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A Clinical Study of Mucormycosis in a Tertiary Care Center

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ABSTRACT

To assess the possible causes, clinical findings, associated co-morbidities, investigations, treatment modalities and the clinical outcomes of post covid-19 rhino-cerebral mucormycosis. A sum total of thirty-three patients presenting with symptoms and signs of Rhinocereberal Mucormycosis in the Department of E.N.T and H and N.S. Department, BRIMS, Bidar from May 2021 to April 2022, were included in the study. These patients were subjected to radiological investigations like MRI and CT scan of Paranasal sinuses and brain. All these patients underwent surgical debridement and systemic antifungal therapy. The clinical course, management, outcome data were recorded. Out of 33 patients, there were 28 (84.8%) males and 5 (15.2 %) were females. All the patients were categorised according to their age. Four patients were in the age group of 21-30 years, 10 patents in the age group of 31-40 years, 07 patients each in the age group of 41-50 years and 51-60 years and 5 patients were in the age group of 61-70 years. The p-value was significant ($p<0.05$). Micro-organisms isolated were mucor in 22 patients, aspergillus in 04, Rhizopus in 03 and others in 04 cases. Previous history of O2 therapy was present in 9 patients, no history of O2 therapy in 20 and in 4 cases the history of O2 therapy was not known. History of receiving steroid therapy was observed in 19 patients, no history of steroid therapy was seen in 10 patients and 4 patients had no information about the steroid therapy. Thirty patients were Covid positive, 09 patients were Covid recovered, 8 patients were non-covid and covid status was unknown in 03 cases. The complications like visual impairment were observed in 05 cases and hemiparesis/hemiplegia in 03 cases. Surgical debridement was done in 31 patients. All the patients received Inj. Amphotericin-B[liposomal] for 2 weeks followed by Tab. Posoconazole 300mg for 4 weeks. The p value was significant ($p<0.05$). Mucormycosis is a rapidly progressing disease and can prove fatal. The early diagnosis and treatment can prevent complications and save lives.

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Key Words
Covid, mucormycosis, rhizopus

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INTRODUCTION

Coronavirus disease 2019 (COVID-19) first emerged in Wuhan, China in December 2019, and since then the frequency of bacterial and fungal coinfections has been continuously rising[1]. Individuals infected with SARS-CoV-2, or severe acute respiratory syndrome, may experience secondary fungal and bacterial infections. The phycomycetes family of fungi in the order Mucorales produces a saprophytic fungus that causes the deadly opportunistic infection known as mucormycosis[2]. Mucorales are saprophytes that grow in the soil and decompose organic materials. Typically, these fungi grow on fruits, vegetables, manure, and soil. Dust inhalation can trigger fungal infection of the nasal cavity and paranasal sinuses with fulminant consequences. A common predisposing factor for mucormycosis is neutropenic conditions and diabetic ketoacidosis. There is a strong tendency for this potentially fatal infection to target arteries[3]. The fungi that cause mucormycosis are not pathogenic, but they can cause serious opportunistic infections in people with diabetes mellitus the elderly, those taking cytotoxic medications, people in renal failure, leukemia, cirrhosis and people who have had severe burns[4]. Mucormycosis spread to the brain and orbit, resulting in meningoencephalitis and cavernous sinus thrombosis. These conditions lead to headache, facial swelling, orbital cellulitis, proptosis, loss of vision, ophthalmoplegia, necrosis of the turbinates and palate and osteomyelitis of the facial bones[5].

Few cases of COVID-19 associated mucormycosis (CAM) have been reported in the literature, even though invasive pulmonary aspergillosis (IPA) and COVID-19 are increasingly being linked, particularly in critically ill patients admitted to the intensive care unit. Mucormycosis is an extremely rare and deadly fungal infection that usually affects people with underlying compromising conditions like corticosteroid use, hematologic malignancies, solid organ/allogeneic stem cell transplant, primary immunodeficiency, diabetes mellitus, neutropenia and immunosuppressive treatment[6]. The COVID-19 pandemic brought with it the complications of Rhino-cerebral mucormycosis which was seen in a sizeable number of patients treated for COVID-19 infection[7]. This study analyses the possible causes, clinical findings, associated co-morbidities, investigations, treatment modalities and the clinical outcomes of post covid-19 rhino-cerebral mucormycosis in BRIMS, Bidar.

MATERIALS AND METHODS

The medical records of the thirty-three (33) patients admitted with symptoms and signs of Rhinocereberal Mucormycosis in the Dept. of E.N.T and H&NS Department, BRIMS, Bidar from May 2021 to April 2022, were included in the study and analysed. All these patients had undergone radiological investigations like MRI and CT scan of Paranasal sinuses and brain. The microbiological studies like KOH preparation and fungal culture had been done. All these patients had undergone surgical debridement and systemic antifungal therapy. The clinical course, management, outcome data were recorded. Results were subjected to statistical analysis using Mann-Whitney U-test. $p>0.05$ was set significant.

RESULTS

Out of 33 patients, males were 28 (84.8%) and females were 5 (15.2%) (Table 1). Age group 21-30 years had 4 patients, 31-40 years had 10, 41-50 years had 7, 51-60 years had 7 and 61-70 years had 5 patients. The difference was significant ($p<0.05$) (Table 2, Fig. 1).

The mucor was isolated in 22 patients, aspergillus in 04, Rhizopus in 03 and others in 04 cases. History of O2 therapy was present in 9 patients, no history of O_2 therapy was present I in 20 cases and in 4 cases the history of O_2 therapy was unknown. The history of steroid therapy was seen in 19 patients, no steroid therapy noted in 10 and there was no information of steroid therapy in 4 cases. Thirty patients were Covid-19 positive, 9 patients were Covid-19 recovered, 8 patients were non-covid, and the covid-19 status was unknown in 3 patients. Visual impairment was noted in 05 patients and hemiparesis/hemiplegia in 03 patients. Surgical debridement was done in 31 cases. All the patients received Inj.Amphotericin-B therapyfor two weeks, followed by Tab. Posoconazole 300mg orally for 4 weeks. The P value was significant ($p<0.05$) (Table 3).

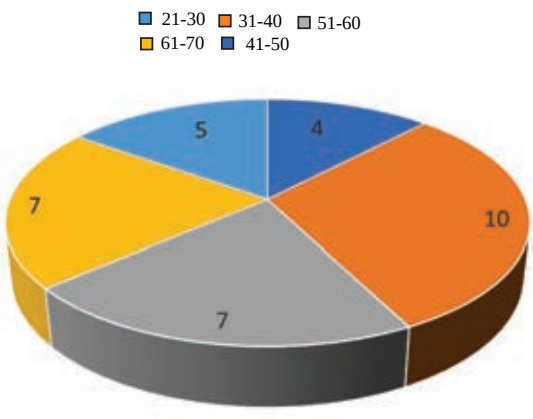

Fig. 1: Age-wise distribution of cases

Table 1: Patients distribution

Total- 33

Gender	Males	Females
Number (%)	28 (84.8%)	5 (15.2%)

Table 2: Age-wise distribution of cases

Age group (years)	No.	p-value
21-30	4	0.03
31-40	10	
41-50	7	
51-60	7	
61-70	5	

Table 3: Assessment of parameters

Parameters	Variables	No.	p-value
Micro-organism /fungus isolated	Mucormycosis	22	0.021
	Aspergillus	04	
	Rhizopus	03	
	others	04	
History of O2 therapy	Yes	9	0.01
	No	20	
	Unknown	4	
History of steroid therapy	Yes	19	0.01
	No	10	
	No information	4	
Surgical debridement	Yes	31	0.01
	No	2	
Covid status	Covid positive	13	0.052
	Covid recovered	9	
	Non-covid	8	
	Unknown	3	
Complications	Visual impairment	05	0.85
	Hemiparesis/hemiplegia	03	

DISCUSSIONS

Mucormycosis is a fulminant fungal infection that often involves the sinonasal area, oral cavity and cranial and facial structures[8]. It is an opportunistic potentially fatal fungal infection that affects debilitated and immunosuppressive patients. The nomenclature of Mucormycosis is suggested by anatomic site localization rather than by mycologic classification[9]. For the head and neck region, they can be classified into isolated nasal, rhino-orbital or rhino-orbital-cerebral Mucormycosis[10]. Other accepted forms are pulmonary, disseminated, cutaneous, gastrointestinal and miscellaneous. Fungi of the genus Rhizopus account for the majority of clinical isolates[11,12]. This study analyses the possible causes, clinical findings, associated co-morbidities, investigations, treatment modalities and the clinical outcomes of post covid -19 rhino-cerebral mucormycosis in BRIMS, Bidar.

In our study the nasal discharge, crusts and the tissue from nose and PNS of all the patients were subjected for KOH preparation, culture and sensitivity and HPE test, to confirm the diagnosis. CT-scan and MRI scans were done to assess the extent of disease. Out of 33 patients, males were 28 (84.8%) and females were 5 (15.2%). Priya *et al*.[13] studied thirty-eight patients diagnosed with mucormycosis based on microbiological and/or histopathological examination (HPE). The most commonly affected age-group was between 41 years and 60 years. More number of cases were reported during the months of post rainy season (September to December). A large number of patients (77%) presented with uncontrolled diabetes mellitus. All the patients received antifungal therapy.

In our study, the age group 21-30 years had 4 patients, 31-40 years had 10, 41-50 years had 7, 51-60 years had 7 and 61-70 years had 5 patients. Gupta *et al*.[14] assessed the prevalence, pathogenesis, and treatment of mucormycosis in patients who have recovered from COVID-19 on seventy patients. The patients found to be most commonly affected by mucormycosis was middle-aged to elderly. The majority of the affected patients had uncontrolled diabetes and had delayed hospital presentations as a result of the ongoing COVID-19 pandemic crisis. The body's hormonal balance was significantly impacted by the Covid infection, as evidenced by the uncontrolled blood glucose levels of affected patients. In patients with mucormycosis, early detection, surgical debridement, adequate antifungal therapy and control of risk factors like diabetes mellitus are the main parameters of successful management of this lethal infection.

We observed that the micro-organisms isolated were mucor in 22 patients, aspergillus in 04, Rhizopus in 03 and others in 04 cases. History of O_2 therapy was present in 9 patients, 20 patients had no history of O2 therapy and in 4 cases, theO2 therapy was unknown. History of steroid therapy was seen in 19 patients, no history of steroid therapy in 10 patients and 4 cases had no information of steroid therapy. 13 Patients were Covid positive, 09 were Covid recovered, 08 patients were non-covid and the covid status was unknown in 3 cases. Visual impairment was noted in 05 patients and hemiparesis/hemiplegia in 03 patients.

Surgical debridement had been done in 31 cases. All the patients diagnosed as rhino-cerebral mucormycosis received Inj. Amphotercin-B (liposomal) for two weeks followed by tab. Posoconazole 300 mg once a day for 4 weeks. Elzein *et al*.[15] in their study a total of eighteen patients were found, with a median age of 43.5 years (range 13-72 years, 72% male). Skin and rhino-orbito-cerebral presentations were the most frequent, with gastrointestinal mucormycosis coming in second. During molecular testing, Apophysomyces variabilis (Rhizopus oryzae) was the primary fungal isolate. Liposomal amphotericin B was given to every patient, either on its own or in conjunction with other antifungal medications. All patients underwent repeated aggressive debridement and underlying factor reversal attempts. This emphasizes the group's lower mortality rate.

CONCLUSION

Given that mucormycosis is a rapidly progressing and proven fatal disease, early diagnosis and treatment can prevent complications and save lives.

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