

## Original Article

# RHINOSINUSITIS : A DEMOGRAPHIC OVERVIEW

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### Abstract

**Background:** Fungal rhinosinusitis is one of the important healthcare problems and its incidence and prevalence is increasing over the past three decades. It affects approximately 20% of the population at some time of their lives. It occurs in both acute and chronic forms. Early and effective treatment based on the knowledge of causative microorganisms can ensure prompt clinical recovery and possible complications can thus be avoided. **Objectives:** To study the demographic and microbiological profile of rhinosinusitis. **Materials and Methods:** Clinically diagnosed cases of rhinosinusitis were enrolled in the study and detailed clinical history was taken. Samples like nasal mucosa, crusts, scrapings / excised nasal polyps and biopsy were collected. The specimens were processed for fungal culture. Isolates were identified as per standard protocols. **Results:** A total of 50 patients clinically diagnosed with rhinosinusitis were enrolled in our study out of which 28(56%) were males. Most common presenting complaint was nasal obstruction (92%) followed by nasal discharge (78%). Overall KOH positivity in our study was 72% and fungal culture positivity was 40%. Most common fungal isolate was *A.flavus* followed by *Mucor spp.* **Conclusion:** Continuous and periodic evaluation of microbiological pattern of isolates is necessary to decrease the potential risk of complications by early institution of appropriate treatment. **Keywords:** Fungal rhinosinusitis, Acute rhinosinusitis, Chronic rhinosinusitis, Aspergillus.

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## INTRODUCTION

Most common nasal infection encountered in our population is rhinosinusitis. It affects a large number of population on a day to day basis and can have a huge impact on the quality of life. Histopathologically, sinusitis is defined as “the inflammation of mucosa of paranasal sinus” and rhinitis is “inflammation of the nasal mucosa”.<sup>1</sup> Sinus inflammation is usually accompanied by inflammation of nasal mucosa. It is due to the continuity of the mucosal lining. Clinically, rhinitis and sinusitis co-exists most of the times. Thus, the term sinusitis is expanded to rhinosinusitis to represent the inflammatory symptom complex.<sup>1,2</sup> Rhinosinusitis can be initiated by an inflammatory insult i.e; viral infection of upper respiratory tract or allergic rhinitis preceded by a bacterial or fungal superinfection.<sup>3</sup> The infection results in mucosal swelling with occlusion or obstruction of the sinus ostia. It leads to reduction in oxygen tension, which can impair mucociliary transport and transudation of fluid into the sinuses.<sup>4</sup> The

inflammation also results in changes in the mucus which becomes more viscid and often alterations in ciliary beat frequency occur. These changes in the nasal sinus environment lead to stasis of the mucus and thereby bacterial colonization.<sup>5</sup> Major symptoms include facial pain/ pressure, facial congestion/fullness, nasal obstruction/blockage, nasal discharge/purulence, post nasal drip, hyposmia/anosmia or purulence on nasal examination. Minor symptoms include headache, fever (non-acute), halitosis, fatigue, dental pain, cough, ear pain/pressure/fullness.<sup>6</sup> Rhinosinusitis is classified on the basis of duration of symptoms. Acute rhinosinusitis (ARS) includes disease lasting less than or equal to 4 weeks, sub acute includes disease lasting 4 to 12 weeks and in chronic rhinosinusitis (CRS) disease lasts more than 12 weeks.<sup>6,7</sup> Etiology of chronic rhinosinusitis includes osteomeatal obstruction, allergies, polypi, dental diseases and occult or subtle immunodeficiency states, which lead to inflammation of nose and paranasal sinus.<sup>5</sup>

Fungal rhinosinusitis is one of the important healthcare problem and its incidence and prevalence is increasing over the past three decades. North india has been identified as an endemic zone of paranasal mycoses. The most important aetiological agents of fungal rhinosinusitis are *Aspergillus*, *Mucor*, *Alternaria*, *Candida*, *Bipolaris* and *Curvularia spp.*<sup>8</sup> Therefore this study was conducted to study the demographic and microbiological profile of rhinosinusitis.

**MATERIALS & METHODS**

This prospective study was approved by Institutional Ethical Committee. 50 cases clinically suspected of rhinosinusitis were included in the study. It was conducted in Dayanand Medical College & Hospital, Ludhiana. Demographic details (age,sex, presenting complaints, duration of disease etc.) were recorded in a predesigned proforma. Specimens like nasal secretions, mucosa, crusts, scrapings, excised nasal polyp/tissue biopsy were collected and were processed as per standard protocols. For direct examination, KOH mount was prepared. For fungal culture, specimens were inoculated on four tubes of Sabouraud dextrose agar (SDA) with and without cycloheximide and incubated at 25°C and 37°C. Fungal growth obtained was identified on the basis of colony morphology, rate of growth, colour, texture, pigmentation and findings on lactophenol cotton blue mount examination.

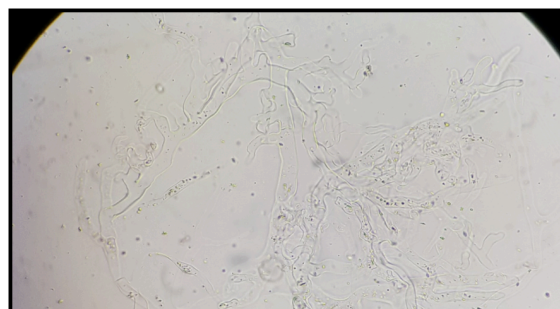
**RESULTS**

During the one year study period, out of 50 suspected cases, 28(56%) were males and 22(44%) were females, with a male:female ratio of 1.3:1 Male preponderance could be due to more occupational exposure to various causative agents. The age group of cases ranged from 11 -70 years. The most affected age group was 41- 50 years with 14(28%) cases while the least affected age group was 11-20 years and 61-70 years with 4(8%) cases in each age group. Geographically, our study comprised more of urban patients 38 (76%) as compared to patients from rural background 12(24%). Most common presenting complaint was nasal obstruction 46(92%) followed by nasal discharge 38(78%), headache 21(42%) and post nasal drip 20(40%). Features like facial pain and swelling and eye symptoms were seen in fewer cases. Most of the cases presented with duration of disease > 4 weeks 33(66%). Out of 50 cases, 37 were positive by direct KOH mount. Hyaline

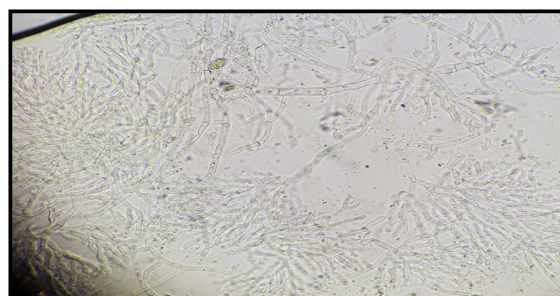
septate fungal hyphae were seen in 29 and hyaline aseptate fungal hyphae were seen in 8 cases. (Figure I and II) Fungal culture was positive in 20 cases (40%).(Table I) Most commonly isolated fungus was *A. flavus* (75%) followed by *Mucor spp.* (20%) and *A.fumigatus* (5%).(Figure III) Overall KOH positivity in our study was 72% and fungal culture positivity was 40%. Highly significant (p value <0.05) correlation was obtained between direct examination and culture. Out of 50 patients with rhinosinusitis, 7 were managed conservatively with oral antifungal medication, while 43 cases underwent surgery for management of symptoms & complications.

**Table I: Co-relation of direct examination with culture in rhinosinusitis cases (n=50)**

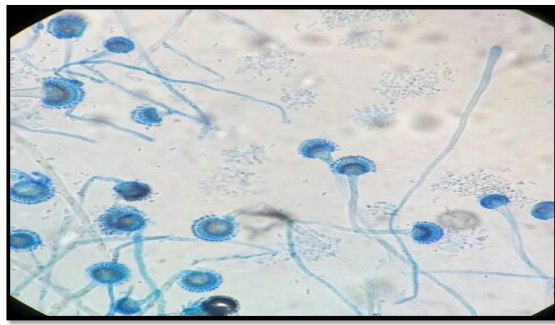
Direct examination (KOH results)	Culture (growth on SDA)	
	Positive (n= 20)	Negative (n=30)
Positive (n= 37)	20	17
Negative (n= 13)	0	13
<b>p value &lt;0.05</b>		



**Figure I : Hyaline aseptate fungal hyphae as seen on KOH mount (X400)**



**Figure II : Hyaline septate fungal hyphae as seen on KOH mount (X400)**



**Figure III: LCB mount preparation: *Aspergillus flavus* - septate hyphae with chains of conidia in single or double rows of phiallides covering the entire circumference of spherical vesicle (X400)**

## DISCUSSION

In a prospective cohort observational study conducted in the Department of Microbiology on clinically suspected cases of rhinosinusitis, detailed demographic history with microbiological findings were analyzed. During the recent decades, paranasal sinus mycosis has been recognized more frequently in different parts of the world. It is a common disorder affecting approximately 20% of the population at some time of their lives. A significantly higher incidence is reported in areas that have warm and dry climate. Its incidence in recent years has shown a marked increase especially in north India.<sup>9</sup> The overall prevalence of FRS among the patients with clinical suspicion was 72%. In a study done in USA, prevalence of FRS was 93%.<sup>10</sup> There was predominance of rhinosinusitis in male patients with a male:female ratio of 1.3:1. This result was similar to the study done by Erkan *et al*<sup>11</sup> and Manning SC *et al*<sup>12</sup> that also noted a male predominance with male:female ratio of 1.6:1 and 2.15:1 respectively. However, study done by Micheal *et al*, and Dufor *et al*<sup>13,14</sup> showed female predominance. The results obtained in our study can be attributed to the fact that the males are more commonly exposed to irritating pollutants and have higher prevalence of smoking whereas females have hesitance in the social setting like India to seek medical care. In the present study, age of patients with rhinological symptoms ranged from 11- 70 years. The most affected age group was 41- 50 years with 14(28%) cases while the least affected age group was 11-20 years and 61-70 years with 4(8%) cases in each age group. Our finding is nearer to the observation of Micheal *et al* in which age group 11-79 years was found to be affected.<sup>13</sup> However, in other studies, the median affected age was 30 years.<sup>12,15</sup> This is possibly due to risk factors like diabetes,

chemotherapy which are common in older age groups. Geographically, our study comprised more of urban patients (76%) as compared to patients from rural background (24%). This can be due to the fact that our institute is a tertiary care hospital. This finding is similar to the study conducted by Farhani *et al*<sup>16</sup> where urban cases were reported more as compared to rural. Another reason could be that the population residing in urban areas are more commonly exposed to the irritant pollutants of traffic, dust and factories residuals. These irritants cause allergic rhinitis which can progress to fungal sinusitis. Most common presenting complaint was nasal obstruction (92%), followed by rhinorrhoea (78%). It is similar to the study by Irfan *et al*,<sup>17</sup> where 76% of the patients presented with nasal obstruction. In a similar study done in Nepal, nasal discharge was the chief presenting symptom in 78.5% followed by headache in 50% while, 42.9% complained of nasal blockage, either bilaterally or unilaterally.<sup>18</sup> Other symptoms included headache (42%), post nasal drip (40%) and nasal polyps (34%), which is comparable to the observations of Madani *et al* who also reported post nasal discharge in 40% patients.<sup>19</sup> Overall KOH positivity in our study was 72% and fungal culture positivity was 40%. Some cases with positive direct KOH smear examination yielded a negative culture, which may be due to inadequate specimen or improper sample collection or antifungal therapy of the patient. The most common fungal isolate in our study group was *Aspergillus flavus*. This finding was similar to the study done by Chhabra *et al*.<sup>20</sup> Another prospective study of 176 cases of FRS done in north India showed that *A.flavus* was the causative agent in 80% of the patients. Other than *Aspergillus*, next common isolate in invasive group was *Mucor spp* . Similar findings were reported from two separate studies from Tamil Nadu.<sup>13,21</sup>

## CONCLUSION

Thus it is clear from the present study that despite recognition of fungal rhinosinusitis as a serious disease entity for more than two centuries, our knowledge about the epidemiology and medical mycology of the disease remains incomplete and subject to newer findings and research. Further long prospective studies may help to unravel the mystery of whether the two entities are in fact spectra of the same disease.

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