

# Fungal Infections in Patients with Chronic Rhinosinusitis in Al-Mukalla City, Yemen

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## Abstract

**Background:** Chronic rhinosinusitis is a major cause of morbidity today. **Aim:** The aim of this study is to find out the prevalence of fungal infection in patients with chronic rhinosinusitis, the clinical presentation of fungal infection and the common fungal organisms. **Patients and Methods:** This cross-sectional hospital based study was conducted during the period from March 2002 to March 2013 Al-Mukalla city. Three hundred and twenty patients with chronic rhino sinusitis included in this study. All patients underwent nasal endoscopic examination, maxillary sinus surgery, biopsy, fungal culture and CT scan. **Results:** Thirty two 32 (10%) patients had a fungal infection out of 320 patients with chronic rhinosinusitis. The majority of fungal organisms were *Aspergillus fumigates* 22 (68.75%), followed by *Aspergillus Niger* 4 (12.50%), *Aspergillus Flavus* 2 (6.25%), mucormycosis 2 (6.25%) and candidiasis 2(6.25%). CT scan homogenous opacities were noted in 60%. The endoscopic findings showed 10 (31.25%) of patients with chronic rhinosinusitis and 14(43.75%) had chronic rhinosinusitis with bilateral nasal polyposis and 8 (25%) with unilateral polyposis. Regarding correlation between fungal infection and socioeconomic status; the low socioeconomic status noted in 18 (56.25%), followed by middle status in 8 (25%) and high status in 6 (18.75%). **Conclusion:** CT scan , nasal endoscopy, histopathological examination and fungal culture have made the diagnosis easier. Otorhinolaryngologists must keep in mind fungal infections in their daily practice due to the increasing fungal infections in the recent time.

**Key Words:** *Paranasal sinuses. Polyposis*

## Introduction

Chronic rhinosinusitis (CRS) is defined as a chronic inflammation of the nose and paranasal sinuses. CRS is one of the most common chronic diseases and it has negative impacts on the health. The fungal infection in patients with CRS was rare in the past time, but in recent time there are many positive reports have been noticed, may be due to the advent of nasal endoscopic scan, and the tendency to subject all the removed tissue

for histopathological examinations and culture<sup>(1)</sup>. Fungal spores are distributed in the environment, and upon inhalation they can colonize and cause invasive or non-invasive forms depending on the host immunity<sup>(2)</sup>. Fungal rhinosinusitis is divided into two types: invasive and noninvasive. The invasive fungal infections are divided into three types: acute, chronic and granulomatous. The non invasive infections are divided into two types; fungal ball and allergic fungal rhinosinusitis (AFRS)<sup>(3)</sup>. Fungal CRS is more prevalent in Af-

rican American and lower socioeconomic status<sup>(4,5)</sup>. The incidence of fungal infections are increasing in the immune-competent host<sup>(6)</sup>. There is no study demonstrating the fungal infection in patients with CRS in Yemen. The aim of this study is to provide a picture of fungal infection in patients with CRS.

## Patients and Methods

This cross-sectional study, which conducted in Ibn Sina central & teaching hospital and AL-Madinah poly-clinic during the period from March 2002 to March 2013 in AL-Mukalla city in Yemen. Three hundred and twenty patients with CRS included in this study. One hundred and eighty patients underwent Caldwell Luc operation & nasal polypectomy, one hundred patients underwent nasal endoscopy (FESS) and forty patients underwent antral puncture. The diagnosis of fungal infection in patients with CRS was based on: (1) Detailed history, (2) CT scan of nose and paranasal sinuses, (3) Nasal endoscopy, (4) Histopathological examination of biopsy, (5) Fungal culture. Patients from 15 years to >60 years were included.

### Statistical Analysis

Data were analysed using SPSS software.

## Results

Thirty two (10%) patients had fungal infections out of 320 patients with CRS. 20 patients (62.5%) were males and 12 patients (37.5%) were females. The majority of patients belonged to the age group of third and fourth decade (Table 1). The majority of fungal organisms were *Aspergillus fumigates* (68.75%), followed by *Aspergillus Niger* (12.5%), *Aspergillus Flavus* (6.25%), mucormycosis (6.25%), and candidiasis (6.25%) (Table 2). Regarding CT scan findings homogenous opacities were noted in 60% (Table 3). Regarding the endoscopic findings were 31.25%

patients with CRS and 68.75% patients with nasal polyposis (43.75% with bilateral and 25% with unilateral polyposis) (Table 4).

**Table 1:** Age distribution of fungal infection in patients with CRS

Age group (years)	No.	%
20-30	10	31.25%
31-40	12	37.5%
41-50	4	12.5%
51-60	3	9.37%
>60	3	9.37%

**Table 2:** Fungal organisms of fungal infection in patients with CRS

Fungal Organism	No	%
<i>Aspergillus fumigates</i>	22	68.75%
<i>Aspergillus Niger</i>	4	12.5%
<i>Aspergillus flatus</i>	2	6.25%
Mucormycosis	2	6.25%
Candidiasis	2	6.25%

**Table 3:** CT scan findings of fungal infection with CRS

CT scan finding	%
Homogenous opacity	60%
Heterogenous opacity	30%
Mucosal Thickening	8%
Bone involvement	2%

**Table 4:** Nasal endoscopy findings of fungal infection with CRS

Nasal endoscopy finding	No.	%
CRS with fungal infections	10	31.25%
Bilateral polyposis with fungal infections	14	43.75%
Unilateral polyposis with fungal infections	8	25%

**Table 5:** The correlation between fungal infection and socioeconomic status

Socioeconomic status	No.	%
High status	6	18.75%
Middle status	8	25%
Low status	18	56.25%
Total	32	100%

## Discussion

In our study the prevalence of fungal infection among patients with chronic rhinosinusitis is 10%. A previous study showed that African Americans were more prone to allergic fungal sinusitis than whites<sup>(5)</sup>. The most patients were in third and fourth decades. The most causative agents were *Aspergillums'* (87.5%) among them were *Aspergillus fumigates* (67.75%). Other study reported 6.7% prevalence of fungal sinusitis in Brazil<sup>(7)</sup>. The prevalence of allergic fungal sinusitis is about 12.1% among patients in Saudi Arabia<sup>(8)</sup>. The prevalence of fungal infection among patients with CRS in Turkish is about 13%<sup>(9)</sup>. The prevalence of fungal infection among patients with CRS in Iran is found 7.3%<sup>(10)</sup>. In studies showed that the most affected age groups were twenties and thirties<sup>(11,12)</sup>. In a study showed a higher prevalence of fungus ball in elderly patients<sup>(13)</sup>. In a study<sup>(5)</sup> did not report any sex difference. In a study reported a higher prevalence in women<sup>(14)</sup>. Another study reported a male predominance in fungal infections<sup>(12)</sup>. *Aspergillus* is reported as the most fungal agent in many studies<sup>(7,12,15,16)</sup>. In study *Aspergillus* has a 60% prevalence<sup>(12)</sup>. A high prevalence of *Aspergillus* infection has been reported in the French population<sup>(6)</sup>. In the study *Alternaria species* are the most common fungal agent<sup>(10)</sup>. Regarding the role of socioeconomic status and fungal sinusitis there was a positive correlation between fungal infection and low socioeconomic status 56.25%. In our study, some studies have reported a significant positive correlation between poor socioeconomic status and fungal sinusitis<sup>(12)</sup>. Some have not found any correlation<sup>(17)</sup>. Regarding the role of climate and weather humidity some studies have reported some role in the incidence and prevalence of fungal sinusitis<sup>(18,19)</sup>.

Regarding to CT scan findings, we found in our study homogenous opacity 60%, heterogenous opacity 30%, mucosal thickening

8% and bone involvement 2% (Table 3). Regarding endoscopic findings, we found in our study CRS without polyposis were 31.25% and CRS with polyposis were 68.75%. A previous study regarding CT scan findings reported homogenous opacities in 56%, heterogenous opacities in 32%, mucosal thickening in 10% and bone involvement in 2%. In the same study, endoscopic examination revealed CRS in 34% and nasal polyposis in 67%<sup>(20)</sup>.

## Conclusion

CT scan, nasal endoscopy, histopathological examination and fungal culture have made the diagnosis easier. Otorhinolaryngologists must keep in mind fungal infections in their daily practice due to the increasing fungal infections in the recent time. We recommend that further studies to be done to get complete picture of fungal infection with CRS.

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