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Original Research Article

Mucormycosis outbreak in India - What lead us to this crisis?

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ABSTRACT

This is a retrospective study analysing the demographics, clinical characteristics, radiological findings and treatment of the 54 patients of rhino-sino-orbital or cerebral mucormycosis in a tertiary health care centre in Jharkhand. All patients with probable or proven mucormycosis were included in the study. A significant number (45%) of patients belonged to rural areas. About 20% of patients did not give history of COVID infection denoting association of mucormycosis in mild or asymptomatic COVID patients. There was a delay of approximately 11 days in seeking medical care leading to poorer outcome in patients. Diabetes was a major risk factor associated with 83% of the patients. Steroid was given as treatment in 80%of the patients who had COVID - 19. Extensive disease was seen in 37% of the patients suggesting that the mucormycosis was more devastating during the outbreak as compared to pre- covid times.

1. Introduction

The coronavirus pandemic affected India adversely with 30.3 million cases and 398,000 deaths by the end of June, 2021 making it the world's second largest hit country in terms of number of cases and third largest in terms of the death count.[1,2] In the early May, 2021, India also witnessed the collapse of its health infrastructure as it faced the brunt of the second wave of COVID-19.[3] Amidst the decline in COVID cases, a steep rise in potentially life threatening Mucormycosis /"Black fungus" became a cause of concern. There were over 40,000 cases in India as reported on 28th June, 2021 and was declared an epidemic in several states and classified as notifiable disease. The Jharkhand government declared Mucormycosis an epidemic on 22nd June, 2021. As of 23rd July, 2021, total of 160 cases of Mucormycosis were notified. The highest prevalence of cases was seen in Ranchi district with a total of 62 cases followed by East Singhbhum with 24 cases. The sudden rise of the cases has been attributed to a number of factors. The present study was undertaken to analyse the demographic, clinical and radiological findings of rhino-sino-orbital and cerebral mucormycosis in a tertiary health centre in the state of Jharkhand.

2. Materials and Methods

This was a retrospective study conducted on hospitalised patients with clinical or histopathological diagnosis of rhino-sino-orbital or cerebral mucormycosis from 1st April, 2021 to 1st July, 2021 at a tertiary health care centre in Ranchi. A detailed data collection was done regarding the demographics, underlying conditions, relation with COVID-19 with reference to treatment, oxygen requirement signifying severity of COVID -19, radiological findings, clinical course and treatment protocol of Mucormycosis.

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In view of the epidemic situation and the abrupt course of the disease, patients were classified into "Probable" and "Proven" Mucormycosis. All patients suspected of Mucormycosis were examined for eschar and surrounding inflammation by diagnostic nasal endoscopy and were classified as Probable Mucormycosis (Figure1). All probable patients were started on Amphotericin B. MRI was done to evaluate for the disease spread to bones and soft tissues (Figure 2). Surgical debridement was planned and samples sent for lactophenol cotton blue mount for microscopic examination of fungi (Figure 3). Routine hamatoxylin and eosin staining was also done.

All statistical data were analysed using Statistical package of social sciences (SPSS) version 20.

3. Results

A total number of 54 patients were included in the study who had probable or proven mucormycosis (Table 1).

The median age was 49 years (ranging from 27 to 72 years). 44% of patients belonged to rural areas. 83% of patients had underlying diabetes, one patient was a hypothyroid on medication. The average time delay in the onset of symptoms of mucormycosis to seeking medical help was 11 days (ranging from 2 days to 30 days). Around 20% of patients were not COVID positive according to the history given by them. About 55% of patients were taking steam inhalation on regular basis. There was a history of oral trauma in one patient.

All the patients who had diabetes was Type 2. The diabetes was newly onset in 20% of patients. The duration of diabetes ranged from newly onset to 13 years. The diabetes was uncontrolled in 53.3% of patients.

Approximately 50% of patients who were COVID positive were hospitalised, the rest were treated in home. The symptoms of fever was seen in 50% of patients, cough in 69.7% of patients, respiratory distress in 42% of patients. About 80% of patients were given steroids as treatment for COVID-19. All patients in hospital care received oxygen through nasal cannula or mask. About 20% of total patients who were COVID positive received oxygen in home care through mask because of scarcity of hospital beds. The disease involved both nasal cavities in 11.1% of patients. It had spread to the orbits in 38% of patients manifested as redness of eye and visual problems (27%), decreased eye movements (18.5%), periorbital cellulitis (31.48%), blackening of skin around eyes (22.2%), and blackening of mucosa/Loosening of teeth/exposed palatal bone (33.33%). There was no patient with cranial nerve involvement. Localised disease as seen in MRI (only restricted to nasal cavities and sinuses) was seen in 62.96 % of patients. In diagnostic endoscopy, all patients had eschar in the nasal cavity.

Fig. 1: Diagnostic nasal endoscopy of the left nasal cavity of the patient of mucormycosis showing blackish eschar between the septum and inferior turbinate, Mucopurulent discharge is seen too signifying underlying sinusitis.

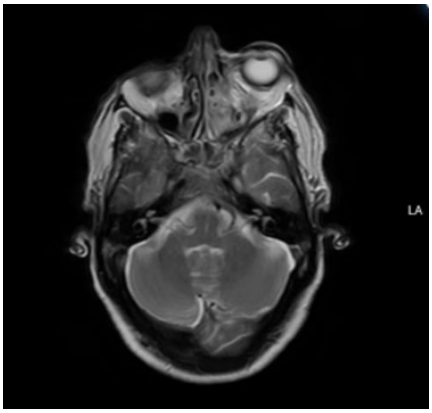

Fig. 2: T2 weighed MRI of maxillary sinuses (axial section) in a patient of mucormycosis showing hyper- intense lesion in left maxillary antrum with obliteration of left osteomeatal complex, thickened andoedematous medial wall of left orbit and left peri orbital area.

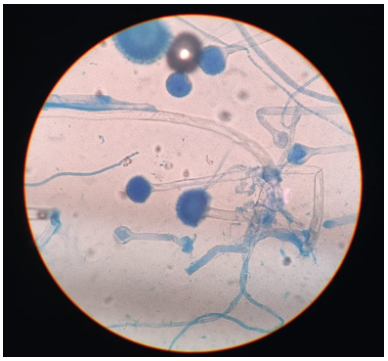

Fig. 3: Lactophenol cotton blue mount (magnification40X) showing aseptate broad hyphae of mucormycosis

Table 1: Demographic and clinical characteristics ofpatients of mucormycosis Total number of patients of mucormycosis included instudy (n) = 54

Characteristics	
Age - Median	49yrs (27 to 72 yrs)
Sex(M:F ratio)	1.8:1
Rural : Urban	24:30
Diabetes Mellitus	
Newly onset	9(45)
Previously diagnosed	36(45
Uncontrolled	24(45)
Hypothyroidism	1(54)
COVID-19	43
Hospitalised	21
Home	22
Fever	22
Cough	30
Respiratory distress	18
Received steroids	34
Symptoms Of Mucormycosis	
Delay in diagnosis from first symptoms	11 days
Both nasal cavities	6
Involvement of orbits	20
Decreased eye movements	10
Blackening of skin around eyes	12
Periorbital cellulitis	17
Blackening of mucosa /exposed palatal bone / loosening of teeth	18
Cranial nerve deficits	0
MRI Findings	
Localised	34
Extensive	20

4. Discussion

The highest number of cases of mucormycosis has been detected in India in pre COVID times with an estimated prevalence of 140 cases per million population. The fungus is ubiquitous in our environment. The hot and humid conditions favours the growth of the fungus. Also, India has the second largest cases of diabetes in the world. Diabetes is unarguably an important risk factor for development of mucormycosis. It was an underlying condition in 83% of our patients similar to other studies.[3–6] Around 40% of patients had involvement beyond the nasal cavities and sinuses. This is in contrast to earlier systematic reviews on mucormycosis wherein only 25% of patients had multiple affected sites.[6,7] This signifies that the mucormycosis was more invasive and lethal during the outbreak.

Mucormycosis outbreak in the region of Jharkhand was a challenge for the medical professionals. Though the coronavirus outbreak was somewhat limited to urban areas, a significant rural population (45%) contributed to the mucormycosis cases. These were agriculture based people living in substandard conditions. 20% of the patients were unaware of their COVID status signifying association of mucormycosis in mild or asymptomatic COVID patients. The hot and humid climatic conditions in addition to the proximity to vegetations may be a determinant. The indiscriminate use of steroids in rural settings may also be implicated in these cases.

The diagnosis of mucormycosis was delayed by 11 days on an average from the appearance of first symptoms. This may be due to unawareness of the condition, difficulty in seeking medical care during COVID times and inadequate health infrastructure. This delay led to more morbidity as well as mortality of patients.

The use of industrial oxygen have been considered as one of the factors for the outbreak but in our study, only 50% of patients were admitted in the hospital. Reusable oxygen humidifiers was used by only 1 patient. The role of industrial oxygen and humidifiers needs to be investigated further.

The indiscriminate use of steroids and broad spectrum antibiotics might have also increased the risk of acquiring mucormycosis by lowering down the immunity levels and increased susceptibility for opportunistic infections. Overzealous use of steam inhalation have been implicated as a cause too.

The study has some limitations. The retrospective nature of the study made collection of new data difficult. The data regarding previous treatment for COVID 19 was difficult to elicit as the patients did not have proper documents. In the face of collapse of health infrastructure, patients in rural areas were forced to take over the counter drugs and medicines given by quacks. The use of vitamin supplements which contain zinc and iron could not be investigated due to lack of data.

The clinical course of mucormycosis was abrupt and more lethal emphasising the need of early diagnosis and treatment.[8–10] A high index of suspicion has to be kept for patients of COVID-19 who are diabetic and on steroids.[11–14] Proper hygiene should be established in hospitals and use of sterile water in humidifiers has to be maintained.

5. Source of Funding

None.

6. Conflict of Interest

None.

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