

## Original Research Article

# Demographic profile of fungal rhinosinusitis at a tertiary care centre

Manish Munjal<sup>1\*</sup>, Veenu Gupta<sup>1</sup>, Deepinder Chinna<sup>1</sup>, Suman Viridi<sup>1</sup>, Shubham Munjal<sup>2</sup>,  
Vasu Gupta<sup>1</sup>, Neha Dhawan<sup>2</sup>, Iti Bharadwaj<sup>2</sup>

<sup>1</sup>Department of Microbiology, Dayanand Medical College, Ludhiana, Punjab, India

<sup>2</sup>Research student, Dayanand Medical College, Ludhiana, Punjab, India

**Received:** 19 August 2020

**Revised:** 03 October 2020

**Accepted:** 30 November 2020

### \*Correspondence:

Dr. Manish Munjal,

E-mail: manishmunjaldr@yahoo.com

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ABSTRACT

**Background:** Fungal rhino sinusitis is rampant in the North Indian state of Punjab. The demographic profile, presentation and comorbidities have been analysed.

**Methods:** 110 samples from the nasal cavity were collected in Oto-rhino-Laryngology services and processed in the Microbiology services of Dayanand Medical College and Hospital, Ludhiana. Nasal secretions and surgically excised tissue were processed and subjected to direct microscopy by potassium hydroxide (KOH) preparation as well as inoculated on Sabouraud's dextrose agar. Identification of fungal isolates was done as per standard procedures.

**Results:** Fungal sinusitis was most common followed by acute invasive sinusitis, chronic invasive, granuloma (fungal ball) and granulomatous invasive fungal sinusitis. Males were affected more than females and the majority of the patients were from urban background. Allergic form of disease was commonly seen in younger age group as compared to the invasive form of the disease which was seen more in older patients. Nasal discharge was common presentation followed by nasal obstruction. Bronchial asthma and diabetes mellitus were co-morbidities. KOH positivity was 44.5% and fungal culture positivity was 33.6%. The common fungal isolate in this group was *Aspergillus flavus* (22.7%). The most common fungal isolate in the invasive group was *Rhizopus* spp. (4.5%) and *Mucor* spp. (3.6%).

**Conclusions:** Elderly diabetic and asthmatic males are more susceptible to invasive fungal rhino sinusitis while the young males are vulnerable to the allergic fungal rhino sinusitis. Thereby control of diabetic status and appropriate allergy testing and desensitization is emphasised.

**Keywords:** Demography, Fungal rhino sinusitis, *Aspergillus*, *Rhizopus*

## INTRODUCTION

Association of fungus human civilization dates from time immemorial. Egyptians utilized fungi for preparing bread and wine. Ever since its utility to mankind in different ways can't be overemphasised. On the contrary its detrimental effects on our daily life cannot be ignored. The fungal infections of the paranasal sinuses are becoming common day by day. Fungal rhinosinusitis is an important health care problem with increasing incidence and prevalence since the last few decades and has a significant

impact on the quality of life.<sup>1</sup> Rhino-sinusitis is inflammation of the mucosa of the nose and paranasal sinuses, with alterations ranging from inflammatory thickening to gross nasal polyp formation.<sup>2</sup> Rhinosinusitis affecting 135 per 1000 population results in a large financial burden on the society.<sup>3</sup> This common disorder is seen in approximately 20% of the population at some time of their lives.<sup>4</sup> Approximately 31 million patients (4% of adult population) have fungal rhino sinusitis in the USA, each year.<sup>5</sup> It is a well-documented disease in the immunocompromised patient but recently many reports have

indicated an increased prevalence in otherwise healthy individuals. Therefore, it results in great socio-economic effects, including both direct and indirect costs to the society.

Plaignaud first reported fungal sinusitis in 1791 AD. Since then it has been brought into being the foremost challenges for clinicians, clinical microbiologists and basic scientists.<sup>6</sup> Baker et al in 1957 reported for the first time an acute invasive (fulminant) type of fungal rhinosinusitis caused by Zygomycetes in immuno-compromised patients.<sup>7</sup> In 1965, Hora recognised two categories of fungal sinusitis, the non-invasive behaving clinically like chronic bacterial sinusitis, and the other invasive, in which the infection results in a mass that behaves like malignant neoplasm, eroding bone and spreading into adjacent tissue.<sup>8</sup> Milosev et al first recognised the chronic granulomatous type of invasive fungal rhino sinusitis in Sudan in 1969.<sup>9</sup> In 1980 acute invasive fungal rhino sinusitis was also attributed to *Aspergillus spp.*<sup>10</sup> The exact aetiology of fungal rhino sinusitis is not known. Various agents including bacteria, viruses and fungi have been introduced as aetiological origins of the disease.<sup>11</sup> The most accepted one is allergic or hypersensitive response to the presence of extra mucosal fungi in the sinus cavity. It is more common in atopic individuals that occur commonly in areas of high temperature and humidity. The prevalence of the disease and the dominant fungal pathogen appear to vary in different geographical regions and probably are related to individual host conditions. Previously, 5-15% cases of chronic rhinosinusitis were assumed to be of fungal aetiology. However, after the claim of fungus to be the aetiological agent in majority of cases of chronic rhinosinusitis by Ponikau et al, the impact of fungal rhinosinusitis seems to be tremendous. Fungal rhinosinusitis causes significant physical symptoms, severe quality of life impairment and can substantially impair daily functioning.<sup>5</sup>

Aim of the study was to analyse the demographics of fungal rhinosinusitis in the state of Punjab.

## METHODS

A prospective study of subjects undergoing functional endoscopic sinus surgery was undertaken. 110 samples from the nasal cavity were collected in the Rhinology clinics and during endoscopic surgical interventions in the Oto-rhino-laryngology and head neck services and processed in the Mycology Division of Microbiology services of Dayanand Medical College and Hospital, Ludhiana. The study was undertaken in a period of one and a half year. (June 2010 to December 2011)

### Inclusion criteria

Patients with fungal sinusitis were included in the study.

### Exclusion criteria

Patients on antifungal medications were excluded from the study.

Patients with suppurative sinusitis- the clinical samples like nasal secretions and the surgically excised tissue like the hypertrophic or abnormal looking nasal mucosa were processed in the microbiology lab.

These samples were subjected to- direct microscopy by KOH preparation, inoculation on Sabrouaud's dextrose agar, identification of fungal isolates was done as per standard procedures.

### Statistics analysis

All the statistical calculations were done using statistical package of social sciences (SPSS) 17 version statistical program for Microsoft windows (SPSS Inc. Released 2008. SPSS statistic for windows, version 17.0, Chicago).

## RESULTS

The observations of the study were tabulated in the tables.

**Table 1: Demographic profile of fungal rhino-sinusitis cases (n=110).**

Clinical type Features	Allergic FRS (n=57)	Acute invasive FRS (n=23)	Chronic invasive FRS (n=21)	Fungal ball (n=5)	Granulomatous invasive FRS (n=4)
<b>Gender</b>	Male (n=71)	36	15	14	3
	Female (n=39)	21	8	7	2
<b>Area</b>	Urban (n=60)	22	15	16	4
	Rural (n=50)	35	8	5	1
<b>Clinical presentations</b>	Nasal discharge (n=43)	22	10	8	2
	Nasal blockage (n=26)	17	3	4	2
	Eye symptoms (diplopia/proptosis/loss of vision etc.) (n= 13)	0	7	3	1

Continued.

Clinical type Features	Allergic FRS (n=57)	Acute invasive FRS (n=23)	Chronic invasive FRS (n=21)	Fungal ball (n=5)	Granulomatous invasive FRS (n=4)
Nasal discharge with headache/earache (n=11)	9	2	0	0	0
Excessive sneezing (n=6)	5	0	1	0	0
Headache (n=5)	-	-	5	-	-
Difficulty in breathing/snoring (n=4)	3	0	1	0	0
Cheek swelling (n=2)	-	1	-	-	1
Nasal blockage with headache (n=1)	1	0	0	0	0
<b>Co-morbidities</b>					
Bronchial asthma (n=13)	10	-	1	1	1
On steroids (n=2)	1	-	-	-	1
Diabetes mellitus (n=6)	1	5	-	-	-
Previous sinus surgery (n=2)	1	1	-	-	-
<b>Occupation</b>					
Farmer (n=28)	19	4	4	-	1
Student (n=23)	17	-	3	2	1
Housewife (n=21)	9	5	5	-	2
Business (n=16)	3	7	4	2	-
Service (n=14)	5	5	3	-	1
Unemployed (n=6)	3	1	1	-	-
Labourer (n=2)	1	-	1	-	-

The age of our patients ranged from 9 years to 80 years and the most affected age group was 41-50 years, 22.7% cases, while the least affected age group was of 0-10 years with 0.9% cases. Majority of cases of FRS were farmers by occupation (25.4%) followed by students (20.9%).

There were more urban patients (54%) compared to those from rural background (46%). This can be due to the fact that our institute is a tertiary care hospital. Most common presenting complaint was nasal discharge (37.2%) followed by nasal blockage (23.6%), eye symptoms (11.8%), nasal discharge with headache (4.5%). 23 (20.9%) patients had associated co-morbidities like bronchial asthma and diabetes 56.5% and 26.5% respectively.

## DISCUSSION

During the recent decade paranasal sinus Mycosis has been recognized more frequently in different parts of the world due to the increased awareness of physicians. A significantly higher incidence is reported in restricted areas that have warm and dry climate.<sup>12-14</sup> Its incidence in recent years has shown marked increase specially in North Sudan, in South Western states of USA and in of North of India.

Rhino sinusitis is a common disorder affecting approximately 20% of the population at some time of their

lives. Over one and a half year period, 110 patients that presented with clinical suspicion of fungal sinusitis were studied. The overall prevalence of FRS among the patients with clinical suspicion was 50%. In a study done in USA prevalence of fungal rhino sinusitis was 93%.<sup>5</sup> The reasons for this difference are a matter of speculation but several factors may be involved.

There was predominance of FRS in male patients with a male: female ratio of 1.8:1. This result is similar to the Manning et al study, that noted a male predominance with 1.6 male per female.<sup>15</sup> However, Micheal et al and Dufour et al showed female predominance.<sup>16,17</sup> The results obtained in our study can be attributed to the fact that the males are more commonly exposed to irritating pollutants of traffic, dust, and factories.

In our study age of patients ranged from 9 years to 80 years. The most affected age group was 41-50 years, 22.7% subjects, while the least affected age group was of 0-10 years with 0.9% subjects. Our finding is similar to the observation of Michael et al in which the age group 11-79 years was found to be more commonly affected.<sup>16</sup> However, in other studies the affected median age was 30 years.<sup>18,19</sup> This is possibly due to risk factors like diabetes, chemotherapy which are common in older age group.

Majority of cases of fungal rhinosinusitis were farmers by occupation (25.4%) followed by students (20.9%),

housewives (19%) and businessmen (14.5%). Least number of patients were unemployed and belonged to the labour class (5.4% and 1.8%) respectively. Probably because individuals working in the fields in hot and dry climate sustain frequent mucosal injury of paranasal sinus and acquire the fungal agents from the fields.<sup>11,20</sup>

Our study comprised more of urban patients (54%) compared to those from rural background (46%). This can be due to the fact that our institute is a tertiary care hospital. This finding is similar to the study done in Nepal where urban cases were reported more frequently as compared to rural. Another reason could be that the populace residing in the urban area is more frequently exposed to the irritant pollutants of air conditioners, traffic, dust, factories, compared to the rural folk. These irritants causes rhinitis and lead to the fungal sinusitis.

The predominant presenting complaint was nasal discharge (37.2%) followed by nasal blockage (23.6%), eye symptoms (11.8%) (mainly in invasive form of disease), and nasal discharge with headache (4.5%). Less common features were excessive sneezing, headache, nasal blockage, headache and swelling of the cheek. 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>21</sup> In the PGIMER Chandigarh study, rhinorrhoea with nasal polyposis (45.8%) and proptosis (46.4%) were the chief complaints, followed by headache (11.3%), cheek swelling (9.5%) diminished vision (8.9%), blindness (5.3%) seizures, vomiting and altered sensorium (5.3%).<sup>20</sup>

23 (20.9%) cases had associated co-morbidities like bronchial asthma and diabetes 56.5% and 26.5% respectively. There are several possible reasons for these findings. A significant proportion of the Indian population lives below poverty line and hence may be malnourished. Though they are immuno-compromised their poor nutritional status may also make them more susceptible to this disease. The second reason may be that bronchial asthma and diabetes mellitus are known to be extremely common in India and some of the patients may have had undiagnosed bronchial asthma and diabetes mellitus, predisposing them to fungal sinusitis.

## CONCLUSION

Elderly diabetic and asthmatic males are more susceptible to invasive fungal rhino sinusitis while the young males are vulnerable to the allergic fungal rhino sinusitis. Thereby control of diabetic status and appropriate allergy testing and desensitization is emphasised.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

- Chander J. Fungal sinusitis. In: Textbook of Medical Mycology 3rd ed. New Delhi. Mehta. 2009;480-92.
- Spector SL, Bernstein IL, Li JT, Berger WE, Kaliner MA, Schuller DE et al. Parameters for the diagnosis and management of sinusitis. J Allergy Clin Immunol. 1998;102(6 Pt 2):5107-44.
- Ray NF, Baraniuk JN, Thamer M, Rinehart CS, Gergen PJ, Kaliner M, et al. healthcare expenditures for sinusitis in 1996; contributions of asthma, rhinitis and other airway disorders. J Allergy Clin Immunol. 1999;103(3 pt 1):408-14.
- Lethbridge-Chejku M, Schiller JS, Bernadel L. Summary health statistics for US adults: National Health Interview Survey 2002. Vital Health Stat. 2004;222:1-151.
- Ponikau JU, Sherris DA, Kern EB, Homburger HA, Frigas E, Gaffey TA et al. The Diagnosis and Incidence of Allergic Fungal Sinusitis. Mayo Clin Proc. 1999;74(9):877-84.
- Fergusson BJ. Fungal rhinosinusitis: spectrum of disease. Otolaryngol Clin North Am. 2000;33:227-49.
- Baker RD. Mucormycosis: A new disease ? JAMA. 1957;163(10):805-08.
- Hora JF. Primary aspergillosis of the paranasal sinuses and associated areas. Laryngoscope. 1965;75:768-73.
- Milosev B, EL-Mahgoub S, Aat OA, EL-Hassan AM. Primary aspergilloma of paranasal sinuses in Sudan: A review of seventeen cases. Br J Surg. 1969;56(2):132-37.
- McGill TJ, Simpson G, Healey GB. Fulminant aspergillosis of the nose and paranasal sinuses: A new clinical entity. Laryngoscope. 1980;90(5 pt 1):748-54.
- Tilak R, Kumar V, Nigam C, Gupta MK, Kumar R, Jain RK. Clinicomycological Spectrum of Fungal Rhino-Sinusitis from University Hospital, North India. J of Clin and Diagnostic Res. 2012;(2)6(4):656-59.
- Chakrabarti A, Sharma SC, Chander J. Epidemiology and pathogenesis of paranasal sinus mycoses. Otolaryngol Head Neck Surg. 1992;107(6 PT 1):745-50.
- Wahburn RG, Kennedy DW, Begley MG, Henderson DK, Bennett JE. Chronic fungal sinusitis in apparently normal hosts. Med. 1998;67(4):231-47.
- McGuirt WF, Harrill JA. Paranasal sinus aspergillosis. Laryngoscope .1979;89(10 pt 1):1563-68.
- Manning SC, Holman M. Further evidence for allergic pathophysiology in allergic fungal sinusitis. Laryngoscope. 1998;108(10):1485-96.
- Michael RC, Michael JS, Ashbee RH, Mathews MS. Mycological profile of fungal sinusitis: An audit of specimens over a 7-year period in a tertiary care hospital in Tamil Nadu. India J Pathol Microbio. 2008;51(4):493-96.

17. Dufour X, Kauffmann-Lacroix C, Ferrie Jc, Goujon JM, Rodier MH, Klossek JM. Paranasal sinus fungus ball: epidemiology, clinical features and diagnosis. A retrospective analysis of 173 cases from a single medical center in France, 1989-2002. *Med Mycol.* 2006;44(1):61-7.
18. Lalwani AK, Snow JB Jr. Sinusitis. In Harrison's Principles of Internal Medicine Vol-I 15th ed. Eds: Kasper, Braunwald, Fauci, Hauser, Longo, Jameson: MC Graw Hill. United States of America. 2001;188.
19. Schubert MS. Fungal rhinosinusitis: diagnosis and therapy. *Curr Allergy Asthma Rep.* 2001;1(3):268-76.
20. Panda NK, Sharma SC, Chakrabarti A, Mann SB. Paranasal sinus mycoses in north India. *Mycoses.* 1998;41(7-8):281-6.
21. Joshi RR, Bhandary S, Khanal B, Singh RK. Fungal Maxillary sinusitis: A prospective study in a tertiary care hospital of eastern Nepal. *Kathmandu Univ Med.* 2007;5(2):195-8.

**Cite this article as:** Munjal M, Gupta V, Chinna D, Viridi S, Munjal S, Gupta V. Demographic profile of fungal rhinosinusitis at a tertiary care centre. *Int J Otorhinolaryngol Head Neck Surg* 2021;7:61-5.