



CORONAVIRUS DISEASE ASSOCIATED MUCORMYCOSIS FROM A TERTIARY CARE HOSPITAL

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ABSTRACT **BACKGROUND:** Coronavirus disease remains a health concern with recent rise of opportunistic infections especially mucormycosis in COVID-19 patients. Mucormycosis is well known to infect patients with diabetes mellitus, malignancy, chemotherapy, and other immunocompromised conditions. The treatment of COVID-19 largely remains systemic steroids and other immunomodulators that add to the risk of invasive fungal infection. **METHODOLOGY:** We included patients who presented with diagnosed mucormycosis by culture in month May and June 2021 and who were previously treated for COVID-19 in last three months of presentation (recent COVID-19) or currently being treated for COVID-19 (active COVID-19). Information regarding possible risk factors, like diabetes mellitus, steroid intake, hypertension, lung disease, ICU stay and requirement of oxygen support were collected. **RESULTS** Overall, 41 cases of mucormycosis in people with COVID-19 have been reported. Mucormycosis was predominantly seen in 30 males (73.17%). Pre-existing diabetes mellitus (DM) was present in 31 patients (75.6%) of cases. Corticosteroid intake for the treatment of COVID-19 was recorded in 28 patients (68.29%) of cases. Pre-existing lung disease was in 6 patient (14.63%), ICU stay due to COVID was in 7 patient (17.07%), Pre-existing hypertension was in 12 patient (29.26) and oxygen support at the time of COVID in 18 patient (43.9%) **CONCLUSION:** An unholy trinity of diabetes, rampant use of corticosteroid in a background of COVID-19 appears to increase mucormycosis. All efforts should be made to maintain optimal glucose and only judicious use of corticosteroids in patients with COVID-19.

KEYWORDS : COVID-19, mucormycosis

INTRODUCTION-

Mucormycosis (MM) are syndromes in humans caused by the mucorale group of fungi. These fungi are ubiquitous and present in any environment including hospitals. Inhalation of fungal spores is harmless in immunocompetent individuals but can cause life-threatening disease in those who are immunocompromised.[1]

Coronavirus disease 2019 (COVID-19) pandemic continues to be a major health problem worldwide. The treatment of COVID-19 largely remains systemic steroids and other immunomodulators that add to the risk of invasive fungal infection [2]. This increased incidence of secondary infections may also be attributed to preexisting morbidities such as poorly controlled diabetes mellitus, lung diseases, malignancy, and the immunocompromised state[3.] In the general population, in the pre-COVID era, the incidence of mucormycosis is very low, varying from 0.005 to 1.7 per million [4]. Here, we present a 41 diagnosed patient of mucormycosis who were previously treated for COVID-19 in last three months of presentation (recent COVID-19) or currently being treated for COVID-19 (active COVID-19) along with its risk factors.

METHODOLOGY

The study was conducted in the microbiology department at a tertiary care teaching institute of India between 1st May to 30th June 2021, 41 diagnosed patient of mucormycosis who were previously treated for COVID-19 in last three months of presentation (recent COVID-19) or currently being treated for COVID-19 (active COVID-19) was included in this study. The patient with the diagnosis of mucormycosis was identified with a positive KOH mount and culture on SDA media. SDA plate and slant both placed in incubator at 37°C for period of 2 weeks. species identification of mucorales done by –

1. Gross colony morphology
2. LPCB mount

Demographic details including age and gender, along with the risk factor were noted. Details pertaining to the days of steroid intake, pre-existing diabetes mellitus, hypertension, steroid therapy, ICU stay and oxygen support requirement were also collected

RESULTS

41 CAM patients (median age: 51.4 years, 73.17% males) with active (75.7%) or recent COVID-19 who presented to the tertiary hospital in between 1st May 2021 to 1st June 2021, were included. Most common risk factors were diabetes mellitus (75.6%) and steroid use for COVID-19 disease (68.29%). Pre-existing lung disease were seen in 14.63%, ICU stay due to COVID were seen in 17.07% and Pre-existing hypertension recorded 29.26% and oxygen support at the

time of COVID were seen in 43.9%.

Table No. 1: Sex Wise Distribution Of 41 Cases:

SEX	POSITIVE	PERCENTAGE
MALE	30	73.17
FEMALE	11	26.83

Table No. 2: Risk Factor For Covid 19 Associated Mucormycosis:

RISK FACTOR	TOTAL NO. OF CASES	PERCENTAGE
DIABETES MELLITUS	31	75.6
STEROID USE	28	68.29
PRE-EXISTING LUNG DISEASE	6	14.63
ICU STAY	7	17.07
PRE-EXISTING HYPERTENSION	12	29.26
OXYGEN SUPPORT	18	43.9

DISCUSSION

Although mucormycosis is an extremely rare in healthy individuals but several immunocompromised conditions predispose it. This includes uncontrolled DM with or without DKA, hematological and other malignancies, organ transplantation, prolonged neutropenia, immunosuppressive and corticosteroid therapy, iron overload or hemochromatosis, deferoxamine or desferrioxamine therapy, voriconazole prophylaxis for transplant recipients, severe burns, acquired immunodeficiency syndrome (AIDS), intravenous drug abusers, malnutrition and open wound following trauma [5].

Mucormycosis can involve nose, sinuses, orbit, central nervous system (CNS), lung (pulmonary), gastrointestinal tract (GIT), skin, jaw bones, joints, heart, kidney, and mediastinum (invasive type), but ROCM is the commonest variety seen in clinical practice worldwide [5].

Microbiological identification of the hyphae based on diameter, presence or absence of septa, branching angle (right or acute branching), and pigmentation, differentiates it from other fungal infections. The 1950 Smith and Krichner [6] criteria for the clinical diagnosis of mucormycosis are still considered to be gold standard and include:

- (i) Black, necrotic turbinate's easily mistaken for dried, crusted blood,
- (ii) Blood-tinged nasal discharge and facial pain, both on the same side,
- (iii) Soft peri-orbital or peri-nasal swelling with discoloration and induration,
- (iv) Ptosis of the eyelid, proptosis of the eyeball and complete ophthalmoplegia and,
- (v) Multiple cranial nerve palsies unrelated to documented lesions.

We conducted a single centre, retrospective study of 41 patients with Covid associated mucormycosis who presented to our hospital in the setting of acute or recent COVID-19. Majority of the patients in our study were middle-aged (age: 38 - 55 years), of which nearly two-thirds were male. This demographic profile was similar to the population of 82 mucormycosis patients studied by Chander et al, of which two third were male and aged between the ages 31 to 60 years[7]. It has been hypothesized that the effect of estrogen might be protective in systemic fungal infection, which could have led to lower incidence in females [8].

Many experts believe that the combination of high dose steroids and uncontrolled diabetes, has led to this epidemic of mucormycosis in COVID-19 patients. [9, 10, 11]

Table No. 3: Comparison Between Different Papers:

S.NO	DIABETES	CORTICOSTEROIDS
Sharma et [12]	risk factor in 90% cases	100%
Singh et [13]	risk factor in 80% cases	76.3%
Our study	risk factor in 75.6% cases	68.29 %
John et al.[16]	93%	88%
A.K. Singh, R. Singh, S.R. Joshi et al. Diabetes & Metabolic Syndrome: Clinical Research & Reviews 15 (2021) 102146 [14]	80%	76.3%)
2021 Singh et al. Cureus 13(7): e16152. DOI 10.7759/cureus.16152 [15]	61.5%)	84.6%

Airway epithelial damage and immune dysfunctions are known complications of COVID-19, which may provide an opportunity for fungus to invade lung tissues[17,18]. In this pandemic, acute shortage of oxygen and hospital beds [19] led to unhygienic delivery of oxygen including use of industrial oxygen, prolonged use of humidifiers without cleaning, and unmonitored use of oxygen delivery devices like nasal cannula (may lead to micro-injuries). This might have added fuel to this fire of CAM surge [20].

CONCLUSION

To sum up, clinicians must be aware of the risk of mucormycosis in patients suffering as well as recovering from COVID-19 especially those with inappropriate steroid therapy and with uncontrolled diabetes mellitus. Also, there is a need to stress the sensible use of steroids. Where there is no oxygen requirement and no evidence to suggest a florid inflammatory response, it would be prudent to avoid steroid and immunosuppressive use for COVID-19. Key to the management of mucormycosis remains early diagnosis and starting of appropriate antifungal treatment, and if required timely surgical intervention.

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