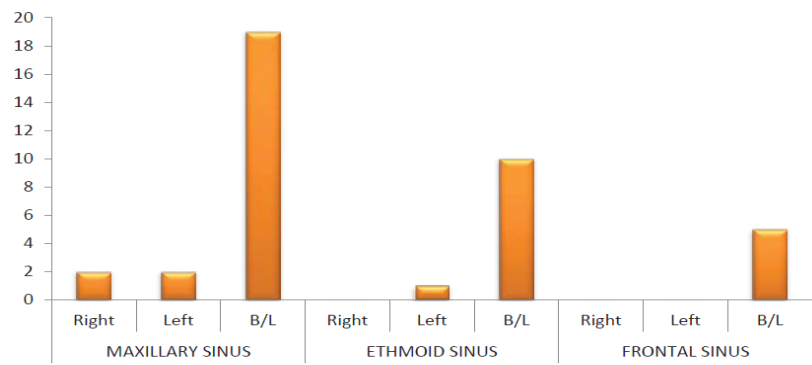
In this study, we used the Cottles classification of DNS, and found that simple DNS was found in 18 persons of which 13 were males (36%) and 5 were females (14%) followed by Obstructed type of DNS seen in 14 patients (39%) and Impacted type being the least common accounting to 11% of the study population.

LATERALITY OF DNS
Type of DNS



In this study, C Shaped DNS was found to be more common on the left side in 22 patients (44%), while S shaped was common on the left side in 6 patients (12%)

TYPES OF DNS IN TERMS OF GENDER



PNS TENDERNESS

In this study, bilateral maxillary sinus tenderness was in 19 patients (38%) which was the highest followed by Bilateral

ethmoid sinus tenderness observed in 10 patients (20%) and bilateral frontal sinus tenderness in 5 patients (10%).

LUND MCKAY SCORE OF CT FINDINGS

CT FINDINGS	CT Lund Mackay Score		
	No opacification SCORE 0	Partial opacification SCORE 1	Complete opacification SCORE 2
MAXILLARY SINUS – U/L	6	6	3
MAXILLARY SINUS – B/L	18	19	5
FRONTAL SINUS – U/L	4	4	0
FRONTAL SINUS – B/L	40	6	0
ANTERIOR ETHMOID SINUS – U/L	10	10	0
ANTERIOR ETHMOID SINUS – B/L	32	8	1
POSTERIOR ETHMOID SINUS – U/L	9	9	0
POSTERIOR ETHMOID SINUS – B/L	36	4	1
OSTEOMEATAL COMPLEX – U/L	9	5	2
OSTEOMEATAL COMPLEX – B/L	36	12	2
SPHENOIDAL SINUS – U/L	1	1	0
SPHENOIDAL SINUS – B/L	46	2	0

In this study, Lund MacKay score was used to analyse the CT findings of individual sinuses which showed complete opacification of bilateral maxillary sinuses in 5 (10%) patients, and 3 patients had complete opacification of unilateral maxillary sinus. Both Bilateral and

unilateral complete opacification of Osteomeatal complex was seen in 2 (4%) patients. Partial opacification of sinuses was seen in 19 patients (28%) in bilateral maxillary sinuses, 12% in frontal sinuses. In Sphenoid sinus, 92% had no opacification while 4% had partial opacification.

ASSOCIATION BETWEEN IMPACTED TYPE OF DNS WITH CHRONIC RHINOSINUSITIS

CT FINDINGS	No	IMPACTED		Fisher’s Exact Test
		Present	Absent	
Maxillary Sinus – Right	27	1	26	P<0.297
Maxillary Sinus – Left	29	1	28	P<0.208
Frontal Sinus – Right	7	0	7	P<0.630
Frontal Sinus – Left	9	0	9	P<0.544
Anterior Ethmoid Sinus – Right	13	1	12	P<0.000
Anterior Ethmoid Sinus – Left	15	1	14	P<0.000
Posterior Ethmoid Sinus – Right	9	1	8	P<0.000
Posterior Ethmoid Sinus – Left	10	1	9	P<0.000
Osteomeatal Complex – Right	7	1	6	P<0.26
Osteomeatal Complex – Left	5	1	4	P<0.02
Sphenoidal Sinus – Right	3	1	2	P<0.04
sphenoidal sinus – LEFT	2	1	1	P<0.118

In this study, 13 patients (26%) with right sided anterior ethmoidal sinusitis, 15 patients (30%) with left sided anterior ethmoidal sinusitis, 9 patients (18%) with right posterior ethmoiditis and 10 patients (20%) with left sided posterior ethmoiditis were highly associated with Impacted type of DNS with p<0.000, which is highly significant.

Also, 5 patients (10%) with left Osteomeatal complex block were associated with obstructed type of DNS with p<0.02 and 3 patients (6%) with left sphenoid

sinusitis were associated with impacted type of DNS with p<0.04, which were statistically significant

DISCUSSION

A total of 50 patients were enrolled in the study between 15 and 60 years old. All the patients presenting with symptoms of deviated nasal septum and rhinosinusitis of more than 12 weeks duration with 2 major and one minor or 2 minor symptoms were included in the study. Patients diagnosed as cases of rhinosinusitis based

on TFR criteria. There are three theories explaining pathophysiological relation between the nasal septal deviation and chronic rhinosinusitis.

- The first of these is the mechanical theory which states that secretions accumulate in the sinus as a result of narrowing of the ostiomeatal complex and thus infections ensue in the retained secretions and causes chronic rhinosinusitis.
- The second theory is the aerodynamic theory. According to this theory, the mucociliary activity decreases following the nasal flow rate increase and mucosal dryness in relation with the nasal septal deviation and consequently, chronic rhinosinusitis develops.
- The third theory is the Bachert's pressure theory. According to this theory, deviation of the posterior nasal septum causes chronic rhinosinusitis by creating pressure and air flow changes within the maxillary sinuses.^[6,7]

In the present study the incidence of DNS was more in male than female with an approximate ratio of 1.6:1 which is in agreement to a study done by Nayak et al.^[8]

In a study by Madani et al, there were 68.3% male and 31.7% female with a mean age of 29.13±15.21 years.^[9] Ozkurt et al in his study observed that incidence was more in male as compared to female.^[10]

Headache is the most commonest presentation in this study (82%) which includes 25 males (50%) and 16 females (32%) followed by nasal obstruction (78%) which includes 25 males (50%) and 14 females (28%). Next common presentation observed was nasal discharge (42%) in which 12 were males (24%) and 9 were females (18%). Followed by facial pain (34%) which accounts to 11 males (22%) and 6 females (12%). Hyposmia accounts to 6%, facial congestion was seen in 2%. Least observed symptoms were halitosis, dental pain and cough.

In the study conducted by Ishwar Singh (2010) headache was the predominant symptom seen in 80% of patients, nasal

blockage was seen in 76.66%, nasal discharge was seen in 43.33%, facial pain in 40% patients^[11].

While in the study by Venkatachalam et al (2000) the commonest symptoms were nasal obstruction in 87%, nasal discharge in 70% of patients and the other symptoms were post nasal drip in 41% and abnormalities in sensation of smell in 36% of patients^[12]. In another study by Nayak et al (1991) nasal discharge was the commonest complaint seen in 78.2%, while nasal blockage and headache was seen in 75.6% of patients^[8]

In our study patients bilateral maxillary sinusitis was seen in 24 patients (48%), unilateral maxillary sinusitis in 8 patients (16%), bilateral frontal sinusitis in 6 patients (12%), unilateral frontal sinusitis in 4 patients (8%), bilateral anterior ethmoidal sinusitis in 8 patients (16%), unilateral anterior ethmoidal sinusitis in 11 patients (22%), unilateral posterior ethmoidal sinusitis was seen in 9 patients (18%) and bilateral posterior ethmoidal sinusitis was seen in 5 patients (10%) and bilateral sphenoidal sinusitis was seen in 2 patients (4%). 3 patients had pansinusitis (6%)

In a study by Mohebbi et al, bilateral maxillary sinusitis presentation was seen in 27% of patients while unilateral presentation was seen in 18.4%, similarly unilateral frontal sinus involvement was seen in 12.5% and bilaterally in 11.2%, bilateral ethmoidal sinusitis was seen in 36.1% and unilateral ethmoidal sinusitis was seen in 18.1%, bilateral sphenoidal sinusitis was seen in 12.3%, unilateral sphenoid sinusitis was seen in 13%.^[13]

In a study by Madani et al, involvement of maxillary sinuses is seen in 41.6% followed by ethmoidal sinuses in 22.9%, then sphenoidal sinusitis in 18%, frontal sinuses in 17.3%.^[9]

In this study, C shaped DNS was more prevalent on the left in 22 patients (44%). In a study by Young Ju Jang et al., type I deformity, which may correspond to the C-shaped, concave dorsal deformity was

the most common deformity, accounting for 32% of the case. [12]

In our study, we found that simple type was DNS was more prevalent in 20 patients (40%) followed by obstructed DNS in 10 patients (20%) followed by impacted DNS in 3 patients accounting to 6%.

In a study by Vinay Kumar Poorey and Pooja et al, Obstructed type of DNS was more prevalent in 50%, followed by impacted DNS in 30% and simple DNS in 19% of study population. [14]

In this study, Obstructed type of DNS was associated with left anterior ethmoiditis in 15 patients (30%) and right Osteomeatal complex block in 7 patients (14%) Also, In our study we found that patients with anterior and posterior ethmoiditis had significant association with Impacted type of DNS. Also right sphenoid sinusitis and right Osteomeatal complex block was significantly associated with impacted type of DNS.

Moorthy et al found that the DNS can be associated with significant sinonasal disease even in absence of any nasal symptoms, especially an “S” shaped DNS [15], similarly in our study we have found significant association between S shaped DNS and anterior and posterior ethmoiditis and sphenoid sinusitis.

In a study by Sumaily et al, showed that DNS showed no impact on frontal, maxillary and sphenoid sinuses. The anterior and posterior ethmoid sinuses found to be relatively affected by DNS. [16]

In our study, we conclude that DNS has significant impact on anterior and posterior ethmoid, and maxillary sinuses. And relatively less impact on Sphenoid sinus and no impact on frontal sinus

In this study we found that the prevalence of nasal septal deviations and the sinusitis was significant. [p-value is <0.000]

CONCLUSION

Chronic rhinosinusitis is most common rhinological problem encountered worldwide which has greater propensity to cause morbidity. Deviated nasal septum can

be associated with significant sinonasal disease, especially a S-shaped obstructed and impacted type of DNS which showed statistically significant correlation with sinus disease in our study. Also, DNS to left, in general, was associated with higher incidence of sinuses disease than DNS to right. This study brings to light various presentations of DNS implicated in causation of chronic sinusitis which will influence the treatment decisions and also reduce the morbidity caused by it.

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Conflict of Interest: None

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Ethical Approval: Approved

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