

## Original Research Article

# A prospective study of sinonasal and nasopharyngeal pathology in chronic otitis media

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### ABSTRACT

**Background:** Chronic otitis media (COM) implies a permanent abnormality in the tympanic membrane characterized by irreversible changes in the mucosa of middle ear and mastoid cavity. Diseases of the nose and para nasal sinuses have been implicated in the development of the disease. Hence the present study aims at identifying the risk factors involved and the importance of its management in treating the disease. The objective was to study the correlation between COM and Sino nasal and nasopharyngeal pathology.

**Methods:** A total of 100 patients with chronic otitis media were included in the study. A Detailed history and clinical examination was done using a pre-prepared questionnaire. Diagnostic nasal endoscopy was done in all cases to assess the nasal cavity and nasopharynx along with bacteriological study of ear and corresponding side of nasopharynx.

**Results:** Symptomatic, clinical and diagnostic profile proved the evidence of sinonasal pathology in 82% of patients with COM. The comparative study of the microbiological flora of both ear and corresponding side of nasopharynx showed 77 % of ear swabs and 91% of nasopharyngeal swabs to be sterile. The results were statistically significant with a p value of 0.003.

**Conclusions:** This study emphasises on a thorough evaluation of nose and paranasal sinuses in all cases of COM for comprehensive management of the disease. Its detection and management is equally important as the ear surgery per se.

**Keywords:** Chronic otitis media, Deviated nasal septum, Sinusitis, Allergic rhinitis, Diagnostic nasal endoscopy, Ear swab, Nasopharyngeal swab

### INTRODUCTION

Chronic otitis media (COM) implies a permanent abnormality in the tympanic membrane characterized by irreversible changes in the mucosa of middle ear and mastoid cavity. The worldwide burden of COM is 65 to 330 million people, and approximately 60% suffer from clinically significant hearing impairment.<sup>1</sup> There are multiple factors involved in pathogenesis of the disease. Recurrent attacks of acute otitis media and eustachian tube dysfunction are few among those. Pathologies

involving nasopharynx and paranasal sinuses can lead to dysfunction of eustachian tube due to its close anatomical relationship. A relationship between allergic rhinitis and otitis media has been postulated since many years. Improvement of otitis media following septoplasty was also noted and evidenced by few authors in their study.<sup>2</sup> The present study was conducted at ENT department of jubilee mission hospital, Kerala involving 100 patients suffering from chronic otitis media. The study also aimed to compare the microbiological flora of the diseased ear and the nasopharynx.

## METHODS

It was a prospective study conducted at ENT department of Jubilee Mission Hospital, Kerala. The study period comprised of 2 years from March 2013 to February 2015. 100 patients suffering from chronic otitis media were included as study population. Age ranged from 8–70 yrs. and 61 were female and 39 were male. A detailed history was taken with regards to the symptoms of chronic otitis media, chronic rhinosinusitis and nasopharyngeal pathology in a previously prepared questionnaire. A detailed clinical ENT examination was performed.

### Inclusion criteria

All patients willing for the study with chronic ear discharge – both unilateral & bilateral and only those patient who gave consent to participate in the study were included.

### Exclusion criteria

Exclusion criteria were traumatic perforation; acute infection of nose and PNS; congenital condition – cleft palate, choanal atresia; post sinonasal and nasopharyngeal surgeries; co morbid conditions– diabetes mellitus.

### Diagnostic nasal endoscopic examination

It was done to assess the nasal septum, middle turbinate and middle meatus, to study the status of paranasal sinuses, to assess the condition of nasopharynx and eustachian tube orifice, and to collect nasopharyngeal culture swab.

### Collection of nasopharyngeal swab

The nasopharyngeal swab was collected by a sterile technique to avoid commensal growth. A specially designed long tipped sterile swab was used. It was introduced into a sterile suction catheter. This avoided the contact between the swab and the nasal mucosa. The catheter with the swab was introduced in to the nasal cavity under endoscopic guidance and soon after reaching the choana, the swab alone was pushed further inside to contact the nasopharyngeal mucosa at the region of eustachian tube orifice. After 10 seconds swab was withdrawn into the catheter and was removed out of the nasal cavity. It was then sent for culture and sensitivity in a sterile container.

### Statistical analysis

Data analysis was done using chi square test and paired t test.

## RESULTS

A total of hundred patients with chronic otitis media were studied. Out of which 86 patients were suffering from

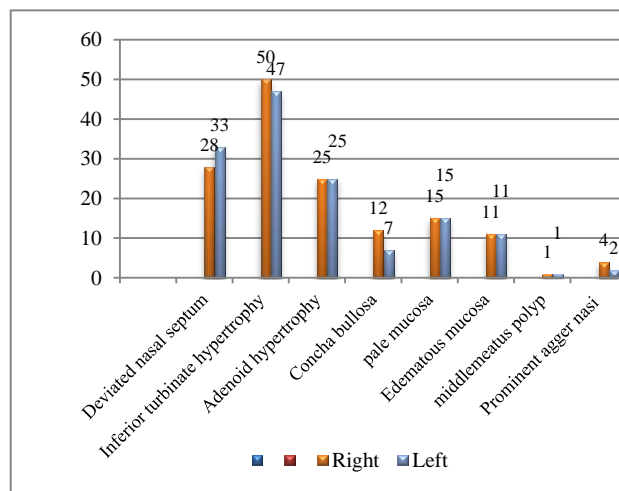
mucosal and 14 patients from squamous type of otitis media. The most common presenting nasal complaint was nasal obstruction (63%), followed by post nasal drip (24%), nasal discharge(22%), sneezing (20%),snoring (9%), headache(8%), 33% of patients had no nasal symptoms. The distribution of nasal symptoms is shown in Table 1. The most common otoscopic findings in a mucosal type of COM was a subtotal central perforation which was 26% in U/L and 7% in B/L cases.

The most common otoscopic finding in a squamous type of COM was a postero superior retraction pocket with granulations seen in 11% of cases.

**Table 1: Nasal symptoms.**

Symptoms	No. of cases	Percentage (%)
Nasal obstruction	63	63
Nasal discharge	22	22
Sneezing	20	20
Post nasal drip	24	24
Head ache	8	8
Snoring	9	9
No symptoms	33	33

Diagnostic nasal endoscopy findings are depicted in Figure 1.



**Figure 1: Diagnostic nasal endoscopy.**

### Comparison between microbiological study of ear and nasopharyngeal swab

The comparative study of ear and nasopharyngeal swab showed statistically significant correlation. 77 % of ear swabs and 91% of nasopharyngeal swabs were found to be sterile. The results were compared by chi square tests and were found to be statistically significant with a p value of 0.003. 7% of ear cases showed MSSA growth and 4% cases from nasopharynx of corresponding side also grew the same organism. Out of which 4 % were in concurrence with the study which was also statistically

significant. *Pseudomonas aeruginosa* was grown in 12% of ear swabs whereas their corresponding

nasopharyngeal swabs were sterile. Those cases were squamosal type of COM.

**Table 2: Microbiological study of ear swab \* microbiological study of nasopharyngeal swab cross tabulation.**

		Bacteriological study of nasopharyngeal swab						Total
		Co-SA	<i>KL. pneumoniae</i>	MRSA	MSSA	Sterile	<i>Streptococci – a</i>	
<b>Bacteriological study of ear swab</b>	ASP sp	0	0	0	0	2	0	2
	<i>Kl. pneumoniae</i>	0	0	0	0	1	0	1
	MSSA	1	0	0	4	2	0	7
	<i>Pseudomonas</i>	0	1	1	0	10	0	12
	Sterile	0	0	1	0	76	0	77
	<i>Enterococci</i>	0	0	0	0	0	1	1
<b>Total</b>		1	1	2	4	91	1	100

## DISCUSSION

The pathogenesis and identifying the risk factors in COM is evolving and its etiology seems to be multifactorial. Anatomical and functional characteristics of the Eustachian tube are proposed to be the most important factors.<sup>3</sup>

In the present study patients presented with various combinations of nasal and sinus symptoms. The most common presenting nasal complaint was nasal obstruction followed by post nasal drip, nasal discharge and other sinonasal symptoms. Most of the patients had combination of two or more symptoms. These nasal symptoms were also chronic in nature and not all were present at the time of data collection. Acute infections were excluded from the study to avoid any kind of bias.

In a study conducted by Singh et al unilateral nasal obstruction with or without discharge was one of the most common symptom (59%), which was consistent with our study.<sup>4</sup> Among different sinonasal pathologies deviated nasal septum (DNS) was the most common finding. It was found to be present in a total of 61 cases, it was a solitary finding in 28 cases. These findings are in agreement with the findings of Yeolekar et al and Bozkus et al who also observed that deviated septum alone or in combination was the most common sinonasal pathology.<sup>5,6</sup>

After deviated nasal septum, sinusitis was the next common finding, which was diagnosed based on the symptoms such as post nasal drip, headache with or without nasal obstruction and signs on nasal endoscopy such as Concha bullosa, prominent agger nasi. It was observed in 24 patients. Sinusitis was observed as independent finding in 8 patients and 16 in combination with septal deviation and allergic rhinitis. Fujita et al reported sinusitis to be present in 48% cases of refractory otitis media.<sup>7</sup> Gopalakrishnan and Kumar reported sinusitis to be a major pathology of COM in adult subjects.<sup>8</sup>

Allergic rhinitis (20%) was the next common finding, which was diagnosed based on the symptoms such as sneezing and watery nasal discharge and signs on DNE such as pale nasal mucosa. It was seen alone in 4 cases and 16 in combination with DNS. The role of allergic rhinitis in COM was also highlighted by Ghoniam et al in their study.<sup>9</sup> Rhinitis is influential in the occurrence of COM via two mechanisms which include eustachian tube dysfunction secondary to allergic reactions effective on nasal mucosa, and decrease in the frequency of ciliary whipping motions. The prevalence of allergic rhinitis in present study was higher than that reported by Mion et al who reported 15.69% cases of COM to be having a prevalence of 3.33% only.<sup>10</sup> The reason for this could be difference in environment. In developed countries where the environmental stimulants working as allergens are lower, the prevalence of allergic rhinitis could be lower as compared to that in developing countries.

In the present study we also compared the microbiological flora of both ear and corresponding side of nasopharynx. Since acute infections were excluded from the study, majority of swabs from the ear and nasopharynx were found to be sterile. 77% of ear swabs and 91% of nasopharyngeal swabs showed no growth. Only four cases grew methicillin sensitive *Staphylococcus aureus* in both ear and their corresponding nasopharyngeal swabs. The results were statistically significant (p value of 0.003). 12% of cases showed pseudomonas from the ear swabs, which were squamosal type of disease and their corresponding nasopharyngeal swab was found to be sterile. This infers no correlation between squamosal type of disease and nasopharyngeal flora. Acute infections of nose and para nasal sinuses were excluded from the study to avoid any kind of bias during diagnostic nasal endoscopic examination and its results. Results could not be compared with the previous studies as the data regarding the same was lacking in the previous literatures.

Identification and understanding of nasopharyngeal and sino nasal pathology helps to locate and understand the

magnitude of the disease that helps in its successful management.

Symptomatic, clinical and diagnostic profile proved the evidence of sinonasal pathology as indicated by nasal obstruction, presence of Eustachian tube blockade, and other abnormalities on diagnostic nasal endoscopy.

In the present study a total of 82% cases had positive sinonasal pathology which was consistent with few other studies mentioned in the literature. Otitis media is a multifactorial disease which is affected by many aetiologies including nasal, nasopharyngeal and paranasal sinus abnormalities and the present study confirmed these observations.

## CONCLUSION

Chronic otitis media is a disease with multiple factors and different possible aetiologies. The concept of a relationship between sinonasal and nasopharyngeal pathologies and chronic otitis media has been supported by the present study.

This study concludes that a proper diagnostic nasal evaluation is necessary in all cases of COM for comprehensive management of the disease. Sinonasal diseases being one of the important foci of infection leading to chronic otitis media, its detection and management is equally important as the ear surgery per se. Hence all patients with COM should undergo a thorough sinonasal and diagnostic nasal endoscopic examination and their pathology should be ruled out or cleared before any surgical management of ear disease to be undertaken.

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