

# FREQUENCY OF ALLERGIC FUNGAL AETIOLOGY OF CHRONIC RHINOSINUSITIS

Noor Sahib Khan, Arif Raza Khan, Shah-Ee-Din,  
Aziz Dawar

Department of ENT,  
Khyber Teaching Hospital, Rehman Medical Institute, Peshawar, Pakistan

## ABSTRACT

**Objective:** The aim of this study was to find out the frequency of intranasal fungal sinusitis in patients attending a tertiary care hospital in North West Frontier Province (NWFP) of Pakistan.

**Material and Methods:** This study was conducted in the ENT department of Khyber Teaching Hospital Peshawar Pakistan from November 2004 to May 2006. One hundred patients with chronic rhinosinusitis (CRS) and 50 healthy subjects as a control group were included in this prospective study. Nasal lavage samples were investigated for the presence of fungus, using new culture technique and histological examination. Epidermal and intradermal hypersensitivity tests were used to find out fungal atopy. Levels of serum eosinophils, total IgE were estimated in the blood samples.

**Results:** Allergic fungal sinusitis was diagnosed in 13 (13%) patients. Clinical and laboratory parameters of CRS were not significantly different in the groups with and without intranasal fungi.

**Conclusion:** In this study frequency of fungal sinusitis was not as high as expected in patients living in NWFP with CRS. Furthermore, no significant correlation could be found between presence of intranasal fungus and type- I hypersensitivity in patients with CRS.

**Key Words:** Fungi, Allergy, Chronic Rhinosinusitis.

## INTRODUCTION

The etiopathogenesis of chronic rhinosinusitis (CRS) has not been explained completely.<sup>1</sup> Allergic aspergillus sinusitis was described as a new form of CRS at the beginning of the 1980 s.<sup>2</sup> In recent years fungal aetiology of CRS gained wide interest and, fungi were detected in 96% of nasal lavage samples, using new culture technique.<sup>3,4</sup> Basic diagnostic criteria of allergic fungal sinusitis (AFS) include radiologically confirmed CRS, presence of allergic mucin and detection of fungus without tissue invasion by culture of histopathologic examination.<sup>5,6</sup> Fungal atopy and hyperattenuation areas on computed tomography (CT) are accepted as additional diagnostic criteria by some authors.<sup>7,8</sup> Fungi are wide spread in nature and detection of intranasal fungi in patients with CRs is no surprise. Furthermore, similar ratio of fungal positivity was detected in the nasal passage of healthy controls in many of studies.<sup>8,9</sup> Rate of fungal colonization in

the nasal passage may be affected by different features of climate such as humidity. Various host factors may also cause different response to fungi in nasal passage. Therefore a wide range of AFS has been reported.<sup>10,11</sup>

This study was aimed to find out the frequency of intranasal fungal sinusitis in patients attending a tertiary care hospital in North West Frontier Province (NWFP) of Pakistan and to investigate the role of type –I hypersensitivity in these patients.

## MATERIAL AND METHODS

This study was conducted in the ENT department of Khyber Teaching Hospital Peshawar Pakistan between November 2004 and May 2006. Patients with CRS, accompanied with or without nasal polyposis were included in the study. The procedure was explained to all patients and informed consent was obtained. All subjects were questioned in terms of symptoms of CRs, asthma,

## PATIENT'S CLINICAL DATA ACCORDING TO FUNGAL GROWTH

Symptoms	Culture positive (n = 13)	Culture negative (n = 87)
Nasal /Postnasal drainage	13(100%)	84(96.6%)
Nasal obstruction	12(92.3%)	84(96.6%)
Anosmia/Hypo osmia	11(84.6%)	77(88.5%)
Nasal Polyp	11(84.6%)	75(86.2%)
Fatigue	10(76.9%)	53(60.09%)
Sneezing	9(69.2%)	78(89.7%)
Facial pain	8(61.5%)	64(73.6%)
Headache	8(61.5%)	64(73.6%)
Nasal Itching	8(61.5%)	62(71.3%)
Previous Sinus Surgery	6(46.2%)	36(41.4%)
Coughing	6(46.2%)	48(55.2%)
Dental Pain	5(38.5%)	17(19.5%)
Asthma	4(30.8%)	25(28.7%)
Aspirin Hypersensitivity	2(15.4%)	19(21.8%)
Fever	0(0%)	3(3.4%)

Table 1

aspirin sensitivity, previous history of paranasal sinus surgery, previous medical therapy and additional systemic diseases.

Patients with diabetes mellitus, immunodeficiency disorders, renal transplantation, immunosuppression therapy, malignant disease and acute upper airway diseases were excluded. Three criteria were considered for the diagnosis of AFS.

- Radiologically confirmed CRS,
- Presence of allergic mucin .
- Detection of fungus without tissue invasion by culture or histopathologic examination.

One hundred patients with chronic rhinosinusitis (CRS) and 50 healthy subjects as a control group were included in this prospective study. Nasal lavage samples were investigated for the presence of fungus, using new culture technique and histological examination. Epidermal and intradermal hypersensitivity tests were used to find out fungal atopy. Levels of serum eosinophils, total IgE were estimated in the blood samples.

Ethical committee of our institute approved the study protocol.

### RESULTS

One hundred patients (58 male and 42 females) with CRS, accompanied with or without nasal polyposis were included in the study. Age of the patients ranged from 12 to 60 years (mean 43,

55 ± 14, 58 years). Ages of 50 volunteers (35 male and 15 females) ranged from 12 to 45 ± 5 years. Fungal growth in the culture was observed in the samples of 13 (13%) cases in the patient group [Aspergillus fumigatus (n=2), Aspergillus niger (n=2), Aspergillus flavus (n=1), Penicillium spp (n=2), Penicillium notatum (n=1), candida albicans (n=2),] mixed fungal growth was observed in one patient (two fungi). Cultures in all cases of the control group were negative.

Rate of eosinophilic mucin was higher in both the groups with (100%) or without (93.1%) fungal growth in the culture but the difference was not significant.

Fungal elements were not detected histopathologically. All patients had radiologic findings, changes from mucosal thickening to total opacity, but hyper attenuated areas were not seen on CT. Patient's clinical data according to fungal growth are shown in Table I. comparison of laboratory findings between two groups of patients with and without fungal growth is shown in table 2.

### DISCUSSION

Millar and Katzenstein reported similar clinical and histopathologic features in patients with CRS and allergic bronhopulmonary aspergillosis for the first time, nearly two decades ago.<sup>12</sup> In recent years allergy to intranasal fungi was accepted as one of the common causative

## PATIENT'S LABORATORY FINDINGS ACCORDING TO FUNGAL GROWTH

Parameter	Culture positive (n=13)	Culture negative (n=87)
Eosinophilic mucin	13 (100)	81 (93.1)
High level of eosinophils in the nasal Smear	10 (76.9)	50 (57.5)
Intradermal test Positivity for fungi.	9 (69.2)	50 (57.5)
Serum eosinophilia	7 (53.8)	20 (23)
High levels of total Ig E	1 (7.7)	43 (49.4)
Fungal Specific Ig E Positivity	0 (0)	14 (16.1)
Prick test positivity for fungi	0 (0)	2 (2.3)

Table 2

factor of CRS by many authors<sup>13-15</sup> while the rate of AFS was reported 5-10 % initially, has increased up to 91% in recent studies.<sup>16</sup> However controversy is still continuing on the topic. Fungi can be a normal content of nasal mucus of patients with CRS. In a recent study rate of intranasal fungi was 70% in controls and 46.6% in patients.<sup>17</sup> Singh N et al detected positive fungal cultures in 20% of neonate, immediately after the birth, then 7% on postpartum first day, 15% on postpartum 4th day, 72 % on postpartum 2nd month and 94% on postpartum 4th month.<sup>18</sup> There should be some individual factors that contribute for the development of CRS in addition to fungi. Rate of intranasal fungi detected in culture was 16.7% from the sample lavages and 37% from the surgical specimens.<sup>19</sup> Therefore, sample collection method is another factor that may affect the rate of fungal growth in cultures.

Eosinophilic infiltration is a common finding of AFS. It has been suggested that the proteins secreted from eosinophils destroy fungi.<sup>20</sup> Benefit of steroid therapy in patients with AFS also supports the role of eosinophil in these patients.

In few retrospective studies consisting of patients who underwent endoscopic sinus surgery for CRS. The groups with serum eosinophilia had a higher rate of postoperative recurrent sinusitis, recurrent nasal polyposis. These cases need more revision surgery, more need for postoperative course of antibiotic treatment.<sup>21,22</sup> High levels of fungus specific Ig-E and type-1 hypersensitivity may represent allergic reaction to fungi.<sup>23</sup> Serum levels of specific Ig E for aspergillus were found to be elevated in 705 of cases of AFS.<sup>24,25</sup> Positive skin tests reactivity to fungal allergens in patients with AFS in other studies also supported the role of type-1 hypersensitivity in pathogenesis of AFS. However findings of this study failed to demonstrate a clear correlation between parameters

of type 1 hypersensitivity and intranasal fungi in patients with CRS.

Impact of intranasal fungal colonization on clinical course is another controversy. It is not clear whether severity of symptoms and persistence of disease in patients groups with or without fungal positivity is different or not. Zadeh et al reported that fungal positivity in the middle meatus did not correlate with quality of life outcomes.<sup>26</sup> In a recent study by Yusuf Haider et al , by administering topical amphotericin B into the nostrils over a period of 8 weeks in patients with CRS found no significant effect on symptoms. Frequencies of symptoms were not significantly different in two groups of patients with or without intranasal fungal positivity in our study. Incidence of the triad of aspirin sensitivity, bronchial asthma and nasal polyposis did not differ in two groups of patients in the present study.

## CONCLUSION

Frequency of Fungal infections in patients with chronic rhinosinusitis (CRS) in patients reporting to tertiary care hospital of NWFP of Pakistan has not been as high as reported in the literature. Furthermore, findings of this study failed to demonstrate a clear correlation between the presence of intranasal fungi and type 1 hypersensitivity in patients with chronic rhinosinusitis.

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**Address for Correspondence:**

**Dr Noor Sahib Khan**

Associate Professor  
Department of ENT,  
Khyber Teaching Hospital,  
Peshawar – Pakistan.