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MYCOLOGICAL PROFILE OF FUNGAL RHINO SINUSITIS IN KASHMIR VALLEY

Microbiology

Shaika Farooq* Department of Microbiology, Government Medical College, Srinagar *Corresponding Author

Suhail Amin Department of ENT, Government Medical College, Srinagar, Srinagar

Rumana Farooq Department of Microbiology, Government Medical College, Srinagar

ABSTRACT

Background; Fungal rhino sinusitis (FRS) has been a known medical entity for several hundred years but only in more recent times the disease has been further defined.

Objective. In the present study we tried to find the mycological profile of different types of fungal rhino sinusiti cases (invasive and non-invasive) in our geographical area. Material and methods; This was a retrospective study conducted in the Department of microbiology. Government medical college Srinagar, Kashmir from September 2015 up to December 2018.KOH microscopy and culture of 103 sino-nasal tissue samples obtained by functional endoscopic sinus surgery (FESS) in the ENT. Deptt from patients provisionally diagnosed as fungal rhino sinusitis were analyzed.

Results; Out of the 103 FRS cases ,there was a male preponderance.(M;F ratio=2:1). Prevalence of Non –Invasive FRS was higher (85.3%) as compared to invasive FRS (14.7%) Mucor species was the most common fungi isolated (57%) among suspected cases of mucormycosis. Overall prevalence of aspergillus FRS (46%) was maximum, followed by FRS caused by other hyaline (22%) and demaetacious fungi (15%)

Conclusions; Fungal Rhinusinusitis is an emerging entity in our clinical setup. KOH examination of nasal tissue sample is a simple tool that can prevent delay in treatment in invasive form in particular.

KEYWORDS

INTRODUCTION

Fungi are ubiquitous organisms in nature. Human exposure to them via nose is common and inevitable. However, in select cases with altered immune status and subsequent host microbe interaction, fungi are known causes of sino-nasal disease. The clinical outcomes of Fungal Rhino sinusitis [FRS] infections vary from mild symptoms (non invasive FRS) to intracranial infections (invasive FRS) and high mortality.[1] As elsewhere in India, clinical cases of Fungal Rhinusinusitis are increasingly being reported from our hospital, especially in high risk individuals like diabetics, patients on immunosuppressive drugs and corticosteroids.Therefore,with this background we felt a need to determine. (a) Burden of invasive & non-invasive FRS in our hospital b) culture positivity in nasal tissue samples submitted to our department from clinical cases of fungal Rhinusinusitis [FRS]

MATERIALS AND METHODS

Design and setting

This was a retrospective audit conducted in the Department of microbiology. Government medical college Srinagar, Kashmir from September 2015 up to December 2018.microscopy and culture of 103 sino-nasal tissue samples obtained by functional endoscopic sinus surgery (FESS) in the ENT deptt from patients provisionally diagnosed as fungal rhino sinusitis were analyzed.

Specimen collection and processing

A portion of surgically excised sino nasal tissue specimens (obtained by functional endoscopic sinus surgery)were received in sterile normal saline by mycology laboratory . Part of the same specimens was received in 10% formalin in the histopathology laboratory.

Details about sample collection, processing and final microbiological and Histopathological report were obtained from archived documents.

In the laboratory, the tissue samples received in mycology laboratory were cut using sterile scalpel and forceps then subjected to direct KOH mount (20%) and cultured on sabarouds dextrose agar with chloramphenicol ,followed by incubation at 30 C for 4 wks.(as per standard methods).[2]

Histopathological examination of the specimens was done by Haematoxylin & Eosin and Periodic acid-Schiff stain.

Culture reading

Positive cultures were examined for macroscopic morphology and microscopically for the type of conidiation, lacto phenol cotton blue mount and slide culture technique.

Diagnostic criteria

The classification of fungal rhino sinusitis was based on consensus definition of ISHAM [3]taking all relevant clinical, HPE and radiological details from archival documents in consideration.

RESULTS OBSERVATIONS

Out of the 103 FRS cases ,there was a male preponderance(M;F ratio=2:1).Age groups ranged from 12 yrs up to 55 yrs.Maximum no. of cases received, were in the age the group from 18 up to 50 yrs (65%). Prevalence of Non –Invasive FRS was higher (85.3%) as compared to invasive FRS (14.7%).(Table 1)

Table 1. The distribution of various types of FRS cases

	Culture positive	No growth	Total
Acute invasive mucormycosis	7	2	9
Chronic granulomatous sinusitis	1	1	2
Chronic invasive rhinosinusitis	3	1	4
AFRS with polyp			
with polyp	5	22	27
with polyposis	7	12	19
AFRS	8	10	18
Fungal ball	14	10	24
Total	45	58	103

Overall 44% of the samples were fungal culture positive.KOH positivity was 93% in invasive FRS and 55% in non-invasive fungal rhino sinusitis.(Table 2)

Table 2.Distribution of culture and KOH positivity of invasive and non-invasive fungal rhino sinusitis cases

	Culture positive	KOH positive	Both negative	Total	Percent
Invasive	11	14	1	15	14.70
Non-invasive	34	48	7	88	85.30
Total	45	62	8	103	100

Prevalence of Non –Invasive FRS was higher (85.3%) as compared to invasive FRS (14.7%). (Table 2)

Table 3.Mycological profile of various types of FRS

	Mucor spp.	Rhizopus spp.	Rhizomucor spp.	Aspergillusflavus	Aspergillusfumigatus	Candida albicans	Bipolaris spp.	Penicillium spp.	Scopulariopsis spp.	Scedosporium	Fusarium spp.	Curvularia spp.	Aspergillusniger	Alternaria sp.	Lecythophora	Total
Acute invasive mucormycosis	4	2	1													
Chronic granulomatous sinusitis				1												
Chronic invasive rhinosinusitis				2	1											
AFRS(CRS with polyp)				2	1	1	1									
AFRS(CRS with polyposis)				2				1	1	1		1	1			
AFRS					1		2	3					1		1	
Fungal ball				4	1		1		2		1		4	1		
Total	4	2	1	11	4	1	4	4	3	1	1	1	6	1	1	45

Mucor species was the most common fungi isolated (57%) among suspected cases of mucormycosisOf the samples of suspected fungal rhino sinusitis, majority of isolates were *Aspergillus* species (46%), followed by other hyaline (22%) and demaetacious (15%) fungi. Among the *Aspergillus* group, *Aspergillus* flavus comprised 52% of isolates, *Aspergillus* fumigatus were 19% and other Aspergillus spp were 29%.(Table 3)

DISCUSSION

Fungal rhino sinusitis (FRS) has been a known medical entity for several hundred years but only in more recent times the disease has been further defined. Fungal rhino sinusitis encompasses a wide spectrum of disease, ranging from simple colonization to acute invasion. Each disease entity has a characteristic presentation and clinical course, with the immune status of the host playing a critical patho- physiological role. Accurate diagnosis and targeted treatment strategies are necessary to achieve optimal outcomes. In the present study based on clinical, radiological Histopathological and microbiological data, we tried to estimate the prevalence of different types of fungal rhino sinusitis (invasive and non-invasive) cases in our geographical area. Our study showed that the prevalence of Non –Invasive FRS was higher (85.3%) as compared to invasive FRS (14.7%). Môn tone.[4]in his review of 400 cases of fungal rhino sinusitis identified 87.25% as non-invasive (45% AFRS, 40% FB, and 2% combined AFRS and FB) and 12.5% as invasive (11% AIFRS 1.2% CIFRS 0.5% CGFRS) with One patient 0.25% as combined FB/CGFRS. Krishna et al.[5] reported similar findings from south India (invasive.21% and non invasive 79%).Clearly it is evident that invasive fungal rhino sinusitis as elsewhere in India and abroad, is prevalent in this part of the world. we found that all the patients of acute invasive FRS had an underlying immunocompromised status, uncontrolled diabetes mellitus (n=6) with high Hba1c levels, history of prolonged steroid use (n=2) or anticancer therapy (n=1). An emerging trend in conformity with other studies.[3,6]

Mucor species was the most common fungus cultured from nasal tissue samples in cases of acute invasive rhino sinusitis . Studies in India[7,8]have demonstrated the preponderance of zygomycetes especially Mucor spp. in these patients. It was observed that KOH positivity was high (93%) in invasive fungal rhino sinusitis cases and correlated well with Histopathological findings. In view of the life threatening nature of this disease condition ,we believe that direct KOH examination of nasal tissue sample serves a very useful diagnostic tool that gives an early clue to start antifungal therapy and surgical debridement in such cases. This holds especially true for developing countries where Histopathological examination, although a gold standard can take a turnaround time of two to three days.

In our study, the overall culture positivity was low[Table 2].To increase culture yield especially in non invasive FRS, we recommend that in addition to SDA the tissue specimen should be inoculated on a supplemental media like PDA (potato dextrose agar) or BHI (brain heart infusion agar) which is not done in our resource poor setup. The culture positivity was lower in non-invasive (38.6%) fungal rhino sinusitis than in invasive FRS (73%) ,as has been seen in studies elsewhere.[5] Culture positivity was 24% in AFRS with polypoidal growth and 44% in AFRS without any polypoidal growth[table 2].

Allergic FRS **was the commonest form of non invasive fungal rhino sinusitis diagnosed (62%).studies have reported a similar incidence of AFRS.[6,9] We suggest that occupational exposure should be studied corresponding to such cases which we did not do in our study. This is relevant because we have a primarily agriculture based economy in the valley.**

Fungal culture profile[Table 3] in patients of chronic FRS showed that *Aspergillus* spp comprised forty six percent of the isolates. similar findings have been reported from southern and northern India[9-11]Among the *Aspergillus* species, *Aspergillus* flavus was the most common pathogen isolated (52%).This was in conformity with other studies[6,12]conducted in north India .Hyaline fungi(Fusarium spp, Penicillium spp, Scopulariopsis spp) isolated were 22 % and 15 % fungi isolated were demaetacious fungi (Alternaria spp, Curvularia spp, Bipolaris spp,lecythophora) .In studies by Chakrabarti et al., [6] & Michael et al.[9] the authors have highlighted the fact that although *Aspergillus* spp. are the commonest etiological agents in allergic fungal sinusitis , the importance of demaetacious fungi in allergic fungal sinusitis should not be overlooked.

CONCLUSION

Fungal Rhinusinusitis and invasive form in particular is an emerging entity in an ever increasing debilitated population of our region. High index of suspicion and multispecialty approach can help reach the diagnosis and early KOH examination of nasal tissue sample is a simple tool that can prevent delay in treatment.

Chronic rhinosinusitis (CRS) not responding to standard therapy should be investigated for FRS.

Mycological identification should be sought in diagnosing and categorizing FRS. It provides epidemiological profile and therapeutic guidance relevant to particular geographic area

Data accessibility; Data compiled will be available on request to the corresponding author

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Conflict of interest. The authors have no conflicts of interest to declare.

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