



## Clinical features of Fungal Rhinosinusitis in Sudan. A study of 440 cases

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**Background:** *Fungal rhino sinusitis (FS) is considered as a disease spectrum that ranges from simple allergic fungal sinusitis (AFS) and chronic fungal rhino sinusitis (CFS) to true invasive fungal rhino sinusitis (IFS) invading the orbit and the cranium. Fungal rhino sinusitis is a common disease in Sudan. Allergic fungal rhino sinusitis is the commonest type while the invasive fungal rhino sinusitis (IFS) is associated with Aspergillus species.*

**Patients and Method:** *This is a prospective hospital based analytical study conducted in Ibsina and Al Doha ENT hospitals during the period from March 2008 to August 2012 for a group of Sudanese patients who had fungal rhino sinusitis(FS). Patients' diagnosis was made by endoscopic examination, CT and MRI.*

**Results:** *The study included 1219 patients presenting with nasal polyposis. A total of 440 patients (36%) satisfied the selection criteria. Patients' age range was 20-29 years. Females accounted for 56% of the cases. Unilateral disease was the commonest type (67%). Orbital extension was detected in 53% of patients on CT and in 95% of them on MRI. Intracranial extension was detected in 73% of patients on MRI. A. flavus was the most responsible agent detected in 99.3% of cases.*

**Conclusion:** *Fungal rhinosinusitis (FRS) is a common disease in Sudanese patients mainly caused by Aspergillus species and mostly affects young females. The usual presentation is by nasal obstruction, disturbed smell and postnasal drip associated with a nasal mass or polyp. The disease is extensive and can be associated with orbital and intracranial complications. A. flavus is the most responsible agent.*

**Keywords:** *Fungal rhinosinusitis. Aspergillus. A. flavus. Sudan.*

### INTRODUCTION

The aetiology of chronic rhinosinusitis (CRS) is unclear. Recently it has been suggested that a fungus-mediated process is the primary cause of CRS with and without polyps.<sup>(1)</sup>

Fungal infections of the nose and sinuses appear to be increasingly common and invade eye structures.<sup>(2,3)</sup>

As it can be extremely difficult to confirm the presence of fungi, both histologically and by culture, the radiological features may be of paramount importance in initiating a careful search for fungal elements.<sup>(3)</sup>

Classification of fungal rhinosinusitis (FS) into invasive and non-invasive depends mainly to the presence or absence of fungal hyphae within the mucosa, and not to the presence of bone erosion, which can be found in non-invasive forms.<sup>(4,5)</sup>

In Sudan the condition was first noticed by Sanderson et al when they reported a granuloma resembling Aspergillus granuloma in biopsy material from 3 patients with proptosis.<sup>(6)</sup>

Bella et al in 1973 reported 46 cases of primary paranasal Aspergillus granuloma seen in Sudan.<sup>(7,8)</sup>

In a series of 43 Sudanese patients 33 were males and 10 were females. This disease mainly affects age groups between 11 and 50 years and it presents from different localities in Sudan. The symptoms were mainly nasal obstruction, headache, rhinorrhea, external ethmoid swelling or cheek swelling and proptosis.<sup>(9,6)</sup>

Recently, a chronic destructive form of paranasal sinus mycoses characterized by sinus expansion and bony erosion was described.<sup>(9)</sup>

Paranasal Aspergillus seems to be a rare disease in the world in general but is relatively common in the Sudan.<sup>(9,10)</sup>

Mahgoub declared that mycetoma mycoses in Sudan are significant health problems and pointed the importance of paranasal Aspergillus granuloma.<sup>(11,12)</sup>

## PATIENTS AND METHODS

During the period from March 2008 to August 2012, a total of 1219 patients with nasal polyps were seen from which 440 patients (36.1%) with suspected fungal rhino sinusitis (FS) were selected. The prospective analysis was done in the two main referral centres: Ibsina and Al Doha ENT hospitals in Khartoum Sudan where functional endoscopic sinus surgery (FESS) was performed for all patients. Data was collected using a specially designed questionnaire and analyzed by SPSS. To achieve a homogenous study group, only patients exceeding a minimum symptoms score, endoscopy score, and CT score were included.

Fungal cultures, serology and microscopy to detect fungal elements in the nasal cavity were carried out for all patients. Patients were considered fungus-positive if at least one of these methods could demonstrate fungal elements. Specimens for histopathology and cultures were taken postoperatively and serology was performed for all patients.

Inclusion and exclusion criteria for study recruitment

### Inclusion criteria

Age >10 years, Patients with nasal polyposis, CT scan of paranasal sinuses, Symptom score >20, Endoscopic score >1 and CT score >1.

### Symptom score

Sum of values for nasal mass, nasal greenish discharge, proptosis, headache and bad smell.

Maximum = 20 Minimum = 5

### CT score

Each side was separately evaluated for opacification of maxillary, anterior and posterior ethmoid, sphenoid and frontal sinuses and metallic sign.

0=Not opacified or metallic sign.

1=Total opacified with metallic sign (maxillary only).

2=Total opacified with metallic sign unilateral pansinuses.

3=Total opacified with metallic sign bilateral pansinuses.

### Endoscopy score

0=No polyp.

1=Unilateral pan sinuses polyposis with greenish secretions.

2=Bilateral pan sinuses polyposis with greenish secretions and fungal elements (muddy materials).

### Exclusion criteria

History of immotile cilia syndrome, antrochoanal polyp or cystic fibrosis.

Urgent need for or recent paranasal surgery.

Patients on immunosuppressive therapy.

Clinical suspicion of allergic rhino sinusitis.

Known cases of allergic polyposis or tumours.

## RESULTS

All patients who presented with nasal polyposis were 1219. More than one third (36.1%) n= 440 had fungal rhinosinusitis (FS) and they presented with sinonasal polyposis and neuro-orbital complications. CT was done for the all patients while MRI was done for selected patients and mainly those who presented with neuro-orbital extensions (176 patients). The most commonly affected age group was 20-29yrs (40%) and female gender predominated (56%).

The symptoms and signs were mainly nasal obstruction, headache and proptosis (Table 1). The unilateral disease was the most frequent type (67%) (Table 2).

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**Table 1. Clinical Presentation.**

Symptoms/signs	No	%
Nasal obstruction	440	100
Nasal mass	440	100
Anosmia	437	99.3
Postnasal drip	432	98.2
Cacosmia	389	88.4
Proptosis	217	49.3
Headache	203	46.1
Nasal discharge(greenish secretions)	201	45.7

**Table 2. Affected Sites.**

Affected site	Number of patients	%
Nasal cavity & all sinuses(unilateral)	296	67 %
Maxillary alone	32	7%
Nasal cavity, ethmoid & maxillary	32	7%
Nasal cavity, maxillary, ethmoid & frontal	24	5%
Ethmoid & maxillary	24	5%
Nasal cavity & ethmoid	16	3%
Maxillary & sphenoid	8	2%
Maxillary & frontal	8	2%
Total	440	100.0%

**Table 3. Clinical classification of the disease.**

Types of the disease	No of patients	%
AFS	249	56.6
Fungal ball	13	3
Invasive fungal	176	40
Fulminant type	2	0.4

**Table 4. Laboratory Investigations Results (n= 440).**

Result	Patients + ve in n %	Patients -ve in n %
Serology	349 (79%)	91 (21%)
Mycology	423 (96%)	17 (4%)
Histopathology	181 (41%)	259 (59%)

**Table 5. Fungal Culture Results.**

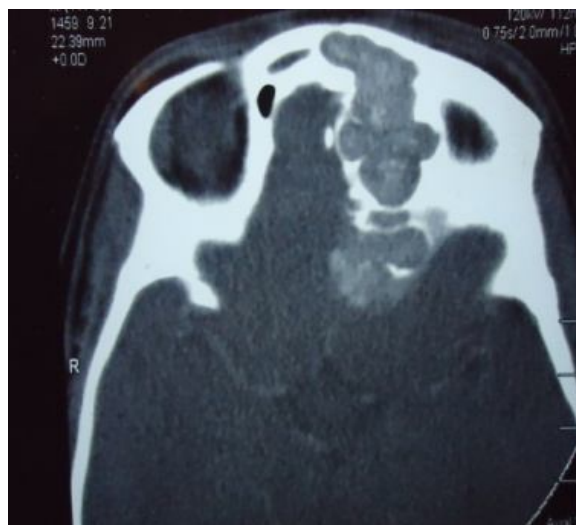
Organism	No	%
A. flavus	437	99.3
A. famigatus	2	0.45
A. niger	1	0.004



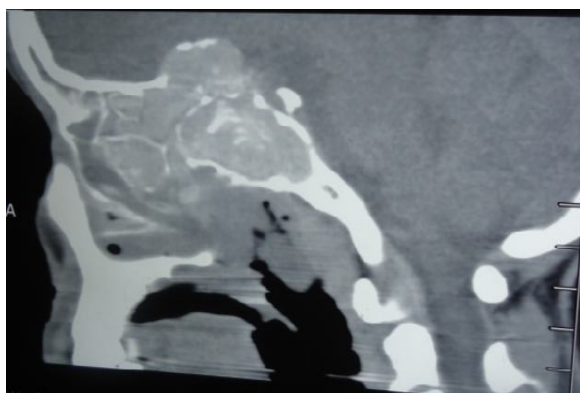
**CT- Scan of FS with intraorbital extension.**



Extensive fungal nasal disease.



CT- Scan of FS with intracranial extension.



CT-Scan of FS patients with intracranial and intraorbital extension.



Orbital extension was detected in (53%) on CT-scan while on MRI, 176 patients had orbital invasion (95%). Affection of vision was noted in 85 patients (19.3%) and blindness in 5 patients (1.1%).

Intracranial extension ranged from dural irritations in (55%) to invasion of the brain tissue in (27%).

The commonest type of the disease was allergic fungal sinusitis (AFS) in (56.6%) while invasive type (IFS) was (40%) of patients (Table 3).

Regarding the laboratory results; serology was positive in 79% of patients. Mycology was positive in 96% of patients. Histopathology was positive in 41% of them (Table 4).

The commonest detected agent on culture was *Aspergillus flavus* in 437 patients (99.3%) (Table 5).

### DISCUSSION

The diagnostic criteria for AFRS vary among authors, but the most widely accepted are the five criteria described by Bent and Kuhn. To diagnose AFRS, the presence of

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allergic mucin in histopathology specimens is important in addition to the demonstration of fungal elements.<sup>(13)</sup>

*Aspergillus* species were found to be the commonest species of fungi causing rhino sinusitis in Sudan and this is in agreement with previously published Sudanese series.<sup>(9,12,14)</sup>

Female gender was predominant and this is in a harmony with the majority of the national and international studies.<sup>(1,2,6,7,8,9,10,15)</sup>

Complications included orbital and intracranial extensions were found in 176 patients (40%) and this agrees with a group of authors.<sup>(3,5,6,9,16)</sup>

In this study some patients started as a non-invasive type and changed to an invasive type during the study period and this also goes with Thacker et al who recommended that fungal sinusitis should be considered a potentially progressive continuum, where noninvasive disease may coexist with an invasive form.<sup>(17)</sup>

*Aspergillus fumigatus* was considered the primary etiologic agent of AFRS cases and was found as a predominant etiologic agent in Western literature.<sup>(18)</sup> However, in contrast *A. flavus* is the predominant etiologic agent causing chronic fungal rhino sinusitis (CFS) in Sudan. In the international literature mucor mycosis is the most implicated fungus for invasive fungal sinusitis (IFS).<sup>(9,12,14,15,16)</sup>

## CONCLUSION

Fungal rhino sinusitis (FS, CFS, AFS and IFS) is a common disease in Sudan and mostly affects females of young age groups. The usual presentation is by: nasal obstruction, disturbed smell and postnasal drip associated with a nasal mass or polyp and can be associated with orbital and intracranial invasion. The main causative agents are *Aspergillus* species with *A. flavus* being the most commonly encountered.

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