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RESEARCH ARTICLE
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A STUDY ON INFLUENCE OF CHRONIC SINUSITIS ON MUCOSAL ACTIVE TYPE OF CHRONIC OTITIS MEDIA IN A TERTIARY CARE HOSPITAL, HYDERABAD

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Abstract

Introduction: Chronic Suppurative otitis media is one of the most frequently encountered diseases in ENT. CSOM affects over 300 million individuals over the globe of which 60% suffer from significant hearing loss. In India, the overall prevalence is 46 and 16 per 1000 in rural and urban population respectively. Chronic suppurative otitis media (COM) is defined as chronic inflammation of mucoperiosteal lining of the middle ear cleft. It is associated with history of ear discharge for more than 3 months and a permanent tympanic membrane defect. The most important pathological factors in CSOM are dysfunction of the Eustachian tube and bacterial infection. The mucosal type of chronic suppurative otitis media is usually associated with co-existent sinus and nasal pathology which can worsen middle ear problems due to eustachian tube dysfunction.

Materials and Methods: A cross-sectional study is carried out in department of Otorhinolaryngology where the study population involves patients with active mucosal type of CSOM who sought treatment at Government ENT Hospital, Koti for a period of 18 months. A total of 50 patients of age >18 years who presented to OPD with complaints of persistent ear discharge for >2 months and with conductive hearing loss of 20-40 dbHL, were selected and were subjected to detailed history, Physical examination, and complete ENT examination. Patients then underwent Otoendoscopic examination and Diagnostic Nasal Endoscopy, and radiological evaluation like, Xray mastoids and CT paranasal sinuses. Routine investigations are carried out in all patients as well as Pure Tone Audiometry. Patients with evidence of chronic sinusitis were treated with antibiotics, antihistamines and decongestions for a period of at least 6 weeks.

Results: A total of 50 patients were selected for the purpose of this study. These patients with active mucosal type of chronic otitis media had persistent ear discharge even following culture directed topical and systemic antibiotics. These patients had cellular type of mastoids on x- ray/CT temporal bones. This study emphasizes sinus pathology as a major factor for persistently active mucosal type

of chronic otitis media. The percentage other septic foci like chronic tonsillitis, adenoids is less in comparison to sinus disease. This study was conducted over a period of 18 months in 50 patients of which 18 were males and 32 were females. Majority of the patients belonged to age group 18 – 30 years. Amongst these patients, 31 came from rural region and 19 from urban areas. The poor living conditions in rural population can be considered as one of the predisposing factor for the higher prevalence in this population.

Conclusion: In the adult population sinusitis is one of the most important cause of persistent ear discharge in mucosal type of Chronic otitis media. Assessment for sinusitis in the treatment of Chronic otitis media should become a routine practice. In the evaluation of the patients with chronic otitis media, radiological, endoscopic, and other diagnostic tools have their roles in the assessment of the patients, and to rule out nasal and paranasal pathologies as potential aetiological factors. Deviated nasal septum, Concha bullosa and enlarged bulla ethmoidalis in order of frequency are the most common anatomical variants of nose and paranasal sinuses predisposing to sinusitis. Unilateral ear discharge is associated with sinusitis only on the corresponding side, which is in concurrence with our study.

Keywords: Chronic Suppurative otitis media, Otoendoscopic examination, Diagnostic Nasal Endoscopy.

INTRODUCTION

Chronic Suppurative otitis media is one of the most frequently encountered diseases in ENT. CSOM affects over 300 million individuals over the globe of which 60% suffer from significant hearing loss. In India, the overall prevalence is 46 and 16 per 1000 in rural and urban population respectively. Chronic suppurative otitis media (COM) is defined as chronic inflammation of mucoperiosteal lining of the middle ear cleft. It is associated with history of ear discharge for more than 3 months and a permanent tympanic membrane defect. The most important pathological factors in CSOM are dysfunction of the Eustachian tube and bacterial infection. The mucosal type of chronic suppurative otitis media is usually associated with co-existent sinus and nasal pathology which can worsen middle ear problems due to eustachian tube dysfunction.

Middle ear cleft constitutes Eustachian tube, Tympanic cavity, attic, aditus, antrum and mastoid air cells lined by lined by epithelium and is in continuity with that of nose and nasopharynx.

Rhinosinusitis affects over 30 million individuals globally each year. Sinusitis causes inflammation of the middle ear mucosa with increased and persistent mucoid/mucopurulent discharge and causes active mucosal disease. Chronic sinusitis can act as a focus of sepsis in the development of chronic suppurative otitis media of mucosal (tubotympanic) type. That such an inter-relationship exists is supported by clinical experience.

Eustachian tube patency and its proper functioning is highly essential for normal maintenance of middle ear function. The mucociliary transport mechanism of the Eustachian tube is of paramount importance in the pathogenesis and prognosis of chronic suppurative otitis media and also in the outcome of myringoplasties. Infection of nose and paranasal sinuses can involve eustachian tube leading to its obstruction. Thus the pathogenesis of mucosal active type of CSOM has been related to the presence of prior or concurrent sinonasal pathologies.

Deviation of nasal septum, hypertrophy of turbinates, anatomical variations in the lateral nasal wall and adhesions, all interfere with ventilation and the free passage of air through the nasal chambers and with the secretion and movement of the mucus blanket and thus predispose to infection.

Tubo-tympanic type of CSOM patients with concurrent active sinusitis have chronically discharging ears. Surgery on the ear without correction of sinusitis has frequently led to failures and poor prognosis. Those patients who have Otitis media secondary to nasal and PNS pathology need to have both the problems addressed.

This study correlates that sinusitis is the main etiological factor for middle ear disease of tubo tympanic type and that clearance of sinusitis in these patients results in good outcome of tubo tympanic disease clearance.

AIM OF THE STUDY

To study the correlation between Sinusitis and mucosal active type of Chronic Otitis Media.

OBJECTIVES OF THE STUDY

1. To establish Chronic sinusitis as focal sepsis active mucosal type of Chronic Otitis Media.
2. To know the importance of proper Diagnostic nasal endoscopic evaluation of all patients with mucosal active type of chronic otitis.
3. To ascertain that there is overall improvement in the management of Chronic Otitis Media active mucosal disease after curing Chronic sinusitis.

MATERIALS AND METHODS

A cross-sectional study is carried out in department of Otorhinolaryngology where the study population involves patients with active mucosal type of CSOM who sought treatment at Government ENT Hospital, Koti for a period of 18 months.

A total of 50 patients of age >18 years who presented to OPD with complaints of persistent ear discharge for >2 months and with conductive hearing loss of 20-40 dbHL, were selected and were subjected to detailed history, Physical examination, and complete ENT examination. Patients then underwent Otoendoscopic examination and Diagnostic Nasal Endoscopy, and radiological evaluation like, Xray mastoids and CT paranasal sinuses. Routine investigations are carried out in all patients as well as Pure Tone Audiometry. Patients with evidence of chronic sinusitis were treated with antibiotics, antihistamines and decongestions for a period of at least 6 weeks. These patients had temporary symptomatic improvement they showed frequent relapse of symptoms. So they underwent endoscopic sinus surgery and septal correction as per need of the patients. These patients were followed up postoperatively at 4 weeks interval and were assessed by otoendoscopy for decrease in ear discharge and improvement in middle ear mucosal status.

INCLUSION CRITERIA

1. Patients of age group >18 years
2. Patients diagnosed with Mucosal active type of Chronic Otitis Media
3. Duration of ear discharge : >2 months
4. Hearing loss : 20 – 40 dbHL
5. Patients giving consent for the study upon him / her

EXCLUSION CRITERIA

1. Patients with Squamosal type of Chronic Otitis Media
2. Patients with traumatic perforation
3. Patients with Acute Suppurative Otitis Media
4. Patients with Active infection of nose and paranasal sinuses
5. Patients with Otitis media with effusion or Otitis externa
6. Patients with comorbidities like Diabetes mellitus / immunocompromised status. Patients not giving consent for study upon him / her

50 patients who met the above criteria were selected randomly for the study and they initially underwent endoscopic evaluation.

DIAGNOSTIC NASAL ENDOSCOPY

Using 4% xylocaine (local anaesthetic) with Xylometazoline (decongestant) nose packed along the inferior meatus, middle meatus and septum on both sides.

After 15 minutes pack removed and Diagnostic nasal endoscopy done with 0º scope. The main aim is to see the following:
1. Patency of the Eustachian tube
2. Structural change of tubal eminence
3. Discharge from middle meatus or sphenoethmoidal recess which was flowing over the Eustachian tube orifice.

In osteomeatal complex area, anatomical variants are noted, which included the following :
1. Medialised uncinate
2. Prominent bulla
3. Enlarged middle turbinate
4. Accessory ostium
5. Circulus phenomenon
6. Discharge from frontal recess and maxillary sinus

OTOENDOSCOPY

Otoendoscopy done with 0º scope for all these patients. Following findings were documented:
1. Type of perforation
2. Quadrants involved
3. Discharge
4. Status of Middle ear mucosa

COMPUTED TOMOGRAPHY OF PARANASAL SINUSES

These patients then underwent CT scan paranasal sinuses both coronal and axial view, 3000 Hu units bone window.
Following findings were noted:
1. Medialised uncinate
2. Blockage of osteo meatal complex
3. Mucosal thickening / Retention cyst in maxillary sinus
4. Concha bullosa
5. Enlarged middle turbinate
6. Mucosal thickening in anterior and posterior ethmoids
7. Agger nasi cells with obstruction to frontal recess
8. Type of skull base. Keros classification
9. Type of frontal cell causing obstruction to frontal recess

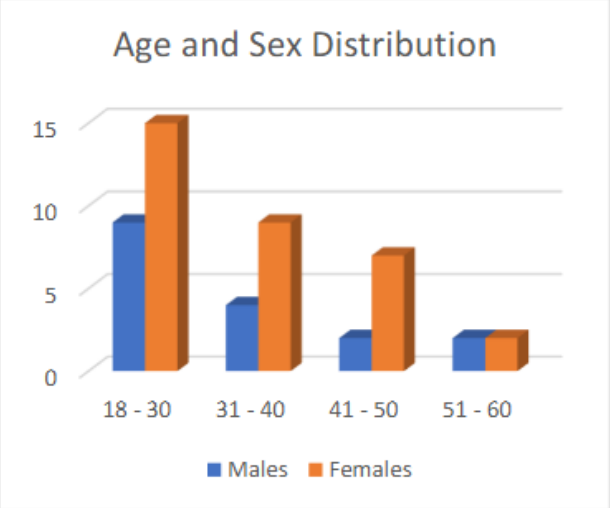
The patients had various anatomic variations in the nose and paranasal sinuses that lead to chronic sinusitis not relieving on medications. They showed signs suggestive of chronic sinusitis on diagnostic nasal endoscopy and computed tomography of paranasal sinuses.
These patients underwent Functional endoscopic sinus surgery and septal correction as per requirement. The surgery done was based on the extent of disease. Post operative care was given and patients were followed up every 2 weeks where both diagnostic nasal endoscopy and serial otoendoscopy to record the decrease in ear discharge and improvement of middle ear mucosal status. These patients were followed up for a period of 3 months.

RESULTS

Observation of 50 patients who had mucosal active type of chronic Suppurative otitis media and underwent functional endoscopic sinus surgery with or without septal correction for clearance of underlying sinus pathology is as follows:

Table 1: Age and gender distribution

AGE GROUP (years)	Males	%	females	%	Total	%
30	24	48	18 – 30	9	18	15
18	13	26	31 – 40	4	8	9
14	9	18	41 – 50	2	4	7
4	4	8	51 – 60	2	4	2
66	50	100	TOTAL	17	34	33



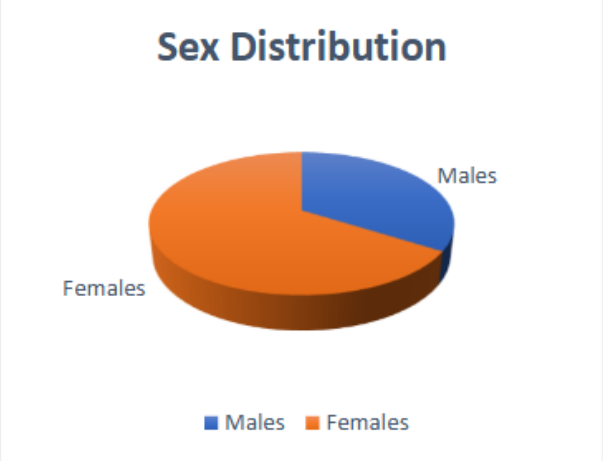


Table 2: Population distribution

POPULATION	No of cases	PERCENTAGE
URBAN	19	38
RURAL	31	62

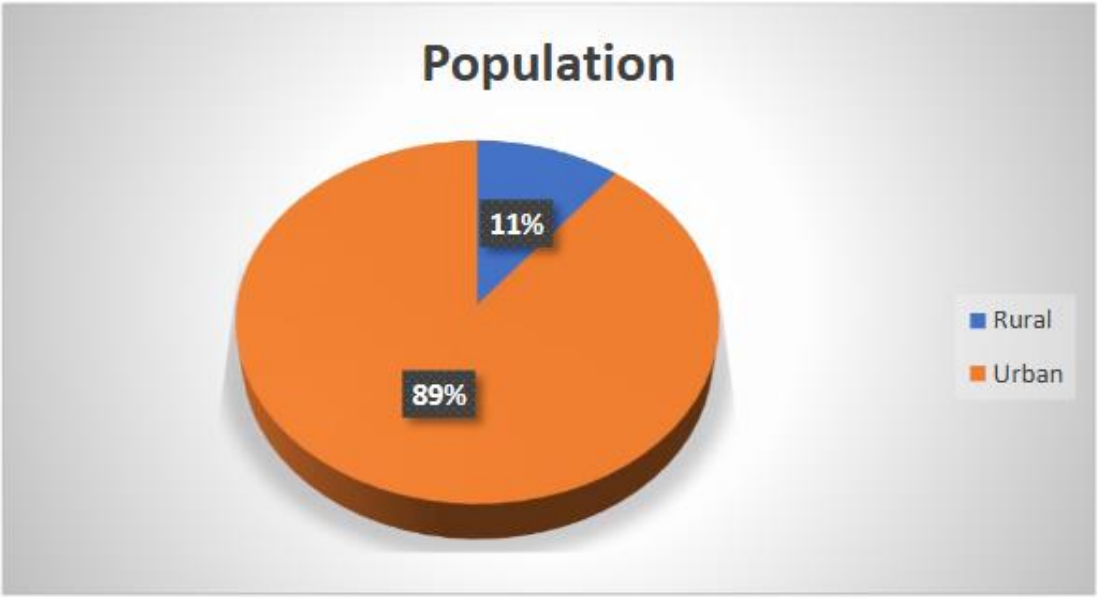


Table 3: Anatomical Varients

ANATOMICAL VARIENTS	PATIENTS	PERCENTAGE
Deviated nasal septum	32	64
Middle Turbinate hypertrophy	17	34
Hypertrophied uncinate process	6	12
Enlarged Bulla ethmoidalis	6	12
Paradoxical Middle Turbinate	4	8

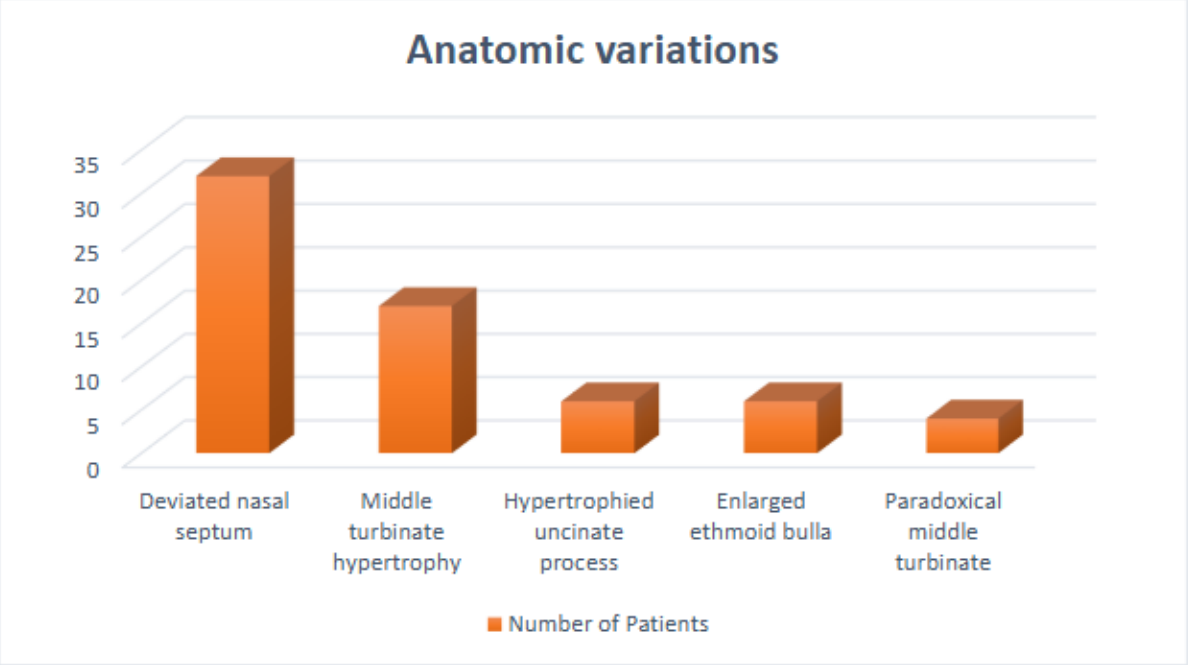


Table 4: Discharge From Middle Meatus

NATURE OF DISCHARGE	PATIENTS	PERCENTAGE
Mucoid Discharge	24	48
Mucopurulent Discharge	20	40
Purulent Discharge	6	12

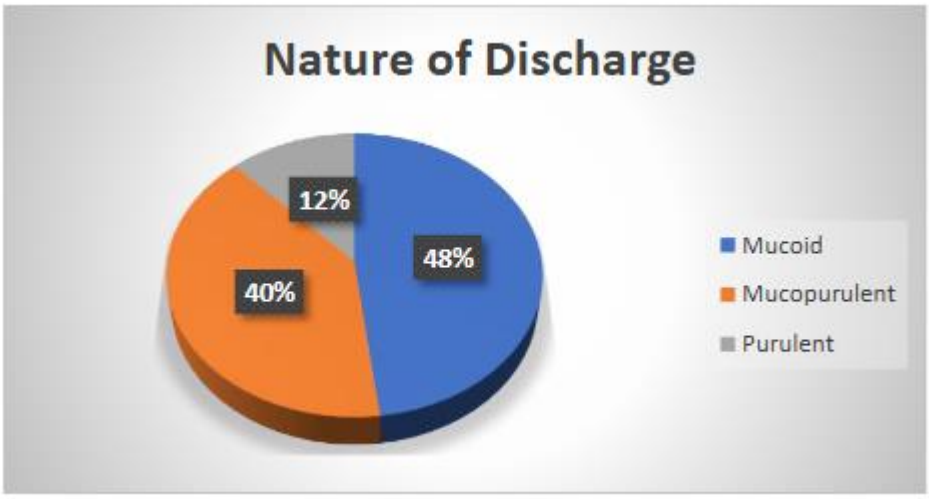


Table 5: Anatomic Variations

ANATOMIC VARIATIONS	PATIENTS	PERCENTAGE
Deviated nasal septum	32	64
Concha bullosa	14	28
Paradoxical middle turbinate blocking osteomeatal complex	4	8
Enlarged bulla ethmoidalis	7	14
Prominent agger nasi	6	12

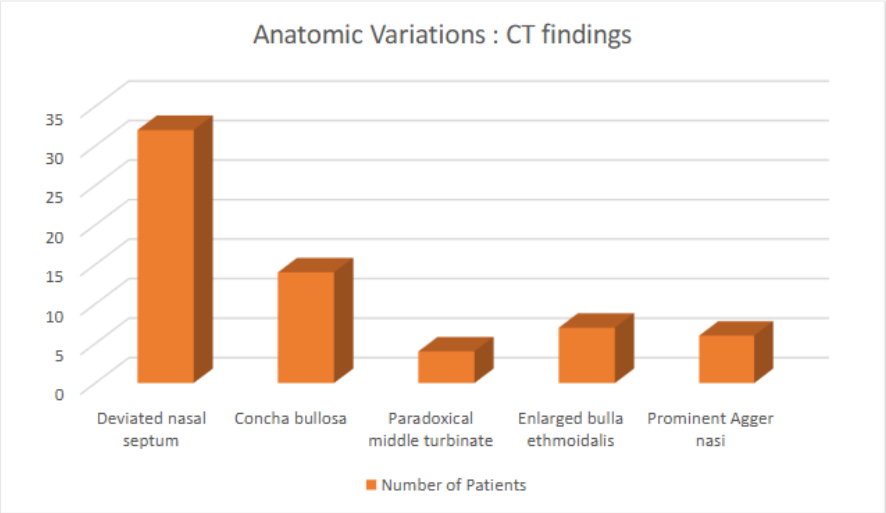


Table 6: Features of Sinusitis

PARANASAL SINSUSES	PATIENTS	PERCENTAGE
Normal findings (Grade 0)	4	8
Disease limited to OMC (Grade 1)	11	22
Incomplete opacification of one/more sinuses (Grade 2)	18	36
Complete opacification of one/more sinuses (Grade 3)	13	26
Total opacification of all sinuses (Grade 4)	4	8

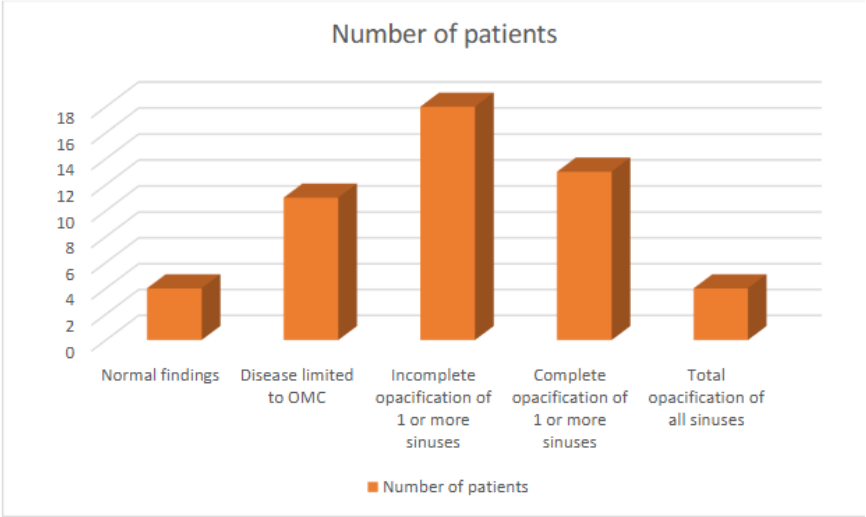


Table 7: Lund and Mackay Scoring

Score	PATIENTS	PERCENTAGE
Lund and Mackay Score =/< 12	33	66
Lund and Mackay Score > 12	17	34

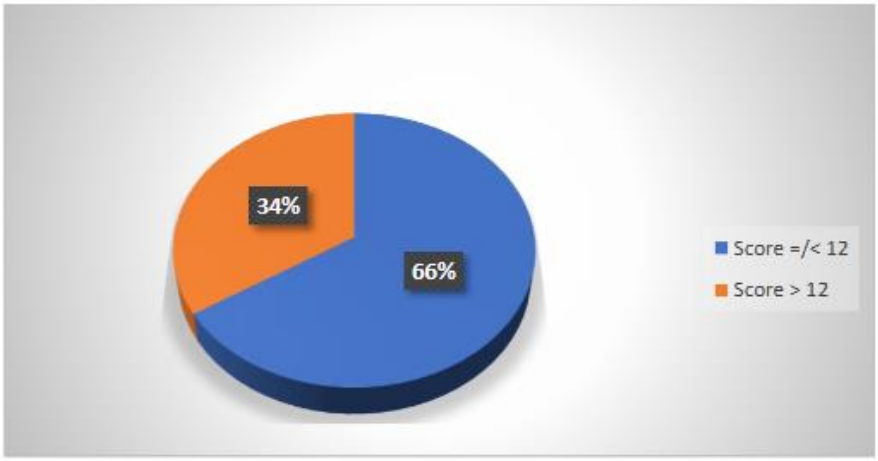


Table 8: Type of Perofration

Type of Perforation	Patients	Percentage
Small Central Perforation	15	30
Large Perforation	26	52
Subtotal perforation	9	18

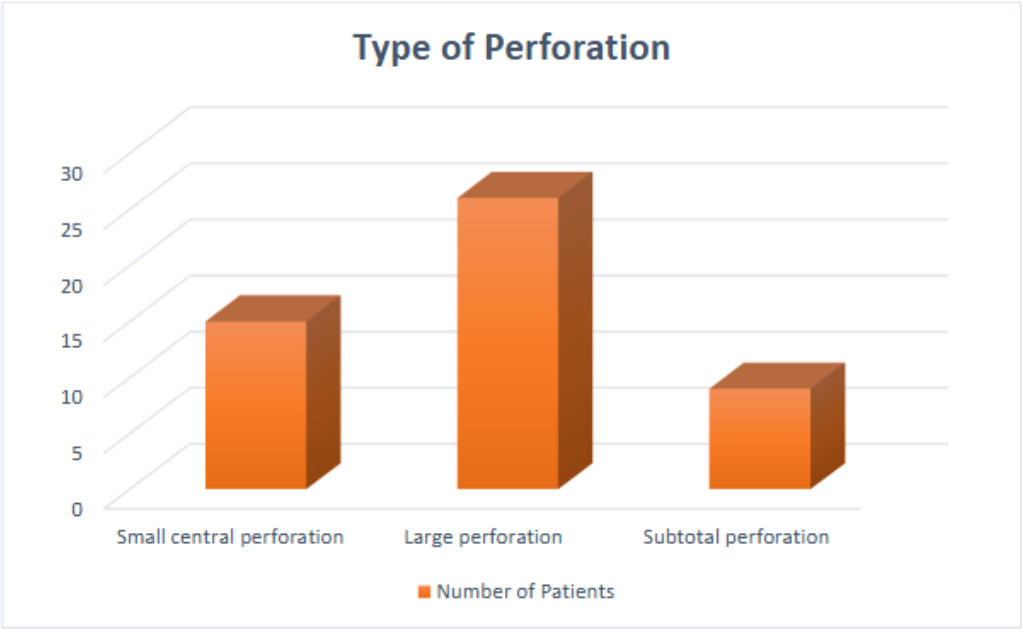


Table 9: Discharge

Type of Discharge	Patients	Percentage
Mucoid Discharge	17	34
Mucopurulent Discharge	31	62
Purulent Discharge	2	4

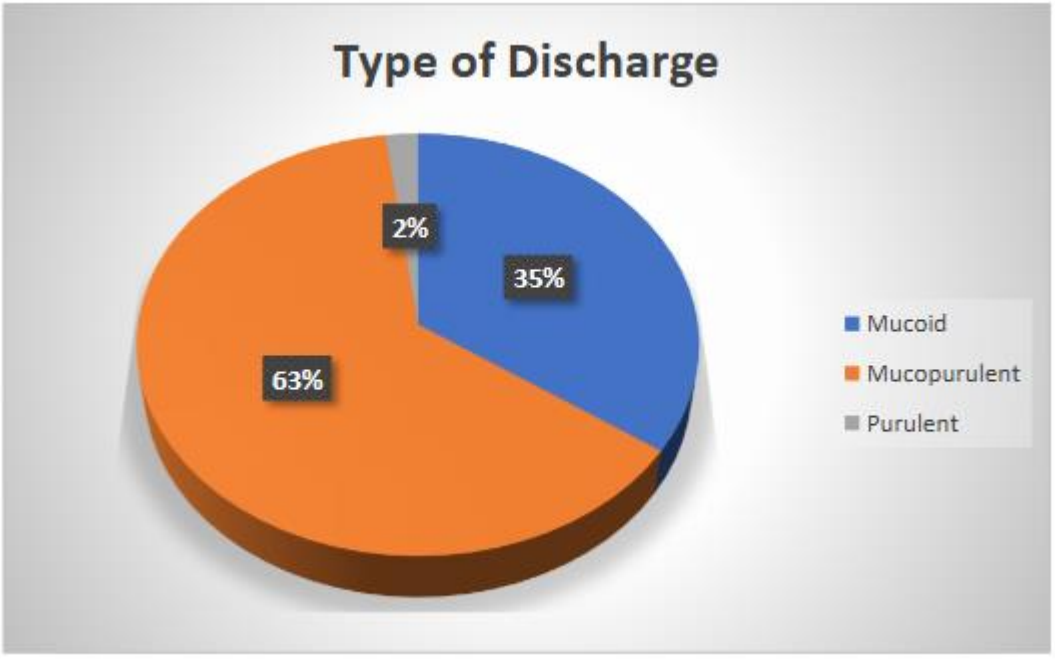


Table 10: Middle Ear Mucosa

Middle Ear Mucosa	Patients	Percentage
Edematous mucosa	27	54
Congested mucosa	14	28
Polypoidal mucosa	9	18

Table 11: Incidence of Unilateral And Bilateral Disease

Pathology	Patients With Mucosal C.O.M	Patients With Chronic Sinusitis	Percentage
Unilateral	18	18	36
Bilateral	32	32	64

Table 12: Surgical Procedure For Clearance Of Sinusitis

SURGICAL PROCEDURE	Patients	Percentage
FESS	18	36
FESS with Septal Correction	32	64

Table 13: Incidence of Improvement of Middle Ear Mucosal Status after Clearance of Sinusitis

NATURE OF MUCOSA PRIOR TO TREATMENT	NATURE OF MUCOSA AFTER TREATMENT	SURGICAL SINUS CLEARANCE + REGULAR SUCTIONING + ANTIBIOTICS
Edematous	Improved	21
	No Improvement	6
Congested	Improved	10
	No Improvement	4
Polypoidal	Improved	6
	No Improvement	3

A total of 50 patients were selected for the purpose of this study. These patients with active mucosal type of chronic otitis media had persistent ear discharge even following culture directed topical and systemic antibiotics. These patients had cellular type of mastoids on x- ray/CT temporal bones.
This study emphasizes sinus pathology as a major factor for persistently active mucosal type of chronic otitis media. The percentage other septic foci like chronic tonsillitis, adenoids is less in comparison to sinus disease.
This study was conducted over a period of 18 months in 50 patients of which 18 were males and 32 were females. Majority of the patients belonged to age group 18 – 30 years. Amongst these patients, 31 came from rural region and 19 from urban areas. The poor living conditions in rural population can be considered as one of the predisposing factor for the higher prevalence in this population.
During Diagnostic nasal endoscopy, all patients had discharge in middle meatus which is a featu of sinusitis. 24 patients had mucoid discharge and 20 patients had mucopurulent discharge, while purulent discharge was noted in 6 patients.
Most common anatomic variant noticed amongst these patients was deviated nasal septum which was noted in 32 patients (64%). 14 patients (28%) showed had concha bullosa blocking the osteomeatal complex where as 4 patients (8%) had paradoxical middle turbinate blocking osteomeatal complex. Enlarged bulla were present in 7 patients (14%) and Prominent agger nasi in 6 patients (12%) all contributing to chronic sinusitis in these patients.
On CT Scan paranasal sinuses, 11 of cases (22%) had minimal disease limited to OMC and 18 patients (36%) had moderate incomplete opacification of one or more sinuses. 13 patients (26%) had complete opacification of one or more major sinuses, while only 4 patients (8%) had total opacification of all sinuses. CT scan Paranasal sinuses was normal in 4 patients (8%).According to Lund and Mackay scoring that suggests the severity of sinusitis, 33 (66%) patients had score 12 or below and 17 (34%) had score above 12. Hence it was observed that all these patients had anatomic variants and signs strongly suggestive of chro nic sinusitis on diagnostic nasal endoscopy and CT scan Paranasal sinuses.
On Otoendoscopy, 15 patients (30%) were having small central perforation involving 1 quadrant, and 26 (52%) patients had large central perforations involving 3 or more quadrants and subtotal perforation was seen in 9 patients (18%). 17 patients (34%) had mucoid ear discharge, whereas 31 patients (62%) had mucopurulent discharge and 2 patients (4%) had purulent discharge.
Middle ear mucosal status assessed by otoendoscopy reflects Eustachian tube function.27 patients (54%) had edematous middle ear mucosa while 14 patients (28%) had congested mucosa and 9 patients (18%) had polypoidal middle ear mucosa reflecting poor Eustachian tube function.
Hence, out of 50 patients, middle ear mucosal status improved showed improvement within 3 months post sinusitis clearance in 37 patients (74%). However, 13 patients (26 %) failed to show improvement in mucosal status.

DISCUSSION

Otitis media is a highly prevalent disease of the middle ear and constitutes to a serious health problem worldwide. The most important step in the diagnosis of Chronic Otitis Media is to identify the underlying pathology, and once it is identified, the treatment would be much simpler.
Fireman et al emphasized that otitis media is a multifactorial disease that was affected by many etiologies including nasal, and paranasal sinus abnormalities. Infection of nose and paranasal sinuses can cause Eustachian tube dysfunction which can in turn predispose to Otitis media.
The present study was undertaken to evaluate the relation between sinusitis, which is one of the most common sinonasal pathologies, and Chronic otitis media. This study was conducted in 50 patients who presented to Government ENT Hospital, Koti ,with Chronic Otitis media mucosal active type with co-existing chronic sinusitis during a period of 18 months.
In this study, maximum number of cases were in age group 18 – 30 years (48%).Youngest was 18 years and oldest was 56 years old. This coincides with a similar study analysis of Sinonasal, pharyngeal and allergy-related risk factors for chronic otitis media conducted by Ferhat BozKus,

Nazim Bozan et al1 where the average age was 21.3±8 years. A study conducted by Dayasena et al2 on Etiological agents in Chronic suppurative Otitis Media in SriLanka showed more prevalence in age group 31 – 40 years.In our study there was female preponderance (33%) which coincides with the study by Karan Sharma, Mridu Manjari3 et al which showed Male : Female ratio to be 1:1.2.

On Diagnostic Nasal Endoscopy, revealed that Deviated nasal septum alone or in combination with other pathologies to be the most common findings in these patients,the most common anatomic variation being Deviated nasal septum (64%). Several studies have proposed nasal septum deviation as a predisposing factor in patients with Chronic sinusitis. Yeolekar et al4, in their study of 200 cases of safe CSOM have found 90 % cases having DNS as the commonest associated sinonasal pathology. Van Cauwenberge et al5 demonstrated that increase in nasal resistance leads to higher static middle ear, and closing pressures of the

Eustachian tube pressure with resultant formation of mucosal edema and finally Eustachian tube dysfunction. Gutierrez-Marcos6 showed that obstructive septal deviation induces Eustachian tube dysfunction.

Nasal discharge was noted in middle meatus of these patients on endoscopy, mainly mucoid discharge (48%),whereas 40% showed mucopurulent discharge and 12% showed purulent discharge which can be attributed to secondary bacterial infections. Fujita A et al7 have also found mucopurulent discharge middle meatus in 62 % cases in his study on refractory Otitis media.In the study conducted by Ferhat Bozkus, Nazim Bozan, Ismail Iynen et al,10 27.02% of COM patients complained of nasal discharge. In a study by Prempal Singh et al8 and Shreshta et al9, nasal discharges were seen in 26%.Computed Tomography findings supported the Endoscopic findings showing Deviated nasal septum to be the commonest anatomical variation. Using paranasal CT procedures, Gocmen10 et al reported septal deviations in 52% patients with Chronic otitis media. In our study, 92% of the patients showed features of sinusitis with majority (36%) showing incomplete opacification of one or more sinuses, maxillary sinus being the most common sinus involved.

Stammberger et al reported a serious loss in Eustachian tube functions occurring as a consequence of impaired function of nasal, and paranasal sinuses that can contribute to chronic otitis media. Takashi et al demonstrated that inflammatory processes of nasal, and paranasal sinuses ensued in obstruction, inflammation, and resultant dysfunction of Eustachian tube. Gocmen et al. detected chronic inflammation of osteomeatal unit in 27% of 52 patients with adhesive otitis media.

Out of remaining 13 patients who failed to show improvement, 4 patients had hypofunction of eustachian tube and 6 patients had recurrence of sinusitis.2 patients developed superadded fungal infections in the ear due to improper care an underlyingcomorbidities like Diabetes.1 patient had primary ciliary dysfunction associatedwith bronchiectasis.These patients required cause specific management to render ear inactive.

CONCLUSION

In the adult population sinusitis is one of the most important cause of persistent ear discharge in mucosal type of Chronic otitis media. Assessment for sinusitis in the treatment of Chronic otitis media should become a routine practice. In the evaluation of the patients with chronic otitis media, radiological, endoscopic, and other diagnostic tools have their roles in the assessment of the patients, and to rule out nasal and paranasal pathologies as potential aetiological factors. Deviated nasal septum, Concha bullosa and enlarged bulla ethmoidalis in order of frequency are the most common anatomical variants of nose and paranasal sinuses predisposing to sinusitis. Unilateral ear discharge is associated with sinusitis only on the corresponding side, which is in concurrence with our study. The clearance of sinusitis has a favourable effect on improving the status of middle ear mucosa. Functional endoscopic sinus surgery has emerged as an effective procedure for clearance of sinusitis. The clearance of sinusitis by endoscopic sinus surgery in mucosal active type of Chronic otitis media patients results in good outcome of disease clearance and achieving a dry ear.

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