Original Article

Clinico Epidemiological Profile of Mucormycosis Patients Admitted in Rims Teaching Hospital -A Retrospective Study

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ABSTRACT

Background: Mucormycosis is a severe fungal infection that has seen a significant increase in cases, particularly among COVID-19 patients, posing a major challenge to healthcare systems in India. Understanding the clinical and epidemiological profile of mucormycosis patients is crucial for effective management and resource allocation a study was conducted to analyse the clinico-epidemiological profile of mucormycosis patients.

Objective: The objective of this retrospective study was to examine the clinical and epidemiological profile of patients with mucormycosis admitted to RIMS Teaching Hospital.

Materials & Methods: A retrospective study design was employed, utilizing existing records and documents from patients admitted to RIMS Teaching Hospital with a diagnosis of mucormycosis. Relevant data, including demographic information, medical history, treatment details, and outcomes, were extracted and analyzed. Data cleaning and quality assurance measures were implemented to ensure accuracy and reliability.

Results: The study included 55 patients diagnosed with mucormycosis. The clinical and epidemiological profile of these patients was assessed, revealing important findings. Corticosteroid therapy was found to be commonly administered in the management of mucormycosis; however, the study highlighted the need for careful evaluation of the potential risks and uncertainties associated with its use. The prevalence rates of comorbidities differed from previous studies, emphasizing the association between COVID-19, diabetes mellitus, and mucormycosis, underscoring the importance of comprehensive strategies targeting these interconnected conditions. The distribution of affected anatomical sites reflected potential routes of fungal invasion, with notable variations observed. Furthermore, a significantly higher survival rate was observed among the patients, suggesting the potential effectiveness of the management approach employed.

Conclusion: This retrospective study provides valuable insights into the clinical and epidemiological profile of patients with mucormycosis admitted to RIMS Teaching Hospital. Careful evaluation of corticosteroid therapy, comprehensive strategies addressing comorbidities, and understanding the distribution of affected anatomical sites are crucial for effective management and prevention. These findings contribute to our understanding of mucormycosis and provide a basis for future investigations and interventions.

Key Words: *Mucormycosis, COVID-19, Diabetes, Steroid, Outcome, Invasive*

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INTRODUCTION

Mucormycosis, a severe fungal infection caused by the Mucorales fungi [1,2], can have detrimental effects on various parts of the body such as the skin, lungs, sinuses, and other organs. While it is considered rare, its incidence has been increasing in recent years, particularly in individuals with weakened immune systems, including those with conditions like diabetes, cancer, or who have undergone organ transplants. Additionally, people who have experienced injuries or undergone surgery [3] may also be at risk.

The rise in mucormycosis cases is thought to be influenced by several factors, such as the growing use of immunosuppressive drugs, an aging population, and the increasing prevalence of diabetes [1]. Notably, there has been a significant surge in cases of mucormycosis associated with COVID-19 infections, particularly in India. The infection has been termed COVID-associated mucormycosis (CAM).

The clinical presentation of mucormycosis can vary depending on the affected site. For instance, it may manifest as a black necrotic ulcer on the skin, pneumonia, or sinusitis in the lungs, or as a mass or abscess in other organs. The diagnosis is typically made through biopsy and culture of the affected tissue. Treatment usually involves a combination of antifungal medications and surgical intervention.

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Unfortunately, mucormycosis carries a poor prognosis, with mortality rates reported to be as high as 90%. The incidence of CAM globally is estimated to range between 0.14 and 7.8 cases per million people [4]. In India, the incidence is considerably higher, with estimates ranging from 140 to 1,400 cases per million people [5].

A study conducted by the National Institute of Mental Health and Neurosciences (NIMHANS) in Bengaluru, India, revealed valuable insights into CAM. In Karnataka, the incidence of CAM was found to be 1,400 cases per million people [6]. Most cases occurred in individuals with diabetes mellitus, who faced a 20-fold increased risk of developing the infection. The study also reported a mortality rate of 70% for CAM in Karnataka.

The findings of this study are crucial for understanding the clinico-epidemiological profile of mucormycosis patients in India and will aid in the early detection and management of the infection, ultimately leading to improved prognosis and outcomes for affected individuals.

MATERIALS AND METHODS
A retrospective observational study was conducted at Raichur Institute of Medical Sciences (RIMS), Raichur, Karnataka. The study was approved by the institutional ethics committee.

Study Participants: Medical records of individuals diagnosed with mucormycosis were included in this study. The inclusion criteria consisted of patients with a documented diagnosis of mucormycosis based on clinical features and supporting laboratory findings such as direct microscopy (KOH), culture, or molecular methods. All patients received treatment as per the discretion of the treating physicians.

Data Collection:
A pre-designed data collection form was used to extract relevant information from the medical records. The collected data included: Basic demographic information and epidemiological profile (age, sex, income, occupation etc.), Clinical characteristics of the patients, Predisposing factors (e.g., diabetes, corticosteroid therapy, and others), Coexisting medical conditions (e.g., diabetes, hypertension, asthma, and others), Diagnostic investigations (blood tests, histopathological findings etc.), Treatment modalities (medical, surgical)

Study Duration: The study period for data collection spanned from June 2021 to August 2021.

Inclusion Criteria:
1) All patients admitted to the hospital during the study period with a documented diagnosis of mucormycosis based on clinical features and supporting laboratory findings.
2) Patients with complete medical records including relevant clinical information, investigations, and treatment details.

Exclusion Criteria:
1) Patients with incomplete medical records or missing essential information necessary for the study analysis.
2) Severely ill patients who could not be interviewed or whose medical records were insufficient for data extraction.

RESULTS
The study on patients with mucormycosis revealed various key findings across different parameters. In table 1 the age distribution of the patients demonstrated varying percentages within different age groups. Most patients were between the ages of 31 and 50, with a gradual decline in occurrence among younger and older age brackets with the mean age of 46.

When considering the religious distribution of the patients, the majority identified as Hindus, with 85.4% belonging to this religious group. Muslims comprised 14.5% of the observed cases. These findings indicate a higher representation of individuals from the Hindu religious community among the patients diagnosed with mucormycosis in the study.

The socioeconomic status classification revealed that the patients came from diverse backgrounds. Among them, 1.8% were classified as belonging to the upper socioeconomic status, 12.7% fell into the upper-middle category, 21.8% were classified as middle class, and 29.09% belonged to the lower-middle category. The largest proportion, comprising 34.5% of the participants, fell into the lower socioeconomic status. This highlights the representation of various socioeconomic strata among the patients with mucormycosis. Regarding professional status, the patients exhibited a range of classifications. Among the participants, 3.6% were classified as professionals, 21.8% as skilled workers, 25.4% as semiskilled workers, 38.1% as unskilled workers, and 10.9% were unemployed. These findings demonstrate the diversity of professional backgrounds among the patients included in the study.

Table 2 shows Corticosteroid administration, either orally or intravenously, was observed in 32 patients which is 58% received corticosteroid treatment, while 42% did not. Among them 66% of the patients were administered oral corticosteroids, The exact number of patients receiving intravenous corticosteroids constituted about 44% of the total patients receiving corticosteroid treatment. Comorbidities were evaluated among the patients were explained in table 3,

with diabetes being the most prevalent. Among the patients, 31(56%) had diabetes, with 29% having controlled diabetes and 11% having uncontrolled diabetes. Other comorbidities observed were hypertension in 9% of patients, asthma in 2%, cardiac disease in 56%, and HIV in 2%.

In terms of medical management, 31% of the patients received medical treatment alone, while 69% underwent a combination of medical and surgical management as shown in table 6, this highlights the importance of a multidisciplinary approach in the management of mucormycosis. The medical outcome of the patients demonstrated positive results, with 94.5% of patients alive at the conclusion of the study. However, 5.5% of patients unfortunately succumbed to the disease.

Regarding the anatomical distribution of mucormycosis as in table 4, the most common site of involvement was the rhino-orbital region, accounting for 47% of cases. Rhino-sinusal involvement was observed in 21% of cases, followed by rhino-orbito-cerebral involvement at 15%. Pulmonary involvement accounted for 10% of cases, while rhino-cerebral involvement was observed in 5% of cases. Teeth involvement and skin involvement were less frequent, at 6% and 2%, respectively.

These results provide valuable information on the clinico-epidemiological profile of mucormycosis patients in India. The findings of the study will help in early diagnosis and management of mucormycosis, which will improve the prognosis of the disease.

Table 1: Demographic details of study participants (N=55)

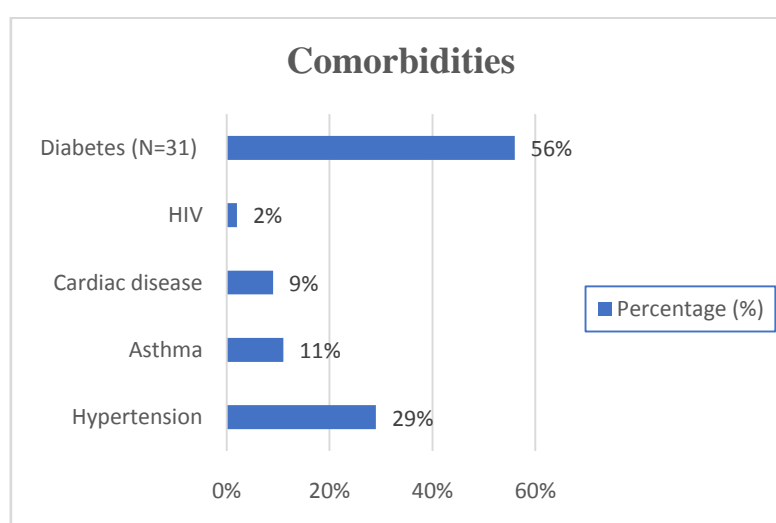| Socio demographic	Frequency(n)	Percentage (%)
Age Distribution		
<20	1	1.8%
21-30	4	7.2%
31-40	12	21.8%
41-50	17	30.9%
51-60	11	20%
>61	10	18.1%
Gender Distribution		
Male	45	82%
Female	10	18%
Religion		
Hindu	47	85.4%
Muslim	8	14.5%
Socioeconomic Status Classification		
Upper	1	1.8%
Upper middle	7	12.7%
Middle	12	21.8%
Lower middle	16	29.1%
Lower	19	34.5%
Occupation		
Professional	2	3.6%
Skilled	12	21.8%
Semiskilled	14	25.4%
Unskilled	21	38.1%
Unemployed	6	10.9%
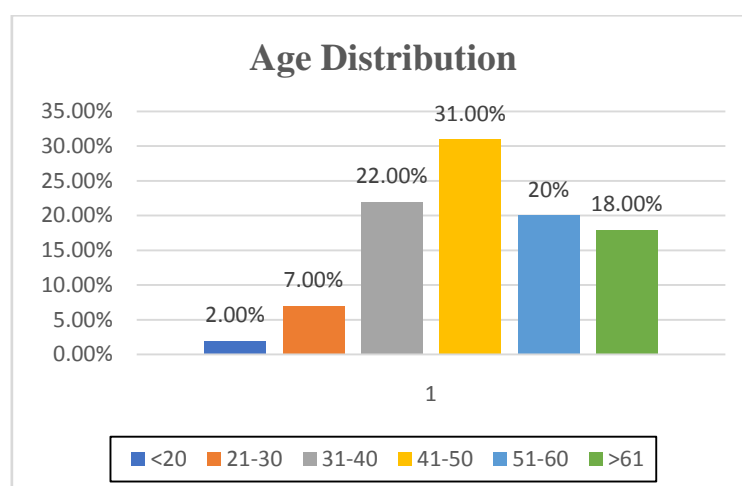
Figure 1: Age Distribution among study participants

Table 2: Treatment and Clinical History in Mucormycosis Patients during covid

| Treatment and Clinical History	Frequency(n)	Percentage(%)
Corticosteroid administration (oral or intravenous)-Yes	32	58%
Corticosteroid administration (oral or intravenous)-No	23	42%
Oral corticosteroids, n=32	21	66%
Intravenous corticosteroids	11	34%
History of ICU stays	4	12.5%
Oxygen therapy	12	37.5%
On Ventilator support	0	0
History of intake of broad-spectrum antibiotics	19	60%
On immunomodulators	3	9.3%
History of Covid 19 infection	32	58%

Table 3: Comorbidities

Comorbidities	Frequency(n)	Percentage (%)
Hypertension	16	29%
Asthma	6	11%
Cardiac disease	5	9%
HIV	1	2%
Diabetes (N=31)	31	56%
Controlled	19	61%
Uncontrolled	12	39%

Figure 2: Comorbidities of study participants

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Table 4:Distribution of Mucormycosis Involvement in Different Anatomical Sites

Anatomical Sites	Frequency(n)	Percentage (%)
Rhino-Orbital Region	26	47%
Rhino-Sinusal	12	21%
Rhino-Orbito-Cerebral	8	15%.
Pulmonary	5	10%
Teeth	3	6%
Skin	1	2%
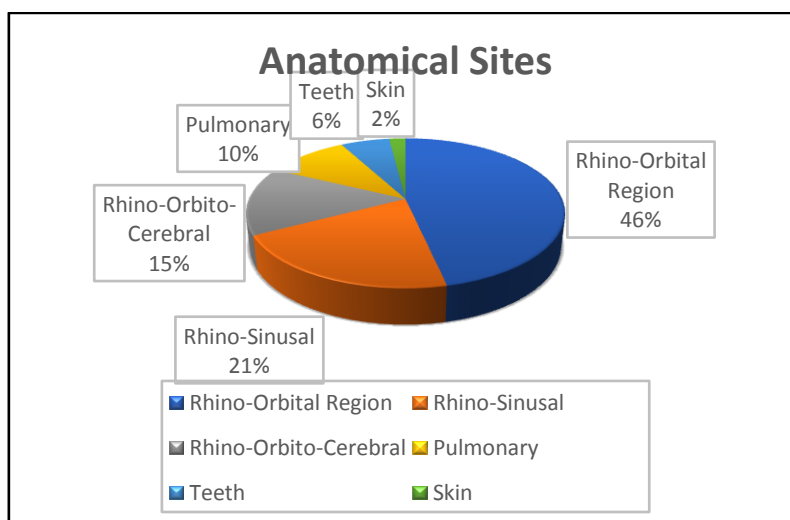
Figure 3: Distribution of Mucormycosis Involvement in Different Anatomical Sites

Table 5: Clinical Symptoms of Mucormycosis

Clinical Symptoms	Frequency(n)	Percentage (%)
Nasal blockage or congestion	33	60%
foul smell	15	28%
Facial Pain	35	64%
Numbness	19	34%
Redness around eyes nose, sinus tract on face	7	12%
Orbital pain	24	44%
Headache	38	69%
Paresthesia	4	8%
Blurred or double vision	2	4%
Toothache	3	6%
Swollen, infected gums	3	6%
Discoloration of skin	1	2%
Cough	13	24%
Shortness of Breath	4	8%
Haemoptysis	3	6%

Table 6: Investigations and Management

Laboratory Findings and Medical Outcomes	Frequency(n)	Percentage(%)
KOH		
Positive	33	60%
Negative	22	40%
HISTOPATHOLOGY		
Positive	22	58%
Negative	16	42%
MANAGEMENT OF MUCORMYCOSIS		
Medical Management	17	31%

Medical and Surgical Management	38	69%
Covid Vaccination		
Yes	31	56%
No	24	44%
Medical outcome:		
Alive	52	94%
Deceased	3	6%

DISCUSSION

The study conducted by Sangita Kamath et al.[7] on mucormycosis revealed an interesting difference in age distribution when compared to our own study. While their research primarily focused on patients aged 41 to 70, our study encompassed a wider age range, including individuals from all age groups with the mean age 46years Furthermore, our study identified a higher proportion of male patients compared to the research conducted by Rahul Kulkarni et al [8]. This gender disparity in distribution may be influenced by various factors and requires further investigation to better understand its implications.

In terms of treatment, corticosteroids were commonly administered in managing mucormycosis in our study, aligning with the findings reported by Sen M et al. However, the decision to use corticosteroids should be carefully evaluated due to potential risks and uncertainties surrounding the optimal dosage and duration of therapy [9]. Regarding comorbidities, our study reported different prevalence rates compared to the research conducted by Arora R et al. [10]For example, Diabetes was slightly more prevalent in our study, while asthma and cardiac disease showed distinct prevalence rates. It is worth noting that the link between COVID-19, diabetes mellitus, and mucormycosis is crucial for effective management and prevention, particularly among high-risk individuals. The association between hyperglycemia, diabetes, and the growth of Mucorales fungi [11,12]emphasizes the need for comprehensive strategies addressing these interconnected conditions.

The distribution of affected anatomical sites in our study closely resembled the findings reported by Gupta R et al. The rhino-orbital region was the most involved site [13], followed by the rhino-sinusal region and rhino-orbito-cerebral involvement. Pulmonary, dental, and skin involvement were observed to varying degrees, highlighting different potential routes of fungal invasion and the susceptibility of distinct anatomical regions. Significantly, our study demonstrated a notably higher survival rate compared to the research conducted by Hoenigl M [14], This suggests that our management approach, which included early diagnosis, timely antifungal therapy, aggressive surgical debridement, and comprehensive multidisciplinary care, may have played a role in improving patient outcomes.

Overall, these findings provide valuable insights into the age distribution, gender disparities, treatment practices, comorbidity prevalence, anatomical site involvement, and survival rates associated with mucormycosis. They emphasize the need for further research and the development of optimized strategies to enhance patient outcomes and mitigate the impact of this severe fungal infection.

CONCLUSION

In conclusion, mucormycosis remains a life-threatening disease and a significant problem in India, leading to high mortality rates. The present study highlighted the common use of corticosteroid therapy in managing mucormycosis, but also emphasized the need for careful evaluation of its potential risks and uncertainties. The prevalence rates of comorbidities varied compared to previous studies, highlighting the important association between COVID-19, diabetes mellitus, and mucormycosis, and emphasizing the necessity for comprehensive strategies. The distribution of affected anatomical sites provided insights into potential routes of fungal invasion, while the significantly higher survival rate observed suggested the potential effectiveness of the management approach utilized. Overall, these findings contribute to our understanding of mucormycosis and emphasize the requirement for further research and optimized strategies to enhance patient outcomes.

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