**ORIGINAL RESEARCH**

# Clinical Features, Prognostic Factors and Outcomes of Rhino-Orbital-Cerebral Mucormycosis in a Tertiary Care Centre in South Rajasthan: A Retrospective Study

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**ABSTRACT**

**Introduction:** A rare condition known as rhino-orbito-cerebral mucormycosis (ROCM) manifests as both acute and fulminant symptoms. There are significant rates of morbidity and mortality linked to this infection. The present study was done among confirmed cases of rhino orbito cerebral mucormycosis to evaluate the clinical features, prognostic factors, and outcomes of this disease.

**Material & methods:** The retrospective study was done among 50 cases of rhino orbito cerebral mucormycosis at a tertiary care centre for a period of one year. All of the clinical and demographic details, including underlying diseases, and ocular and neurologic symptoms were examined. Data was analyzed using SPSS version 25.0.

**Results:** The mean age of patients was found to be 53.1±10 years. Patients 46% had diabetes, 22 % had hematological disorders, 18% had thalassemia and 14% had beta cell lymphoma. The most common symptoms were periorbital swelling, and ocular pain found in almost 80% of cases.74% of cases survived whereas 26% did not survive.

**Conclusion:** It is believed that uncontrolled diabetes mellitus is the predisposing factor for ROCM. It is advised to diagnose this acute disease as soon as possible using a biopsy and clinical symptoms to prevent and lower the mortality rate.

**Keywords:** Diabetes, Infection**,** Mortality, Outcome, Predisposing Factor, ROCM,



## INTRODUCTION

The fulminant fungal infection known as rhino-orbito-cerebral mucormycosis (ROCM) is linked to high rates of morbidity and mortality [1-3]. The most prevalent risk factor for ROCM is diabetes [4, 5]. Chronic renal failure, deferoxamine, and glucocorticoid medication, metabolic acidosis, and malignant hematological diseases are additional risk factors [6, 7]. Opportunistic fungi from the Mucorales order are the cause of this quickly spreading and deadly infection [8–11]. The majority of instances of ROCM are caused by species from the genus Rhizopus, which is one of the multiple Mucorales genera. Mucor, Rhizomucor, Saksenaea, Apophysomyces, and Cunninghamella are the other genera that are commonly implicated in ROCM [12, 13]. After a person breathes in ambient fungal spores [14], the fungi colonize the sinus and nasal mucosa and infect surrounding structures such as the orbit, brain, and cavernous sinus [15].Mucoralean fungi possess the ability to invade angiosomes and induce blood artery thrombosis, which results in tissue necrosis [16] Acidosis is thought to make it easier for these fungi to invade blood vessel walls because they have a system called keto-reductase, which activates at an acidic pH brought on by uncontrolled diabetes [17].With rates ranging from 20 to 50%, overall mortality for infection remains high despite rigorous surgical and polyene antifungal therapy [18,19]. Mortality increases significantly, approaching 70–90% in cases of disseminated mucormycosis, depending on patient characteristics (such as critically ill or immunocompromised individuals) and the site of infection [20].The combination of radiological abnormalities, clinical symptoms, and host variables may aid in the early identification of mucormycosis; however, direct microscopy, histopathology, and tissue sample culture are necessary for the final diagnosis. Because patients are frequently too unstable to undertake invasive treatments, deep tissue biopsy of

the affected location is typically a laborious process [21,22]. Early detection of sinus mucormycosis, treatment of the underlying ailment, and early therapeutic measures are essential to stop the invasion of the orbital and cerebral tissues. The present study was done among confirmed cases of rhino orbito cerebral mucormycosis to evaluate the clinical features, prognostic factors, and outcomes of this disease.

## MATERIAL & METHODS

The retrospective study was done among cases of rhino orbit cerebral mucormycosis at a tertiary care centre for a period of one year. Ethical permission was taken from the institutional ethical committee before the commencement of the study. The consecutive sampling was done and a total of 50 cases that were already diagnosed and confirmed with ROCM were enrolled in the study. Cases with ages above 18 years and showed mycological and histopathological evidence of mucormycosis in tissue biopsy taken by functional endoscopy sinus surgery (FESS) or needle aspiration were considered as the basis of inclusion criteria. Those with an age below 18 years and who do not have confirmed laboratory reports were excluded from the study. Using calcofluor white (CFW) staining solution or 10% potassium hydroxide (KOH), a direct inspection of the biopsy or aspirated material was carried out [21]. The samples were inoculated with antibiotics and kept at 30°C for a maximum of one week. Using the traditional morphological method, a genus-level identification of rapidly growing, fluffy, grey colonies that looked like cotton candy was made. It was thought to be noteworthy when pure and comparable colonies of Mucorales grew on multiple culture media. All of the clinical and demographic details, including underlying diseases, ocular and neurologic symptoms, and medical and surgical procedures, were documented and examined on particular data sheets. Data sheets were also used to record information from paranasal sinus CT scans, including signs of mucosal thickness, turbidity, fluid levels, bone deterioration, and osteomyelitis. Descriptive statistics were employed in SPSS, version 25.0, for data analysis.

## RESULTS

The mean age of patients was found to be 53.1±10 years. Female patients (56%) were more in number as compared to male (44%) patients. Out of 50 patients, 46% had diabetes, 22 % had hematological disorder, 18% had thalassemia and 14% had beta cell lymphoma as shown in Table 1.

**Table: 1 shows the baseline characteristics of cases**

| Variable | Mean ±SD/ N(%) |
|---|---|
| Mean age (years) | 53.1±10 |
| Female | 28 (56) |
| Male | 22 (44) |
| Diabetes | 23 (46) |
| Hematological disorder | 11 (22) |
| Thalassemia | 9 (18) |
| Beta cell lymphoma | 7 (14) |

The most common symptoms were periorbital swelling, and ocular pain found inalmost 80% of cases. Other features include ptosis (78.2%), loss of vision (76%), facial pain and swelling (64%) nasal discharge (60%), necrosis of turbinate (60%), headache (54%), fever (24%), dizziness (13%), ear pain (10%) and itching (8%) as found in table 2.

**Table: 2 shows clinical features found in cases**

| Clinical features | N (%) |
|---|---|
| Periorbital swelling | 42 (84) |
| Ocular pain | 40 (80) |
| Ptosis | 39 (78.2) |
| Loss of vision | 38 (76) |
| Facial pain &and swelling | 32 (64) |
| Nasal discharge | 30 (60) |
| Necrosis of turbinate | 30 (60) |
| Headache | 27 (54) |
| Fever | 12 (24) |
| Dizziness | 6 (13) |
| Ear pain | 5 (10) |
| Itching | 4 (8) |

The average number of hospital days was 21.2±8.4. Out of a total of 50 cases, 74% survived whereas 26% did not survive as shown in Table 3.

**Table 3: shows the outcome of cases with RCOM**

| Variable | Mean ±SD/ N(%) |
|---|---|
| Average hospital days | 21.2±8.4 |
| Survived | 37 (74) |
| Non survived | 13 (26) |

## DISCUSSION

Mucormycosis, or fungal infections caused by members of the order Mucorales, is characterized by a high rate of morbidity and mortality [22]. These infections are extremely dangerous and spread quickly through angioinvasion, resulting in tissue necrosis and thrombosis of the blood vessels in immunocompromised hosts [23]. The most common sites of involvement for patients with mucormycosis are the rhino orbital cerebral (33–49%), cutaneous (10–16%), pulmonary (10–11%), disseminated (6–12%), or gastrointestinal (2–11%) [24]. ROCM stands for rhino orbital cerebral infection, which is characterized by rapid development and spread, with critical involvement of the eye and cranial structures [25].In our study, the mean age of cases was found to be 53.1±10 suggesting the prevalence of this disease in middle age persons. Most cases were of female patients (56%) as compared to male patients (44%). In our study 46% had diabetes, 22 % had hematological disorder, 18% had thalassemia and 14% had beta cell lymphoma. Other studies also revealed that the primary underlying cause of ROCM is diabetic mellitus, which is followed by hematological illnesses and transplantation as a result of immunological abnormalities brought on by chemotherapy [1,3]. Vaezi et al's study [26] of 98 mucormycosis cases in Iran found that uncontrolled hyperglycemia was the most prevalent underlying cause. Diabetes mellitus was the most common underlying illness in 40% of all instances of mucormycosis and was present in 70% of rhino cerebral mucormycosis cases, according to Pak et al [27]. Roden et al [3] reviewed 929 instances of mucormycosis and concluded that the primary risk factor was diabetes. Thirteen cases of ROCM were described by Mane et al [28], all of which had diabetes as the underlying cause. Six instances of ROCM were reported by Sachdeva et al [29], all of whom had diabetes.The most common clinical features were periorbital swelling, and ocular pain found in 80% of patients. According to multiple reports, ptosis, proptosis, periorbital swelling, facial swelling, dysesthesia on the affected side, and black necrotic areas in the turbinate, palate, and other involved sites are the most common manifestations of mucormycosis in ROCM patients, which is consistent with our findings. [1-4] The disease typically begins in the palate, nasal mucosa, or turbinate and progresses to the paranasal sinuses before entering the retro-orbital space through the ethmoid sinus. According to Kulkarni et al [30], the fungus penetrates the anterior ethmoidal sinus, which is unable to produce any symptoms until they spread to the orbit.Six individuals with type I diabetes mellitus and ROCM were reported by Bhadada et al.[31] The two most typical symptoms they listed were proptosis and ptosis. Most of the patients in the studies by Yohai et al [14] and Ferry et al [15] had proptosis and ophthalmoplegia.In hospital mortality in our study was found to be 26% while 74% survived. Eighty percent of the patients undergoing medicinal and surgical treatment survived, according to Ericson et al. [32]. According to Straus et al [33], 40% of patients survived. Patients with CNS involvement at initial assessment have a significant mortality rate [34].Small sample sizes and the short duration of the study with a single center serve as limitations of our study. Future research is needed in the same direction with a large sample size and from various cohorts.

## CONCLUSION

The incidence of ROCM has increased as a result of the prevalence of diabetes in emerging nations, which is a frequent risk factor for the disease. Health care monitoring initiatives, clinician awareness, and pathologists' and mycologists' collaboration can help diagnose this deadly infection early and accurately, easing its management. ROCM is suspected in patients who present with ocular pain and periorbital edema.

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