

Original Research Article

Prevalence and clinical profile of patients with chronic fungal maxillary sinusitis

Vijay Gupta^{1*}, Arindam Gupta²

¹Department of ENT, Government District Hospital, Rajouri, Jammu and Kashmir, India

²SGT Medical College Hospital & Research Institute, Gurugram, Haryana, India

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*Correspondence:

Dr. Vijay Gupta,

E-mail: drvijay1960@yahoo.com

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ABSTRACT

Background: Fungal paranasal sinus disease is considered to be rare but there has been a marked increase in the number and diversity of reported cases of fungal infections of maxillary sinus in recent years. Objectives were to study the incidence of fungal infection in case of chronic maxillary sinusitis, to identify specific type of fungus involved in maxillary sinus infection and to study clinical profile of the patients with fungal infections of maxillary sinus.

Methods: A prospective study of was conducted involving the patients attending outpatient department of Otorhinolaryngology, who were clinically and radiologically proved cases of chronic maxillary sinusitis. Patients diagnosed with underlying paranasal sinus malignancies were excluded from the study. 70 patients of chronic maxillary sinusitis were included in the study. Isolates were identified based on colonial and microscopical morphology. Subcultures were done and slide cultures were prepared to identify the fungi.

Results: Fungus was cultured from 12.8% of patients suffering from chronic maxillary sinusitis. The most frequent victims of the disease were young persons in the second decade of life. All patients found positive for fungus had unilateral maxillary sinusitis. *Aspergillus niger*, *Aspergillus fumigatus*, *Candida albicans* and *Mucormycosis* were the various fungi isolated from cultures of antral washings.

Conclusions: The results of the study emphasise the role of fungi as important pathogens of chronic maxillary sinusitis. There must be high index of suspicion of fungal infection when a young adult with a unilateral antral opacity on X-ray with frank pus in antral washings.

Keywords: *Aspergillus*, Fungal rhinosinusitis, Chronic maxillary sinusitis, Prevalence

INTRODUCTION

Sinusitis is one of the commonest infectious disorder affecting approximately 20% of the population at some time during their whole lives.¹ Fungal paranasal sinus disease, however, is considered to be rare but there has been a marked increase in the number and diversity of reported cases of fungal infections of maxillary sinus in the recent few years which is probably attributed to greater clinical awareness of the existing mycotic infections and better diagnostic facilities.² Among all

sinusitis cases, fungal sinusitis represents the approximately 6-9% of cases.¹ Maxillary sinus is one of the most frequently involved sinus by fungal infection among all the paranasal sinuses.³ The various fungi reported to have involved maxillary sinus include species of *Aspergillus*, *Zygomycetes*, *Candida*, *Curvularia lunata*, *Maduromycosis*, *Fusariosis* and *Rhinoentomophthoromycosis*.⁴ Primary Aspergillosis is the most widely reported fungal infection of the maxillary sinuses followed by Mucor species.⁵

Fungal rhinosinusitis (FRS) can manifest as 2 distinct entities. Invasive fungal rhinosinusitis, also known as 'mucormycosis', occurs in patients with compromised immunity, e.g., diabetes, HIV-AIDS, and long-term corticosteroid therapy, etc.⁵ It leads to widespread facial and paranasal tissue necrosis that has high morbidity and mortality. Intervention with systemic antifungal drugs is required, but the chances of recurrence are more and is difficult to treat.⁶ Non-invasive fungal rhinosinusitis includes fungal ball-'sinus mycetoma' and allergic fungal sinusitis (AFS). Coordinated medical-surgical care required in these type of patients with less chances of recurrence as compared to invasive fungal infection.⁶

The various Indian studies indicate a high prevalence of FRS in India.⁷ The most common (56-57%) type is allergic fungal sinusitis (AFS), followed by chronic invasive granulomatous FRS (2-17%), sinus mycetoma (2-4%), chronic invasive FRS (1-3%).^{8,9} In clinical set-up in countries like India, diagnosis of FRS is based on high index of clinical suspicion. An early and accurate diagnosis of various types of FRS is important for optimum treatment schedule of the patients. Hence, a detailed examination along with correlation with culture results is necessary. It was thus found worthwhile to study the prevalence of fungal infections in cases of chronic maxillary sinusitis. Hence the present study was conducted in the ENT department of S.M.G.S Hospital Medical College Jammu, with the following objectives: (i) to study the incidence of fungal infection in case of chronic maxillary sinusitis; (ii) to identify specific type of fungus involved in maxillary sinus infection; and (iii) to study clinical profile of the patients with fungal infections of maxillary sinus.

METHODS

A prospective study of was conducted in the department of otorhinolaryngology of S.M.G.S. Hospital, Govt. medical college, Jammu between July 2012 to June 2013. The study was presented and got approval from Institutional Ethics Committee. The subjects for the study were selected from the outpatients attending department of otorhinolaryngology, who were clinically and radiologically proved cases of chronic maxillary sinusitis. Patients diagnosed with underlying paranasal sinus malignancies were excluded from the study. A total number of 70 patients of chronic maxillary sinusitis were included in the study. After taking thorough history, general, and systemic examination were done.

A thorough local examination of ear, nose and throat was performed which included: (i) inspection of face and oral cavity followed by palpation of face was done to elicit any tenderness, swelling, bony crepitus or bony expansion, (ii) oral cavity examination including hard palate for any bulge, tenderness, softening or fistula, (iii) anterior rhinoscopy examination to look for any nasal mass, status of nasal mucosa, turbinates and septum. Nasal discharge if any was noted with particular

reference to its colour and odour, (iv) posterior rhinoscopy examination to look for any polyp, discharge or any mass in post nasal space.

Ophthalmic examination for proptosis, chemosis and decreased visual acuity and also eye ball movements. The patients were then subjected to routine haematological, radiological and microbiological examination. Direct microscopic examination was done using KOH smear to ascertain the presence of: (i) hyphae (septate or non-septate), (ii) yeast cells; (iii) spores and (iv) pseudohyphae. Gram staining was also done to identify the presence of epithelial cells, pus cells, yeast cells, pseudohyphae, and bacteria. Lactophenol cotton blue staining was also done for identification of the fungi based on morphological criteria. All specimens were cultured by inoculation on Sabouraud's dextrose agar for growth of fungus. Isolates were identified based on colonial and microscopical morphology with lactophenol cotton blue preparation. Subcultures were done and slide cultures were prepared to identify the fungi.

The data obtained from the patients were recorded in case record form (CRF). The results obtained from data were presented as frequency, proportions, mean and standard deviations. P value of less than 0.05 was regarded as statistically significant difference.

RESULTS

Seventy cases, which were clinically and radiologically proved to be suffering from chronic maxillary sinusitis were taken for study. All the patients were subjected to proof puncture of the involved antra through the inferior meatus and the washings subjected to direct smear examination followed by culture for fungus. Out of the total 70 cases, 9 (12.8%) cases found to be suffering from fungal chronic maxillary sinusitis (Table 1).

Table 1: Age-wise distribution of patients with chronic maxillary sinusitis.

Age group (years)	Patients with chronic maxillary sinusitis					
	Fungal		Non-fungal		Total	
	N	%	N	%	N	%
12-20	4	5.7	15	21.5	19	27.2
21-30	1	1.4	21	30.0	22	31.4
31-40	1	1.4	10	14.3	11	15.7
41-50	3	4.3	10	14.3	13	18.6
Above 50	0	-	5	7.1	5	7.1
Total	9	12.8	61	87.8	70	100.0

Among all patients with chronic maxillary sinusitis, maximum (31.4%) numbers of patients were in the third decade (21-30 years) followed by 27.2% in the second decade (11-20 years). Only 7.1% of the patients were above 50 years. However, in fungal positive cases most of the patients were in the second (n=4) and fifth decade (n=3). According to gender distribution, 42 (60.0%) were

males and 28 (40.0%) were females, the male:female ratio being 1.5:1. In the fungus positive group, there were 5 (55.6%) males and 4 (44.4%) females constituting male female ratio was 1.2:1 (Tables 1 and 2).

Table 2: Gender-wise distribution of patients with chronic maxillary sinusitis.

Gender	Patients with chronic maxillary sinusitis					
	Fungal (N=9)		Non-fungal (N=61)		Total (N=70)	
	N	%	N	%	N	%
Male	5	55.6	37	60.7	42	60.0
Female	4	44.4	24	39.3	28	40.0
Total	9	100	61	100	70	100

Symptomatology wise, patients have unilateral as well bilateral symptoms in chronic maxillary sinusitis, while in fungal sinusitis only unilateral symptoms were found in all 9 patients. In total 61 patients with non-fungal chronic maxillary sinusitis, maximum number of patients presented with the complain of postnasal discharge (45, 73.8%). This was followed by symptom of nasal obstruction (40, 65.6%) and nasal discharge (38, 62.3%). In 9 patients with fungal chronic maxillary sinusitis, common symptoms represented were nasal discharge (7, 77.8%); post nasal discharge (7, 77.8%); and heaviness or pain over cheek (6, 66.7%). Symptoms like, heaviness or pain over cheek (p<0.01); disturbance of olfaction (p<0.05); and epistaxis (p<0.001) were found to be significantly associated with fungal infection as compared to non-fungal infection (Table 3).

On local examination of, a majority of patients (45, 73.8%) presented with deviation of nasal septum to one or the other side in patients with chronic maxillary sinusitis. This was followed by mucopurulent nasal discharge and mucopus in middle meatus in 30 patients. While, septal deviation (8, 88.9%); inferior turbinate hypertrophy (7, 77.8%) and nasal polypi (6, 66.7%) were common findings in patients with fungal disease. Inferior

turbinate hypertrophy (p<0.01); pale boggy mucosa (p<0.01); and nasal polypi (p<0.001) were shown highly significant association with fungal maxillary sinusitis (Table 4).

Nine (12.8%) cases, out of 70 patients with chronic maxillary sinusitis, were found to be positive for fungus when culture results of specimens were obtained. In 4 (44.4%) cases *Aspergillus niger* was identified, 3 (33.3%) cases had *Aspergillus fumigatus* whereas one case each (11.1%) had *Mucormycosis* and *Candida albicans* infection. Thus, *Aspergillus* species was responsible in 77.8% cases (Figure 1).

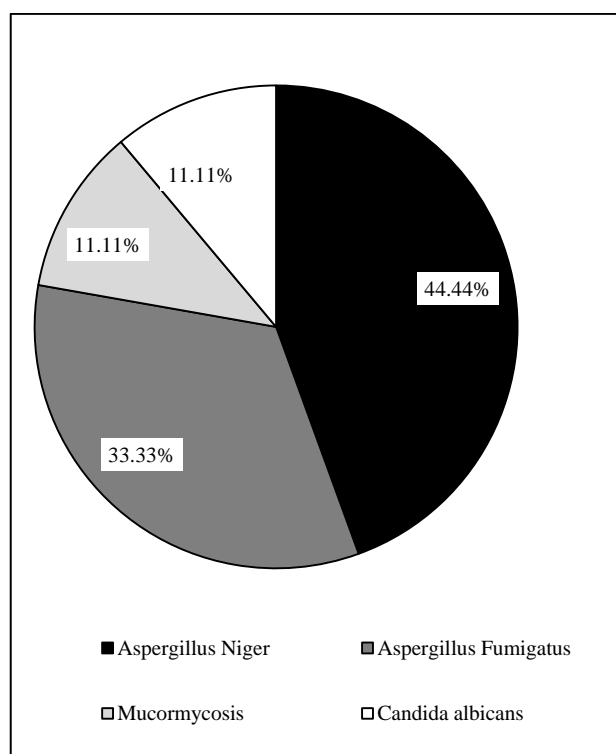


Figure 1: Fungal species involved fungal maxillary sinusitis.

Table 3: Symptoms in patients with chronic maxillary sinusitis.

Symptoms	Unilateral symptoms				Chi-square value	P value	Bilateral symptoms			
	Fungal (N=9)		Non-fungal (N=61)				Fungal (N=9)		Non-fungal (N=61)	
	N	%	N	%			N	%	N	%
Nasal obstruction	5	55.6	30	49.2	0.1	>0.05	0	0.0	10	16.4
Nasal discharge	7	77.8	30	49.2	2.6	>0.05	0	0.0	8	13.1
Post nasal discharge	7	77.8	45	73.8	0.1	>0.05	0	0.0	0	0.0
Heaviness/pain over cheek	6	66.7	13	21.3	8.2	<0.01	0	0.0	9	14.8
Head ache	5	55.6	20	32.8	1.8	>0.05	0	0.0	6	9.8
Disturbance of olfaction	5	55.6	11	18.0	6.3	<0.05	0	0.0	0	0.0
Epistaxis	4	44.4	3	4.9	13.6	<0.001	0	0.0	1	1.6
Sore throat	4	44.4	29	47.5	0.0	>0.05	0	0.0	0	0.0

Table 4: Local findings in patients with chronic maxillary sinusitis.

Local findings	Unilateral findings					Bilateral findings				
	Fungal (N=9)		Non-fungal (N=61)		Chi-square value	P value	Fungal (N=9)		Non-fungal (N=61)	
	N	%	N	%			N	%	N	%
Septal deviation	8	88.9	45	73.8	1.0	>0.05	0	0	0	0.0
Mucopurulent Nasal discharge	3	33.3	20	32.8	0.0	>0.05	0	0	10	16.4
Mucopus in middle meatus	0	0.0	20	32.8	4.1	<0.05	0	0	10	16.4
Inferior turbinate hypertrophy	7	77.8	18	29.5	8.0	<0.01	0	0	4	6.6
Post Pharyngeal wall congestion	0	0.0	12	19.7	2.1	>0.05	0	0	0	0.0
Congestion of nasal mucosa	0	0.0	6	9.8	1.0	>0.05	0	0	4	6.6
Tenderness over cheek	4	44.4	8	13.1	5.4	<0.05	0	0	2	3.3
Pale boggy mucosa	4	44.4	6	9.8	7.7	<0.01	0	0	2	3.3
Middle turbinate hypertrophy	5	55.6	5	8.2	14.4	<0.001	0	0	1	1.6
Swelling over cheek	0	0.0	4	6.6	0.6	>0.05	0	0	0	0.0
Nasal polypi	6	66.7	3	4.9	26.7	<0.001	0	0	1	1.6
Proptosis	3	33.3	3	4.9	8.1	<0.01	0	0	0	0.0

DISCUSSION

Chronic maxillary sinusitis is a common entity seen in the otolaryngology outpatient clinic. The role of pathogenic bacteria in the causation of sinusitis is well known. In the recent literature, the incidence of fungal maxillary sinusitis is also reported with increased frequency, which has been attributed to greater clinical awareness of existence of mycotic infections.¹⁰

Most of our patients with chronic maxillary sinusitis were young. Almost one third (31.5%) patients were in the 21-30 age group and 27.2% in the 11-20-year age group. In case of patients with fungal infections 4 out of 9 (44.4%) were in the 2nd decade of life followed by 3 out of 9 (33.3%) in the 5th decade. Different studies shown different age groups involvement in case of fungal rhinosinusitis. In a study conducted by Marple et al, the majority of the patients belong to 11-20 years, which is 60%.¹¹ In other Indian studies, the younger age group was predominantly affected by fungal rhinosinusitis.^{12,13}

In the present study, chronic maxillary sinusitis was found to be more common in males as compared to females with male:female ratio was approximately 1:1.5. While, in fungal positive cases, the male predominating in the ratio of 1.2:1. In a study done by Karthikeyan and Coumare, total 67 cases diagnosed to have fungal sinus disease, 35 patients were male and 32 were female patients.¹⁴ Similar male:female ratio (1.25:1) was found in the study done by Krishnan et al.¹⁵ A literature review

including 98 cases in the 1980s and early 1990s from 29 published journal articles reported an equal M/F incidence.¹⁶

Patients have unilateral as well bilateral symptoms in chronic maxillary sinusitis, while in fungal sinusitis only unilateral symptoms were found in all 9 patients in the present study. Unilateral symptoms suggestive of unilateral sinus involvement in fungal sinus diseases. In a study carried out by Suresh et al, unilateral involvement of sinuses was found in 83.3% of patients.³ Literature also suggest that unilateral or asymmetric involvement of the sinuses are more in favour of fungal etiology.^{17,18}

The common symptoms represented were nasal discharge; post nasal discharge; and heaviness or pain over cheek in the present study. In Krishnan et al study, all the patients presented with symptoms of nasal obstruction and nasal discharge, followed by headache and facial fullness in 82% and 64% of patients, respectively.¹⁵ In the present study, septal deviation, inferior turbinate hypertrophy and nasal polypi were common findings in patients with fungal disease. It is observed that 90% of the patients have deviated nasal septum in a study done by Waghay.¹⁹

The causative fungal organisms found in the present study were *Aspergillus niger*, *Aspergillus fumigatus*, *Mucormycosis* and *Candida albicans*. *Aspergillus* species was responsible in 77.8% cases. *Aspergillus* was the commonest organism isolated from the cultures of

patients with fungal sinusitis in a study done by Waghray.¹⁹ *Aspergillus* species were the commonest fungal isolates (95.8%) in south Indian study by Rupa et al.²⁰ In north Indian study done by Chakrabarti et al the most common species isolated in his study was *Aspergillus*. *Aspergillus flavus* was isolated in as many as 40 cases.²¹ *Aspergillus* species is a chronic colonizer of paranasal sinuses and ears are commonest fungi responsible for fungal rhinosinusitis as well as a variety of different clinical conditions.⁹

CONCLUSION

The results of the study emphasise the role of fungi as important pathogens in the etiology of chronic maxillary sinusitis, hitherto considered the result of bacterial infection and inflammation. One should have a high index of suspicion of fungal infection when a young adult with a unilateral antral opacity on X-ray is seen to have frank pus in antral washings.

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