



## Chronic Rhinosinusitis-Fungal Etiology & Clinical, Histopathological, Radiological Profile in a Tertiary Care Centre

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### Abstract

**Background & Objectives:** Rhinosinusitis comprises a spectrum of inflammatory and infectious disease that involves the sinuses and nasal mucosa which affects approximately 20% of the population. Fungi are being increasingly implicated in the etiopathology of rhinosinusitis & its clinical presentation is almost indistinguishable from that of chronic rhinosinusitis. The aim of this study is to determine the proportion of fungal sinusitis among diagnosed cases of chronic rhinosinusitis and to describe the clinical, radiological, microbiological and pathological profile.

**Methods:** 186 Chronic rhinosinusitis patients were included in the study after fulfilling the inclusion and exclusion criteria. This study was conducted at Department of ENT, Medical College, Thiruvananthapuram over a period of 13 months. After obtaining informed written consent, detailed history and clinical examination was performed and investigation findings were noted. After surgery, the histopathological, fungal stain and culture results of the tissue samples sent were analysed statistically using SPSS software.

**Results & Discussion:** Out of 186 cases of chronic rhinosinusitis, 50 cases (26.9%) were found to be fungal culture positive. Among them 29(58%) were caused by *Aspergillus* species. Headache, nasal obstruction and nasal discharge were the most common presenting symptoms of these cases. Radiological features like double density, sclerosis, bone erosion, and unilateral affection of the disease were found to be significantly associated with fungal sinusitis cases.

**Conclusion:** The early diagnosis and recognition of fungal sinusitis is very important, not only because it is curable in the early stages, but also to prevent progression of the disease into more destructive invasive forms. *Aspergillus* species is the most common culprit causing fungal sinusitis. CT scan plays a very important role & is one of the best diagnostic tools in diagnosing fungal rhinosinusitis.

**Keywords:** Fungal rhinosinusitis, *Aspergillus*, culture, KOH mount, radiological, chronic rhinosinusitis, endoscopic sinus surgery.

### Introduction

Chronic Rhinosinusitis accounts for more than 90% cases of sinusitis and has a slow protracted

course and different aetiologies, fungal infections being one of the major cause. Fungal sinusitis, especially invasive form is frequently seen in

diabetic or immunocompromised patients, although it has also been reported in immunocompetent individuals. Invasive fungal sinusitis, unless diagnosed early and treated aggressively, has a high mortality rate.

In Indian scenario the incidence of fungal infections involving the nasal cavity has shown an increase. There is also a significant increase in the incidence of fungal infections involving the nose and sinuses even in immunocompetent individuals<sup>1,2 & 3</sup>.

The non-invasive fungal sinusitis is usually not detected clinically and is treated for a long period as chronic rhinosinusitis. Non-invasive infections cause symptoms of sinusitis, and the sinus involved is opacified on radiographic studies. Allergic fungal sinusitis is more prevalent among the non-invasive disease which is caused by Type 1 hypersensitivity towards fungal elements.

In this study, attempt has been made to identify the fungal aetiology in chronic rhinosinusitis patients admitted to department of otorhinolaryngology, Medical College Trivandrum and to study their clinical profile.

### **Aims and Objectives**

The aim is to study the fungal profile of patients diagnosed with chronic rhinosinusitis.

The objectives of this study were to determine the proportion of fungal rhinosinusitis in clinically diagnosed cases of chronic rhinosinusitis posted for endoscopic sinus surgery, to identify the different types of fungi causing rhinosinusitis, to describe the clinical profile of chronic fungal rhinosinusitis, to describe the radiological features of chronic fungal rhinosinusitis and to describe the histopathological picture of chronic fungal rhinosinusitis

### **Materials & Methods**

The descriptive, cross sectional study was conducted at the Department Of Otorhinolaryngology, Medical College, Thiruvananthapuram, over a period of 13 months (June 2015-July 2016).

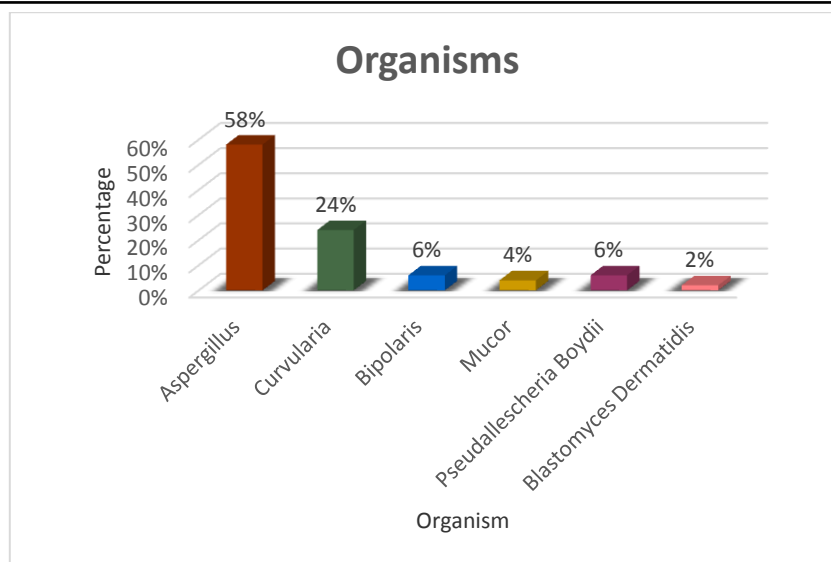
186 clinically diagnosed cases of chronic rhinosinusitis, according to Lanza & Kennedy criteria<sup>4</sup>, were included in this study. Exclusion criteria were patients unwilling to participate in the study and patients who were lost on follow up. All clinically diagnosed cases of chronic rhinosinusitis admitted in the E.N.T Department for endoscopic sinus surgery during the study period were identified. After obtaining informed written consent from the patient, detailed history and clinical examination was performed. Radiological & other investigation findings were noted. Diagnostic nasal endoscopy findings were recorded prior to surgery. During the surgery, the samples like the removed sinus tissue, nasal polyps, sinus secretions and debris from the diseased sinuses were collected and send for fungal staining & culture and histopathological examination. The fungal staining was done using 10% KOH smear and GMS stain. The fungal culture was done using SDA agar plates. Those with fungal culture positivity were taken as fungal sinusitis & their profiles were studied in detail.

All data were analysed statistically using SPSS software. Qualitative data was expressed in percentage and proportion. Quantitative data was expressed in mean and standard deviation. Association was measured by Chi square test.

### **Results**

Among the 186 cases, 105(56.5%) cases were males. The male female ratio obtained was 1.29:1. The mean age of the sample was 46.24years. Among them one fourth patients were between the age of 35-44 years.

26.9% of cases were fungal culture positive and 21.5 % cases were fungal stain positive. Among the fungal culture positive cases 58% were caused due to *Aspergillus* species, followed by dematiaceous fungi, especially *curvularia* species causing 24% of the fungal sinusitis. Figure 2 shows the various fungal species obtained in our study.



**Chart.1.** Distribution of different fungal species

Among all the different symptoms given by the patients, nasal obstruction, nasal discharge and

headache were seen in more than 35% of the total culture positive cases.

**Table.1.** Distribution of examination findings

		Culture negative	Culture positive	P-value
Septal Deviation	Count	87	29	0.601
	%	64%	58%	
Polyp	Count	96	34	0.733
	%	70.6%	68%	
Discharge	Count	74	27	0.960
	%	54.4%	54%	

Among the 50 fungal culture positive cases, 29 cases (58%) had septal deviation. Mucoid discharge was present in 44% cases, 6% with blood stained discharge and 4% with purulent discharge during nasal examination. Polyps were seen in 34 cases out of 50 fungal sinusitis patients

of which 64% were unilateral and 4% were bilateral polyps.

The mean total score of CT scan findings, according to Lund Mackay CT scoring<sup>5</sup>, among the fungal sinusitis patients was 11.64.

**Table.2.** Distribution of Radiological features

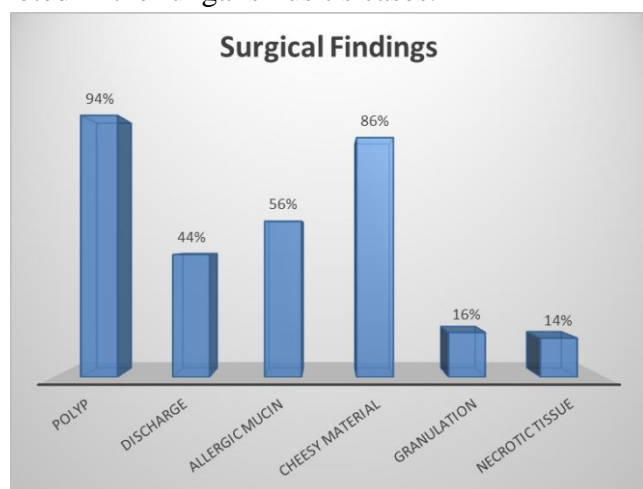
		Culture negative	Culture positive	P-value
	%	54.4%	54%	
Hyperdensity	Count	51	33	0.001
	%	37.5%	66%	
Bone erosion	Count	25	16	0.047
	%	18.4%	32%	
Sclerosis	Count	8	9	0.011
	%	5.9%	18%	
Bone expansion	Count	39	15	0.860
	%	28.7%	30%	
Unilateral disease	Count	22	27	0.000
	%	16.2%	54%	

Among the various radiological features observed, which includes presence of hyperdensities, bone

erosion, sclerosis, bone expansion and laterality of the disease, except bone expansion all other

features were significantly increased in fungal sinusitis cases as compared to other chronic rhinosinusitis patients.

Chart 2 shows the various intraoperative features noted in the fungal sinusitis cases.



**Chart.2.** Distribution of Surgical findings

The histopathology of the various tissue specimens of fungal sinusitis cases were studied and 78% of them showed inflammatory polyp with identifiable extramucosal fungal hyphae.

## Discussion

In this study a humble attempt was made to identify the fungal etiology of diagnosed cases of chronic rhinosinusitis, who have failed to respond with medical management and were planned for endoscopic sinus surgery & also to study the clinico- radiological & pathological profile of the patients with fungal sinusitis.

In this study, among the total 186 cases of chronic rhinosinusitis 50(26.5%) cases were fungal culture positive and were diagnosed as fungal sinusitis. Das et al<sup>6</sup>, 2007, at Chandigarh reported fungal rhinosinusitis with incidence of 42.7% of all the 665 cases of chronic rhinosinusitis over a period of 5 years. In a study by Panda et al<sup>7</sup>, 56% fungal smear positivity has been reported. 48% KOH smear positivity was reported by Krishnan et al<sup>8</sup>, 21% by Prateek et al<sup>9</sup> and 21.29% by Sivani et al<sup>10</sup>.

In our study, most of the fungi isolated were *Aspergillus* species (58%), followed by 24% *Curvularia*. The prevalence of *Aspergillus* species was in accordance with the studies conducted by

Lakshmanan et al<sup>11</sup>, K. Kavitha et al<sup>12</sup> & Chakrabarti et al<sup>13</sup>. This is attributed to the normal fungi present in the soil and environment of tropical countries like India. Whereas, dematiaceous fungal organisms such as *bipolaris* and *curvularia* have been found to be prevalent in North America & other western countries<sup>11</sup>. Though *aspergillus* was the majority in our study, we got a significant number (30%) contributed by the dematiaceous species. Therefore, the geographical pattern, climate and host factors play a significant role in the involvement of fungal organisms in CRS<sup>14</sup>.

Deviated septum and presence of polyps can be a risk factor for development of fungal sinusitis. Polyps contain a high level of mast cells which release eosinophils. The inhaled fungal spores in the sinus mucous cause the eosinophils to be released into the lumen, which cluster around and attack the fungal elements, thereby leading to release of toxic mediators such as interleukins and ensuing secondary inflammation<sup>15</sup>. Unilateral multiple sinonasal polyposis was more implicated with fungal etiology than bilateral polyposis. In our study unilateral polyps were seen in majority (64%) and 4% cases had bilateral polyps. Sivani et al<sup>10</sup> reported 11.11% of nasal polyps & statistical significance of association of fungal sinusitis with polyposis was observed in another study by Santhi et al<sup>14</sup>.

In this study, the CT scores were done using Lund-MacKay scoring where the mean total score was 11.64. In a study conducted by Pokheral et al<sup>16</sup>, they got an average total score of 11.3 in CT scoring which is similar to this study. The presence of double densities is typically seen in fungal sinusitis caused by presence of calcium, iron and magnesium salts. In our study, hyperdensities were seen in 66% cases. Other radiological features including bone erosion, sclerosis and unilateral disease showed statistical significance as compared to chronic rhinosinusitis. Satish et al<sup>17</sup> observed 45.4% having hyperdensities.

Intraoperative findings were observed and noted in this study where, 94% had polyps, 56% had allergic mucin, 44% had mucoid nasal discharge & 80% had presence of cheesy material, which is similar to other studies. Histopathological study of the tissue samples in our study showed inflammation with fungal elements in 78% of cases, as was seen in a study by Bhardwaj et al<sup>18</sup> where fungal elements was observed in 80% of the cases.

### Conclusion

27% of Chronic Rhinosinusitis were diagnosed as fungal rhinosinusitis, so clinical suspicion of fungal sinusitis should be borne in mind when treating chronic rhinosinusitis which is not responding to conventional medical therapy. Aspergillus species is the most common agent in causing fungal sinusitis. CT scan plays a very important role & is one of the best diagnostic tools in diagnosing fungal rhinosinusitis. Various radiological features like presence of hyper densities, sclerosis, bone erosion & unilateral disease were specific for fungal rhinosinusitis. Histopathological and microbiological examination of the surgical materials obtained is mandatory to differentiate fungal rhinosinusitis from other forms of Chronic rhinosinusitis.

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