ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 12 | December - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CLINICOMYCOLOGICAL PROFILE OF FUNGAL RHINOSINUSITIS IN AND AROUND DARBHANGA (BIHAR) – A STUDY IN A TERTIARY CARE CENTRE AT NORTH INDIA

Microbiology

Dr Manish Kumar Purbey	Department of Microbiology, DMC Darbhanga.
Dr Dhirendra Kumar*	Department of Microbiology, DMC Darbhanga. *Corresponding Author
Dr Bushra Manzoor	Department of Microbiology, DMC Darbhanga.
Ram Shanker Prasad	Department of Microbiology, DMC Darbhanga.

ABSTRACT

Fungal rhinosinusitis is a group of disorders characterized by inflammation of mucosa of nose and paranasal sinuses. It has remained a diagnostic and therapeutic challenge since its prominence about two and a half decades ago. Its incidence in recent years has shown a marked increase in immunocompetent population especially in India. To identify the fungal isolates from patients of rhinosinusitis and correlate histopathological findings with culture results for accurate classification of the disease. This prospective study was conducted in the Department of Microbiology, Pathology and Otorhinolaryngology, DMC&H Laheriasarai, Darbhanga, Bihar over a period of 2 years. 50 study patients were selected among inpatients admitted to department of Otorhinolaryngology,DMCH Darbhanga. For each patient, a tissue specimen and relevant informations were collected. Examined by direct microscopy and culture. Final identifications to species level were made by micro slide culture method. Antifungal Susceptibility Testing was done by Disk Diffusion method. Out of 50 cases, 15 were positive for fungal rhinosinusitis. 4 culture negative cases were positive for sporangia on direct microscopy in 20% KOH mount suggestive of Rhinosporidium seeberi. Aspergillus spp. (60%) was most common isolated fungal species. Fungal Rhinosinusitis is a common disorder in and around North Bihar. Early diagnosis and accurate histopathological classification helps in establishing further treatment protocol.

KEYWORDS

Fungal Rhinosinusitis, Paranasal Sinuses, KOH Mount

INTRODUCTION

Fungal rhinosinusitis has remained a diagnostic and therapeutic challenge since its prominence about two and a half decades ago [1]. Rhinosinusitis is widely believed to compromise a spectrum of inflammatory and infectious diseases simultaneously affecting the nose and the paranasal sinuses. The International Classification of Diseases divides rhinosinusitis into acute and chronic forms according to the duration of the symptoms. Acute Rhinosinusitis lasts up to 12 weeks (four weeks in the American Rhinosinusitis Classification) with complete resolution of symptoms, whereas the chronic form persists beyond 12 weeks.[2,3]. Chronic Rhinosinusitis (CRS) accounts for >90% of all cases of rhinosinusitis and the correct diagnosis of each category is important for proper therapy and predicting the course of the disease [1]. Despite awareness, it continues to be under diagnosed. The final diagnosis requires careful review of direct microscopic examination, histopathology of tissue or the cheesy material obtained from the sinuses, fungal culture results and operative surgical observations [1]. Direct microscopy helps in diagnosis of fungal etiology and culture helps in identification of the etiologic agent. Histopathology is important to distinguish the invasive from the non-invasive type. The distinction is easier and can be diagnosed even clinically when invasion of contagious structures has occurred. Fungal rhinosinusitis presents in five forms as recently classified by deShazo and colleagues [1]. Each form is distinct pathophysiologically, histologically and clinically. Each requires different approach to treatment and carries different prognosis. The five major forms are (1) allergic fungal rhinosinusitis (AFRS) (2) fungal ball (FB) (3) acute fulminant invasive fungal sinusitis (AFIFS) (4) granulamatous invasive fungal sinusitis (GIFS) and (5) chronic invasive fungal sinusitis (CIFS).

MATERIALS AND METHODS

This prospective study was undertaken in the Mycology section of the Microbiology department in association with Pathology and Otorhinolaryngology departments of DMCH Laheriasarai Dharbhanga, Bihar, India. The tertiary care hospital serving people from Bihar, Jharkhand and the neighboring countries of Nepal and Bangladesh. The study period was from 5th April 2018 to 4th May 2020. A total of 50 study patients were selected from inpatients admitted in indoor wards of Otorhinolaryngology department, DMC Darbhanga. For each patient, a tissue specimen was collected from the sinuses by endoscopic sinus surgery and all relevant informations were collected. Tissue specimens were examined by direct microscopy in 20% KOH mount and culture on two Sabouraud Dextrose Agar media incubated at 25^0 C and 37^0 C respectively. Fungal isolates were identified by procedures detailed in standard mycology textbooks by Evans and Larone[11].Final identifications to species level were made by micro slide culture method. Antifungal Susceptibility Testing was done by Disk Diffusion method as detailed in CLSI document M51-A for Non-dermatophyte Filamentous Fungi. Histopathological examinations were done by Haematoxylin and Eosin stain, and Periodic Acid Schiff stain.

RESULTS

Out of 50 cases, 15 were positive for fungal rhinosinusitis. Among 15 positive cases, 11 cases were culture positive consisting of 8 cases of *Aspergillus flavus*, and 1 case each as *Aspergillus fumigatus*, *Paecilomyces variotii* and *Cunninghamella bertholletiae*. 4 culture negative cases were positive for sporangia on direct microscopy in 20% KOH mount suggestive of *Rhinosporidium seeberi*. Cases of *R. seeberi* were further confirmed by H & E and GMS staining. *Aspergillus spp.* (60%) was most common isolated fungal species with *Aspergillus flavus* (53.33%) being most common followed by *R. seeberi* (26.66%) [Table 1]. On the basis of histopathological findings, 11 cases (73.33%) were non invasive consisting of 10 cases of AFRS and 1 case of FB and 4 cases (26.66%) were of invasive consisting of 2 cases of CIFS [Table 2]. Histopathologically, out of total 8 isolates of *A.flavus*, 6 isolates belonged to AFRS, and 1 isolate each belonged to FB and GIFS while all 4 isolates of *R.seeberi* belonged to AFRS (Table 3). The azoles tested in this study (Voriconazole, Itraconazole and Fluconazole) showed an excellent activity against *Aspergillus spp.* as all the isolates were found susceptible to it. One isolate of *Paecilomyces variotii* was resistant to fluconazole, but sensitive to voriconazole and itraconazole. On the other hand azoles failed to have any activity against *Cunninghamella bertholletiae.* Amphotericin B exhibited good activity against the different isolates obtained in the study, only one isolate of *Aspergillus flavus* was found intermediate to it.

DISCUSSION

The fungal infections in paranasal sinuses are becoming common day

by day. In 1893, Mackenzie first reported paranasal sinus mycosis and since then numerous cases have been reported from various parts of world [1]. In previous fifteen years more than 200 cases had been reported in numerous studies at PGIMER Chandigarh (Chakrabarti *et al.,* 2000) [4]. One similar study undertaken by Das *et al.,* 2007 [5] at Chandigarh found FRS having incidence of 42.7% of total 665 cases of CRS over 5 years study duration. A study conducted by Joshi *et al.,*[6] in a tertiary care hospital in Nepal reported FRS in 14% cases of CRS in a total of 100 cases of CRS. Our study has found 15 cases of FRS among 50 suspected cases of CRS over a period of two years. Various studies have reported different species of *Aspergillus* to be the causative agents of fungal rhinosinusitis.[7,8] Most cases of *Aspergillus* rhinosinusitis in Sudan and North India have been caused by *Aspergillus flavus* [7] but in United States, *Aspergillus fumigatus* and *Aspergillus oryzae* have been found in increasing number of cases.[8] Panda *et al.,*[9] in their study reported that in all types of paranasal mycoses, *A.flavus* was the commonest isolate (79.7%). *A.fumigatus* was isolated from 11.1% patients. Das *et al.,*[5](2009) eported incidence of AFRS to be 24% of all cases of CRS. Histopathologically in our study AFRS was diagnosed in 10 out of 50 cases of CRS (20%). Out of 10 AFRS, 6 was associated with *A.flavus* while 4 was associated with *R.seeberi*. Michael *et al.,*[10] in a study at CMC Vellore found that out of 211 cases of FRS, 51 cases (24%) were of AFIFS with *Rhizopus spp*. being the most common etiological agent. In our study, we found only one case of AFIFS associated with *Cunninghamella bertholletiae* out of 15 cases of FRS.

Table 1: Fungal agents isolated among cases of FRS

Fungal isolates	No. of cases	Percentage (n=15)
Aspergillus flavus	8	53.33
Aspergillus fumigates	1	6.66
Paecilomyces variotii	1	6.66
Rhinosporidium seeberi	4	26.66
Cunninghamella bertholletiae	1	6.66
Total	15	

Table 2: Histopathological classification of cases of FRS

Histopathological diagnosis		No. of cases	Percentage (n=15)
Non - invasive classes	Allergic Fungal Rhinosinusitis	10	66.66
	(AFRS) Fungal Ball (FB)	1	6.66
Invasive classes	Acute Fulminant Invasive Fungal Rhinosinusitis (AFIFS)	1	6.66
	Granulamatous Invasive Fungal Rhinosinusitis (GIFS)	1	6.66
	Chronic Invasive Fungal Rhinosinusitis (CIFS)	2	13.66
Total		15	

Table 3: Distribution of fungal agents among different histological classes of FRS

Fungal agents	AFRS (n=10)	FB (n=1)	AFIFS (n=1)	GIFS (n=1)	CIFS (n=2)	Total	Percentage (n=15)
A.flavus	6	1	0	1	0	8	53.33
A.fumigatus	0	0	0	0	1	1	6.66
P.variotii	0	0	0	0	1	1	6.66
R.seeberi	4	0	0	0	0	4	26.66
C.bertholletiae	0	0	1	0	0	1	6.66
Total	10	1	1	1	2	15	

REFERENCES

1. Chander J. Textbook of Medical Mycology, 3rd ed, chapter 35. New Delhi: Mehta Publishers;2012. p. 480-492.
2. Fokkens W, Lund V, Bachert C, Clement P, Helllings P, Holmstrom M, Jones N, Kalogjera L, Kennedy D, Kowalski M, Malmberg H, Mullol J, Passali D, Stammberger H, Stierna P, EAACI. EAACI position paper on rhinosinusitis and nasal polyps executive summary. Allergy. 2005; 60: 583-601.
3. Meltzer EO. Hamilos DL. Hadley JA. Lanza DC. Marple BF. Nicklas RA. Bachert C. Baraniuk J. Baroody FM. Benninger MS. Brook I. Chowdhury BA. Druce HM. Durham S. Ferguson B. Gwaltney JM. Kaliner M. Kennedy DW. Lund V. Naclerio R. Pawankar R. Piccirillo JF. Rohane P. Simon R. Slavin RG. Togias A. Wald ER. Zinreich SJ. American Academy of Allergy,Asthma and Immunology (AAAAI), American Academy of Otolaryngic Allergy (AAOA), American Academy of Otolaryngology--Head and Neck Surgery (AAO-HNS), American College of Allergy,Asthma and Immunology (ACAAI), American Rhinologic Society (ARS). Rhinosinusitis: Establishing definitions for clinical research and patient care. Journal of Allergy Clinical Immunolology. 2004; 114: 155-212.
4. Chakrabarti A, Sharma SC. Paranasal sinus mycoses. Indian Journal of Chest Diseases and Allied Sciences. 2000; 42: 293-304.
5. Das A, Bal A, Chakrabarti A, Panda NK, Joshi K. Spectrum of fungal rhinosinusitis; histopathologist's perspective. Histopathology. 2009; 54: 854-59
6. Joshi RR, Bhandary S, Khanal B, Singh RK. Fungal Maxillary sinusitis: A prospective study in a tertiary care hospital of eastern Nepal. Kathmandu University Medical Journal (2007), Vol. 5, No. 2, Issue 18, 195-198
7. Chakrabarti A, Sharma SC, Chander J. Epidemiology and pathogenesis of paranasal sinus mycoses. Indian Journal of Otorhinolaryngology and Head and Neck Surgery. 1992; 107: 745-50
8. Wise SK, Ghegan MD, Gorham E, Schlosser RJ. Socioeconomic factors in the diagnosis of allergic fungal rhinosinusitis. Otolaryngology Head Neck Surgery 2008; 138: 38-42.
9. Panda NK, Sharma SC, Chakrabarti A, Mann SBS. Paranasal sinus mycoses in North India. Mycoses. 1998; 41: 281-6
10. Michael RC, Michael JS, Ashbee RH, Mathews MS. Mycological profile of fungal sinusitis: An audit of specimens over a 7-year period in a tertiary care hospital in Tamil Nadu. Indian Journal of Pathology and Microbiology 2008; 51: 493-96.
11. Evans EGV, Richardson MD. Medical mycology a practical approach. IRL Press at Oxford University Press, England 1989.