

## ORIGINAL RESEARCH

### A Clinical Study on Etiology and Management of Sinusitis

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#### ABSTRACT

**Background:** Sinusitis, defined as inflammation of one or more of the paranasal sinuses, is characterized as acute when lasting less than 4 weeks, subacute when lasting 4 to 8 weeks, and chronic when lasting longer than 8 weeks. Recurrent sinusitis consists of 3 or more episodes of acute sinusitis per year. A noninfectious form of chronic sinusitis is termed chronic hyperplastic eosinophilic sinusitis. Viral upper respiratory tract infections frequently precede subsequent bacterial invasion of the sinuses by *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*. These organisms can also be found in chronic sinusitis, as well as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and certain anaerobes. Fungi are being recognized increasingly as a factor in chronic sinusitis, particularly in the southeast and southwest parts of the country. Despite the prevalence of the disease there has been relatively few studies on the etiological factors and various management options in sinusitis suggesting the need to take up this study. **Objectives:** To study the etiological factors involved in acute and chronic sinusitis. To study the effectiveness of conservative management in sinusitis. To study the effectiveness of surgical procedures performed in the management of chronic sinusitis.

**Materials and Methods:** Total of 80 patients were enrolled in the study between 7-70 years attending ENT OPD of Govt Medical College, Suryapet from November 2019 to May 2021 with symptoms of acute and chronic sinusitis. Predesigned proforma is used to record relevant information (patient data, clinical findings) from individual patient selected with inclusion criteria. Patients are then subjected to diagnostic nasal endoscopy, absolute eosinophil count, antral wash taken for culture, imaging of nose and PNS done by waters view and CT of nose and PNS. After provisional diagnosis all patients were managed with medical/medical + surgical treatment depending on the response. The following observations were made.

**Results:** In present study out of 80 patients 40 each were in acute and chronic sinusitis group, overall 47 were males (58.75%) and 33 were females (41.25%). Male to female ratio was 1.42: 1. No significant difference between the two groups. In our study 32 patients were between the age group of 11-20 years (40%), followed by 18 of them in age group of 21-30 years (22.5%) and 13 patients in age group of 31- 40 years (16.25%), 7 patients were in 41-50 years (8.75%), 5 patients in age group of 51-60 years (6.25%), 3 patients in less than 10 years (3.75%) and 2 patient in age group of more than 70 years (2.5%). Youngest patient was 6 years and oldest patient was 70 years. In our study mean age of presentation was 26.86 years with standard deviation of 13.25. In our study out of 40 Acute Sinusitis patients maximum number of patients i.e, 16 patients presented with symptoms of 2 weeks duration, (40%) followed by 11 patients with symptoms of 3 weeks duration (27.5%) and 10 patients with 1 week duration (25%). Least common presentation was of 4 weeks duration which was observed in only 3 patients (7.5%). Out of 36 patients included in combined modality group 27 patients

**(67.5%) underwent F.E.E.S, 7 patients (17.5%) treated with Septoplasty/SMR and 2 patients (5%) were subjected to Caldwell Luc operation.**

**Conclusion: This study entitled “Clinical study of etiology and management of sinusitis” brings light on various etiological factors implicated in causation of both acute and chronic sinusitis which will influence the treatment decisions and reduce morbidity caused by disease. Study also highlights the management options available in both acute and chronic sinusitis.**

**Keywords: Etiological factors; sinusitis; diagnostic nasal endoscopy; endoscopic sinus surgery.**

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## **INTRODUCTION**

The term “sinusitis” refers to a group of disorders characterized by inflammation of the mucosa of the paranasal sinuses. Because the inflammation nearly always also involves the nose, it is now generally accepted that “rhinosinusitis” is the preferred term to describe the inflammation of the nose and paranasal sinuses.

Patients with chronic headache pain often present to a variety of specialists, including their primary care physician, neurologist, dentist, otolaryngologist and even psychiatrist. They present to otolaryngologist because they or their physician believe the headache to be related to underlying sinus pathology. The primary focus of the otolaryngologist is to exclude this possibility. It is estimated that children have between 6 to 8 upper respiratory infections (URIs) per year and that adult’s average 2 to 3 URIs annually. Evidence has shown that common cold causes a viral rhinosinusitis, and therefore it is possible to project that 90% of patients with colds have either viral or bacterial rhinosinusitis.

Now coming to Indian scenario according to National Institute of Allergy and Infectious Diseases (NIAID) it is estimated 134 million Indians suffer from chronic sinusitis, the symptoms of which include but are not limited to debilitating headaches, fever and nasal congestion and obstruction, estimate does not even take into account those who are suffering from acute sinusitis. Among Indians this disease is more widespread than diabetes, asthma or coronary heart disease. It means one in eight Indians suffer from sinusitis

During the past 10 years, the prevalence of rhinosinusitis has increased more than 50%. This dramatic increase in the incidence of this disease has occurred despite improved surgical techniques and the development of more powerful, broad spectrum antibiotics. Although insights into the pathophysiology of rhinosinusitis have largely been expanded over the last two decades, the exact etiology and mechanism of persistence is still unrevealed. rhinosinusitis is a multifactorial disease and with some evidence, impaired ostial patency, mucociliary impairment, allergy, bacterial or fungal infection (or triggering), immunocompromised state, and environmental and genetic factors have been suggested to be associated or as risk factors.

This study aims at providing further confirmation of etiological factors and management options in both acute and chronic sinusitis.

## **Objectives**

1. To study the etiological factors involved in acute and chronic sinusitis.
2. To study the effectiveness of conservative management in sinusitis.
3. To study the effectiveness of surgical procedures performed in the management of chronic sinusitis.

## MATERIALS & METHODS

This study entitled “Clinical Study of Etiology and Management of Sinusitis” was conducted in department of ENT, Govt Medical College/Hospital, Suryapet from November 2019 to May 2021.

**Source of data:** The patients attending the department of ENT and also patients referred from other departments of combined hospitals of Govt Medical College & Hospital, Suryapet form the subjects for our study.

**Sample Size:** 100

**Inclusion Criteria:** All patients with Acute and chronic sinusitis

The presence of two or more major factors or one major and two minor factors is considered suggestive of sinusitis

**Exclusion Criteria:** No exclusion criteria

**Methods of collection of data:**

1. This study is time bound cross sectional study. The cases selected for the study were subjected to detailed clinical history and clinical examination.
2. All the 100 patients were subjected to

### Blood and Urine Investigations

- Complete hemogram
- Absolute eosinophil count
- RBS/PPBS
- Urine routine.

**Diagnostic nasal endoscopy:** Nasal endoscope used for diagnostic nasal endoscopic examination was 4mm Hopkins rod endoscope with 00 and 300 angulations with these endoscopes first, second and third pass evaluation of nasal cavity and paranasal sinuses is done after topical anaesthesia and decongestion of nasal cavity of patients.

**Antral wash:** Antral wash taken and sent for culture and sensitivity to department of microbiology, Govt Medical College, Suryapet.

**Imaging of nose and PNS done by**

- X-Ray PNS, Waters view – (occipitontental view)
- CT PNS

Direct coronal sections were done All films are taken without contrast.

**Parameters:** Patient’s position: Prone with chin extended. Gantry angulation: perpendicular to hard palate

**Section thickness:** 2mm.

**Scan limits:** from glabella to dorsumsella.

## RESULTS

In the present study the Results are as follows.

**Table 1: Sex Distribution**

Sex	Number of patients		Total	Percentage (%)
	Acute Sinusitis	Chronic Sinusitis		
Male	21	26	47	58.75
Female	19	14	33	41.25

Total	40	40	80	100
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In present study out of 80 patients 40 each were in acute and chronic sinusitis group, overall 47 were males (58.75%) and 33 were females (41.25%). Male to female ratio was 1.42: 1. No significant difference between the two groups.

**Table 2: Age Distribution**

Age (years)	Acute Sinusitis	Chronic Sinusitis	Total no of patients	Percentage (%)
≤10	1	2	3	3.75
11-20	17	15	32	40
21-30	12	6	18	22.5
31-40	7	6	13	16.25
41-50	3	4	7	8.75
51-60	0	5	5	6.25
≥70	0	2	2	2.5

In our study 32 patients were between the age group of 11-20 years (40%), followed by 18 of them in age group of 21-30 years (22.5%) and 13 patients in age group of 31- 40 years (16.25%), 7 patients were in 41-50 years (8.75%), 5 patients in age group of 51-60 years (6.25%), 3 patients in less than 10 years (3.75%) and 2 patient in age group of more than 70 years (2.5%). Youngest patient was 6 years and oldest patient was 70 years. In our study mean age of presentation was 26.86 years with standard deviation of 13.25.

**Table 3: Socioeconomic Status**

SES Class	Acute Sinusitis	Chronic Sinusitis	Total	Percentage (%)
Upper	8	7	15	18.75
Upper Middle	5	5	10	12.5
Lower Middle	6	8	14	17.5
Upper Lower	8	5	13	16.25
Lower	13	15	28	35
	40	40	80	100

In our study socio economic status was calculated according to Kuppu Swami scale taking into account education, occupation and income of family head and was found that 28 patients belong to lower class (35%), 18 patients belongs to upper class (18.75%), 14 patients belong to upper lower and lower middle class each (17.25%), followed by upper middle class constituting 10 patients (12.5%). No significant difference between the two groups.

**Table 4: Duration of Symptoms: Acute Sinusitis**

Duration (weeks)	Number of patients	Percentage (%)
1	10	25
2	16	40
3	11	27.5
4	3	7.5
Total number of patients	40	100

In our study out of 40 Acute Sinusitis patients maximum number of patients i.e, 16 patients presented with symptoms of 2 weeks duration, (40%) followed by 11 patients with symptoms

of 3 weeks duration (27.5%) and 10 patients with 1 week duration (25%). Least common presentation was of 4 weeks duration which was observed in only 3 patients (7.5%).

**Table 5: Duration of Symptoms: Chronic Sinusitis**

Duration (Months)	Number of patients	Percentage (%)
3-8	15	37.5
9-14	21	52.5
15-20	3	7.5
21-26	1	2.5
Total number of patients	40	100

In our study out of 40 Chronic Sinusitis patients maximum number of patients i.e, 21 patients presented with symptoms of 9-14 months duration, (52.5%) followed by 15 patients with symptoms of 3-8 months duration (37.5%) and 3 patients with 15-20 months duration (7.5%). Least common presentation was of 21-26 months duration which was observed in only 1 patients (2.5%).

**Table 6: Distribution of Symptoms: Acute Sinusitis**

Symptoms	Number of Patients	Percentage (%)
Nasal Obstruction	35	87.5
Nasal Discharge	26	65
Headache	37	92.5
Facial pain/ Pressure	23	57.5
Post nasal discharge	8	20
Dental pain	1	2.5
Halitosis	0	0
Fatigue	2	5
Excessive Sneezing	3	7.5
Mouth breathing/ Snoring	3	7.5
Cough	10	25

In our study out of 40 patients diagnosed as Acute Sinusitis, most common presenting complaint was headache (92.5%) followed by nasal obstruction seen in 87.5% of the patients. Nasal discharge complaint was observed in 65%, Facial pain/ pressure in 57.5%, post nasal discharge symptoms in 20% patients. Other presenting complaints were Cough (25%), Snoring and Excessive sneezing in 7.5% each, Fatigueness in 5% and Dental pain in 2.5% of the patients.

**Table 7: Distribution of Symptoms: Chronic Sinusitis**

Symptoms	Number of Patients	Percentage (%)
Nasal Obstruction	36	90
Nasal Discharge	28	70
Headache	28	70
Facial pain/ Pressure	19	47.5
Post nasal discharge	12	30
Dental pain	4	10
Halitosis	2	5
Fatigue	6	15
Excessive Sneezing	10	25
Mouth breathing/ Snoring	6	15
Cough	7	17.5

In our study out of 40 patients diagnosed as Chronic Sinusitis, most common presenting complaint was Nasal obstruction (90%) followed by nasal discharge and Headache in 70% of the patients. Facial pain/ pressure complaint was observed in 47.5%, Post nasal discharge in 30% and Excessive sneezing symptoms in 25% patients. Other presenting complaints were Cough (17.5%), Snoring and Fatigueness in 15% each and Dental pain in 10%, Halitosis in 5% of the patients.

**Table 8: Examination Findings: Acute Sinusitis**

Findings		Number of patients	Percentage (%)
Nasal Mucosa	Normal	10	25
	Congested	24	60
	Pale	6	15
Deviated Nasal Septum	Right	18	45
	Left	14	35
	S -shaped	4	10
	Normal septum	14	35
Inferior turbinate hypertrophy		11	27.5
Mucopus in middle meatus		17	42.5
Congested middle meatus		20	50
Post nasal discharge		18	45
Polyp in the nasal cavity		0	0
Paranasal Sinus tenderness	Maxillary	22	55
	Ant. Ethamoidal	16	40
	Frontal	16	40
	Pan sinus	10	25
	No Tenderness	5	12.5
Altered Smell perception		1	2.5

In our study out of 40 Acute Sinusitis patients congested mucosa seen in 24 patients (60%), pale mucosa in 6 patients (15%), Deviated nasal septum seen in 36 patients (90%), Hypertrophied inferior turbinate seen in 11 patients (27.5%), Mucopus in middle meatus seen in 17 patients (42.5%), Congested middle meatus seen in 20 patients (50%), Post nasal discharge in 18 patients (45%), Sinus tenderness in 36 patients (90%). One patient had altered Smell perception in the form of reduced perception of smell.

**Table 9: Examination Findings: Chronic Sinusitis**

Findings		Number of patients	Percentage (%)
Nasal Mucosa	Normal	9	22.5
	Congested	8	20
	Pale	23	57.5
Deviated Nasal Septum	Right	18	45
	Left	12	30
	S -shaped	8	20
	Normal septum	8	20
Inferior turbinate hypertrophy		19	47.5
Mucopus in middle meatus		18	45

Congested middle meatus		8	20
Post nasal discharge		18	45
Polyp in the nasal cavity	Right	9	22.5
	Left	3	7.5
	Bilateral	15	37.5
Paranasal Sinus tenderness	Maxillary	28	70
	Ant. Ethmoidal	23	57.5
	Frontal	18	45
	Pan sinus	1	2.5
	No Tenderness	6	15
Altered Smell perception		11	27.5

In our study out of 40 Chronic Sinusitis patients congested mucosa seen in 8 patients (20%), pale mucosa in 23 patients (57.5%). Deviated nasal septum seen in 38 patients (95%), Hypertrophied inferior turbinate seen in 19 patients (47.5%), Mucopus in middle meatus seen in 18 patients (45%), Congested middle meatus seen in 8 patients (20%), Post nasal discharge in 18 patients (45%), Sinus tenderness in 28 patients (70%). 15 patients (37.5%) had polyp/mass in the nasal cavity. 11 patients (27.5%) had altered Smell perception in the form of reduced perception of smell.

**Table 10: Associated Factors Causing Sinusitis**

Associated Factors	Acute Sinusitis	Chronic Sinusitis	Total no of Patients	Percentage (%)
Allergy	10	15	25	62.5
Dental Infection	1	4	5	12.5
Adenoid hypertrophy	7	3	10	25

In our study, Allergy seen in 25 patients (62.5%), Adenoid hypertrophy in 10 patients (25%), and dental infection in 5 patients (12.5%). Adenoid hypertrophy seen in children and adolescent group.

**Table 11: Anatomical Variations Associated with Sinusitis**

Anatomical Variations	Acute Sinusitis	Chronic Sinusitis	Total No of Patients (%)
Deviated Nasal Septum	26	32	68
Concha Bullosa	1	5	6
Prominent Bulla Ethmoidalis	0	3	3
Paradoxically Turned Middle Turbinate	0	1	1
Prominent Agger Nasi cell	1	1	2

Deviated nasal septum was most common anatomical variation found in 68 patients (85%), followed by concha bullosa in 6 patients (15%), prominent bulla ethmoidalis in 3 patients (7.5%) paradoxically turned middle turbinate in 1 patient (2.5%) and prominent Agger nasi cells in 2 patients (5%).

**Table 12: Antral Wash Results in Chronic Sinusitis**

Name of the Organism	Number of Patients	Percentage (%)
Coagulase Negative Staphylococcus	2	5
Staphylococcus Aureus	4	10
E. Coli	1	2.5
Diphtheroids	2	5
Streptococcus Pneumonia	1	2.5
No Growth	30	75

In our study in 40 patients culture revealed no growth (75%), in 4 patients revealed Staphylococcus aureus (10%), diphtheroids and Coagulase negative staphylococcus in 2 patients (5%) each, and Ecoli in 1 patient (2.5%).

**Table 13: CT PNS Finding in Chronic Sinusitis**

CT PNS Finding	Number of Patients	Percentage (%)
Anatomical Variation	32	90
Sino-Nasal Polyp / Mass	17	42.5
Soft Tissue Attenuation	11	27.5
Mucosal Thickening	36	90

In our study CT PNS showed mucosal thickening of involved sinuses in 36 patients (90%), anatomical variations in 32 patients (90%), polyp in 17 patients (42.5%) and soft tissue attenuation (35-40 HU) of involved sinuses in 11 patients (27.5%).

**Table 14: Management in Acute Sinusitis**

Management Options	Total Number of Patients included	Number of Patients Resolved	Number of Patients Unresolved
Medical treatment Only	40	39	1
Medical + Surgical Treatment (Antral Wash)	1	1	0

In our study all 40 Acute Sinusitis patients were subjected medical management which included appropriate broad-spectrum Antibiotic + Decongestant + Antihistaminic. 39 patients (97.5%) were completely resolved of symptoms while 1 patient (2.5%) resolved with medical+ surgical management in the form of Antral wash.

**Table 15: Management in Chronic Sinusitis**

Management Options	Total Number of Patients included	Number of Patients Resolved	Number of Patients Unresolved	Recurrence
Medical only	6	4	2	0
Medical + Surgical (FESS/CWL/Septoplasty)	36(34+2)	36	0	1

In our study all 40 Chronic Sinusitis patients were subjected medical management initially which included appropriate broad-spectrum Antibiotic + Intranasal +/-Oral Steroids + Decongestant + Antihistaminic. 4 patients (10%) were completely resolved of symptoms while 36 patient (90%) resolved with medical (broad spectrum Antibiotic + Intranasal +/-Oral



Steroids + Decongestant + Antihistaminic) + surgical management in the form of FESS/CWL/Septoplasty. Out of 36 patient in combined modality 1 patient(2.5%) had recurrence.

**Table 16: Surgical Treatment Options in Chronic Sinusitis**

Surgical Options	Number of Patients	Percentage (%)
F.E.S.S	27	67.5
Caldwell Luc Operation	2	5
Septoplasty / SMR	7	17.5

Out of 36 patients included in combined modality group 27 patients (67.5%) underwent F.E.E.S, 7 patients (17.5%) treated with Septoplasty/SMR and 2 patients (5%) were subjected to Caldwell Luc operation.

## DISCUSSION

This study entitled “Clinical study of etiology and management of sinusitis” was conducted in Department of ENT, Govt Medical College, Suryapet from November 2019 to May 2021. A total of 100 patients were enrolled in the study between 6 and 70 years old. All the patients presenting with symptoms of acute and chronic sinusitis with duration of symptoms less than 4 weeks /more than 12 weeks respectively with two or more major factors or one major and two minor factors were included in the study. Fifty patients each were in both acute and chronic sinusitis group.

In the present study 47 were males (58.75%) and 33 were females (41.25%). Male to female ratio was 1.42: 1

In the studies of McNeil et al,<sup>[1]</sup> Matti Revonta et al,<sup>[2]</sup> higher incidence was seen in women. But as in Kurien et al,<sup>[3]</sup> study in the present study also males were more commonly affected.

In our study 32 patients were between the age group of 11-20 years (40%), followed by 18 of them in age group of 21-30 years (22.5%) and 13 patients in age group of 31-40 years (16.25%), 7 patients were in 41-50 years (8.75%), 5 patients in age group of 51-60 years(6.25%), 3 patients in less than 10 years (3.75%) and 2 patient in age group of more than 70 years(2.5%). Youngest patient was 6 years and oldest patient was 70 years. In our study mean age of presentation was 26.86 years with standard deviation of 13.25.

According to McNeilet al,<sup>[1]</sup> study maximum age incidence was in 4th decade. While in the studies by Vourinen et al,<sup>[4]</sup> Axelsson et al,<sup>[5]</sup> Kurien et al,<sup>[3]</sup> and also the present study, highest incidence was seen in the 11-20 age group (2<sup>nd</sup> decade).

In our study socio economic status was calculated according to Kuppu Swami scale taking into account education, occupation and income of family head and was found that 28 patients belong to lower class (35%), 18 patients belongs to upper class (18.75%), 14 patients belong to upper lower and lower middle class each(17.25%), followed by upper middle class constituting 10 patients(12.5%)

Study of Kavell et al stated that lower socioeconomic status is associated with increased morbidity in children with cystic fibrosis and rhinosinusitis.<sup>[6]</sup>

### Duration of symptoms:

In our study out of 40 Acute Sinusitis patients maximum number of patients i.e, 16 patients presented with symptoms of 2 weeks duration, (40%) followed by 11 patients with symptoms of 3 weeks duration (27.5%) and 10 patients with 1 week duration (25%). Least common presentation was of 4 weeks duration which was observed in only 3 patients(7.5%).

In our study out of 40 Chronic Sinusitis patients maximum number of patients i.e, 21 patients presented with symptoms of 9-14 months duration, (52.5%) followed by 15 patients with symptoms of 3-8 months duration (37.5%) and 3 patients with 15-20 months duration (7.5%). Least common presentation was of 21-26 months duration which was observed in only 1 patient(2.5%).

#### **Distribution of symptoms:**

In our study out of 40 patients diagnosed as Acute Sinusitis, Most common presenting complaint was headache(92.5%) followed by nasal obstruction seen in 87.5% of the patients. Nasal discharge complaint was observed in 65%,Facial pain/ pressure in 57.5%, post nasal discharge symptoms in 20% patients. Other presenting complaints were Cough(25%), Snoring and Excessive sneezing in 7.5% each, Fatigueness in 5% and Dental pain in 2.5% of the patients.

Ling, Fancis T.K. Kountakis Stilianos E,<sup>[7]</sup> conducted a study on clinical symptoms in chronic rhinosinusitis. They found in their study nasal obstruction accounted to 84% postnasal drip in 82% of patients respectively. In the studies by Hinde and Arruda et al, nasal obstruction was the main complaint followed by headache.<sup>[8,9]</sup> In Nayak et al,<sup>[10]</sup> study the commonest symptom was nasal discharge followed by headache and nasal obstruction. Nasal obstruction was the commonest symptom (96%) followed by postnasal drip (92%) & facial pain/headache (90%) in the study by Brain L Mathews et al.<sup>[11]</sup>

#### **Examination:**

In our study out of 40 patients diagnosed as Chronic Sinusitis, Most common presenting complaint was Nasal obstruction(90%) followed by nasal discharge and Headache in 70% of the patients. Facial pain/ pressure complaint was observed in 47.5%,Post nasal discharge in 30% and Excessive sneezing symptoms in 25% patients. Other presenting complaints were Cough(17.5%), Snoring and Fatigueness in 15% each and Dental pain in 10%,Halitosis in 5% of the patients.

Septal deviations indirectly contribute to narrowing of the ostiomeatal complex by means of compressing the lateral wall of nose which inturn lead to anatomical narrowing of ostiomeatal complex, by causing paradoxically turned middle turbinate, lateralized uncinate process. In our study it was seen in 78 of 100 patients(78%). It was more than 55.7% in study by Maru<sup>107</sup>and more than that of 38% reported by Asruddin.<sup>[12]</sup>

In our study conchobullosa (large air cell within middle turbinate) found in 6%, mucopus in middle meatus in 45% and polyp in 27% of patients(Chronic sinusitis group only). In study of R.H. Kamel,<sup>[13]</sup> Concha bullosa found in 5.69% purulent discharge in middle meatus in 44% and polyp in 33.5% of diseased sinuses.

In our study adenoid hypertrophy leading to sinusitis in 19 patients (27.5%), allergy seen in 24 patients (60%) and dental infection in 5 patients (5%). Adenoid hypertrophy leading to sinusitis is most common cause in children and adolescents. In our study 18 patients developed sinusitis secondary to adenoid hypertrophy of which 10 were males and 8 were females.

#### **Dental infection:**

In our study caries and periodontitis followed by extraction of upper molars was common cause of maxillary sinusitis in 5 patients. Upper third molar was most commonly involved followed by upper first molar.

#### **Distribution of anatomical variations:**

In our study, deviated nasal septum seen in 36 patients (90%), Concha bullosa seen in 6 patients (15%), prominent bulla ethmoidalis seen in 3 patients (7.5%), paradoxically turned middle turbinate in one patient (1.25%) and prominent Agger nasi cells in 2 patients (5%).

In study by R.H. Kamel,<sup>[14]</sup> conchabullosa found in 5.69%, prominent bulla found in 19.62% and Agger nasi cell present in 5.69% of diseased sinuses.

In our study bilateral chronic sinusitis was seen in 63 patients (78.75%). Causes are DNS with hypertrophied inferior turbinate, allergic rhinitis, adenoid hypertrophy, bilateral ethmoidal polyp. Unilateral chronic sinusitis seen in 27 patients (33.75%) causes are gross DNS touching lateral wall, chronic periodontitis of upper molars (1st and 3rd), unilateral presence of anatomical variations of ostiomeatal complex (concha bullosa, prominent bulla, paradoxically turned middle turbinate, prominent agger nasi cells).

#### **Antral wash results:**

In our study maximum of cases (Chronic sinusitis group only) yielded no growth (75%) followed by staphylococcus aureus in 4 patients (10%) diphtheroids and coagulase negative staphylococcus in 2 patients (5%) each and Ecoli, streptococci pneumonia in 1 patient (2.5%) each.

In study of Burcin Sener et al,<sup>[15]</sup> 49 patients with diagnosis of chronic maxillary sinusitis were evaluated microbiologically in which there was no bacterial growth in 7 cases. In remaining 42 cases of total 89 bacteria were isolated 28 of them being classical pathogens and 61 being non-classical pathogens. Among the classical pathogens staphylococcus aureus was most common (7 out of 28 of the isolated classical pathogens) followed by beta hemolytic streptococcus, streptococcus pneumoniae and Ecoli.

#### **CT PNS:**

In our study (CT PNS taken in Chronic sinusitis group only) anatomical variations were found in 36 patients (90%) polyp was seen in 17 patients (42.5%), soft tissue attenuation (35-40 HU) seen in 11 patients (27.5%) and mucosal thickening in 46 patients (92%).

In a prospective cohort study by Yoshimi Anzai et al<sup>16</sup> confirmed that the treatment decisions of surgery versus no surgery were altered in one third of patients after sinus CT, increasing probability of surgical treatment. The surgeon's agreement regarding the treatment decision was also improved after they reviewed the sinus CT.

In study by Rong-San Jiang et al<sup>17</sup> endoscopically guided middle meatal cultures correlated well with cumulative Lund-Mackay CT scores for the frontal, maxillary and the ostiomeatal complex.

#### **Management in sinusitis:**

In our study all 40 Acute Sinusitis patients were subjected medical management which included appropriate broad-spectrum Antibiotic + Decongestant + Antihistaminic. 39 patients (97.5%) were completely resolved of symptoms while 1 patient (2.5%) resolved with medical+ surgical management in the form of Antral wash.

For penicillin allergic patients, folate inhibitors (trimethoprim- sulfamethoxazole) are a cost-effective alternative to amoxicillin. The macrolide class of antibiotics may also be used for patients with penicillin allergy.<sup>[18]</sup>

In our study all 40 Chronic Sinusitis patients were subjected medical management initially which included appropriate broad-spectrum Antibiotic + Intranasal +/-Oral Steroids + Decongestant + Antihistaminic. 4 patients (10%) were completely resolved of symptoms while 36 patient (90%) resolved with medical (broad spectrum Antibiotic + Intranasal +/-Oral Steroids + Decongestant + Antihistaminic) + surgical management in the form of

FESS/CWL/Septoplasty. Out of 36 patient in combined modality 1 patient(2.5%) had recurrence.

Out of 36 patients included in combined modality group 27 patients(67.5%) underwent F.E.E.S, 7 patients(17.5%) treated with Septoplasty/SMR and 2 patients (5%) were subjected to Caldwell Luc operation.

Bhattacharya N,<sup>[19]</sup> in 2007 published the progress in surgical management of chronic rhinosinusitis and nasal polyposis. He states that endoscopic sinus surgery remains the treatment of choice for medically refractory chronic rhinosinusitis (CRS). ESS has undergone review, reassessment and substantial refinement. Several advances (powered instrumentation, image guidance, adjunctive intraoperative procedures) have expanded the scope of cases amenable to ESS, decreased operative time and intraoperative blood loss and improved safety.

## CONCLUSION

Sinusitis is most common rhinological problem encountered worldwide which has greater propensity to cause morbidity. Knowledge of etiological factors resulting in rhinosinusitis is very much helpful in making an accurate diagnosis which will aid in prompt treatment of the disease.

### Our study revealed many parameters:

- Sinusitis was prevalent in low socioeconomic group owing to their poor living conditions, overcrowding and lack of nutritional food intake
- Adenoid hypertrophy was the most common cause of chronic rhinosinusitis in children therefore adenoidectomy will have a significant impact in treatment of the disease
- History of tooth ache, endodontic treatment and complete dental examination should be carried out with importance being given to upper molars as periodontitis and caries of upper molars can predispose to chronic maxillary sinusitis
- Allergy as etiological factor should always be considered, as prompt medical treatment of allergy prior to endoscopic sinus surgery will increase the success rates of surgery.
- Diagnostic nasal endoscopy coupled with sinus CT helps in better detection of anatomical variations which influences treatment decisions.
- Deviated nasal septum was most common anatomical variation found in our study.
- Antral wash results revealed predominantly no growth in our study.
- DNS with hypertrophied inferior turbinate, allergic rhinitis, bilateral ethmoidal polyp, adenoid hypertrophy were contributing factors for bilateral chronic sinusitis whereas gross DNS, caries and periodontitis of upper molars, unilateral persistence of anatomical variations of ostiomeatal complex (prominent bulla, paradoxically turned middle turbinate, conc ha bullosa, prominent agger nasi cells) were contributing factors to unilateral chronic sinusitis in our study
- Acute sinusitis can be managed with appropriate broad-spectrum Antibiotic + Decongestant + Antihistaminic in majority of the cases where as in Chronic sinusitis medical management combined with surgical treatment has better results.
- FESS (Functional Endoscopic Sinus Surgery) is having better results comparing to other surgical treatment options available for treatment of chronic sinusitis.

Our study entitled “Clinical study of etiology and management of sinusitis” brings light on various etiological factors implicated in causation of acute and chronic sinusitis which will influence the treatment decisions and also reduce the morbidity caused by it.

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