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Prevalence of Mucormycosis in post covid19 pandemic in tertiary care hospital

Dr. Priyanka Sharma*(Corresponding Author),Dr. Jayshree B.Bhakre,
Dr. Jyoti,A.Iravane,Dr. Mangala.S.Harbade(Co-Author),Dr.Amruta.S.Onkari.
Department of Microbiology, Govt.Medical College Aurangabad, Maharashtra, India.

Abstract
Mucormycosis is a rare fungal infection but potentially often fatal due to its vascular invasion property by the fungal hyphae and which leads to thrombosis and necrosis of the affected area mainly the sinuses[1].In india mucormycosis co-infection in COVID-19 patients at its peak in 2nd wave of COVID-19.[1]The mucormycosis association with COVID- 19 was due to several risk factors associated with it . Rhinocerebral mucormycosis are reported more commonly in people with uncontrolled diabetes and in people who had a history of kidney transplant.Mucormycosis are also the risk for immunocompromised host, uncontrolled diabetes mellitus especially diabetic ketoacidosis, treatment with glucocorticoids ,hematological malignancies[2] ***objectives*** *To study the prevalance of mucormycosis in post Covid 19 patients. Association of the Diabetes Mellitus and steroid therapy in mucormycosis development.* ***Material and methods****: A prospective observational study was conducted at a tertiary care centre over eight months ,involving all patients with mucormycosis of the paranasal sinuses suffering from or having a history of COVID 19 infection. Nasal scrapping were sent to microbiology department , all sample were inoculated on SDA at37[0] C and 25[0] C .The KOH mount were prepared from the sample and presemptive diagnosis were made.The gross and LPCB were checked to confirm the diagnosis.* ***Result*** *Study conducted on sample 328 and out of this 81 were positive for mucoreales group. The positive percentage in our center in that period was 24.6%. Confirm diagnosis for operative procedure was essential. our study help the ent surgeon for taking operative decision.* ***Conclusion*** *The mucormycosis of the paranasal sinuses must be given serious consideration. Uncontrolled diabetes and over-zealous use of steroids are main factors aggravating the illness. Early identification help in early treatment and saving patients from operation.*

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I. Introduction

Mucormycosis is a rare fungal infection but potentially often fatal due to its vascular invasion property by the fungal hyphae and which leads to thrombosis and necrosis of the affected area mainly the sinuses[1].In india mucormycosis co-infection in COVID-19 patients at its peak in 2nd wave of COVID-19.[1]

The mucormycosis association with COVID- 19 was due to several risk factors associated with it . Rhinocerebral mucormycosis are reported more commonly in people with uncontrolled diabetes and in people who had a history of kidney transplant.

Mucormycosis are also the risk for immunocompromised host, uncontrolled diabetes mellitus especially diabetic ketoacidosis, treatment with glucocorticoids ,hematological malignancies[2.]

Objectives

- To study the prevalance of mucormycosis in post Covid 19 patients.
- Association of the Diabetes Mellitus and steroid therapy in mucormycosis development.

II. Material and Method

A prospective observational study was conducted at Government Medical College Aurangabad which is a tertiary care centre over December 2020 to September 2021, involving all patients with mucormycosis of the paranasal sinuses with complaints of facial numbness, ocular pain, and dysfunction, fever, as well

as intranasal painless ulcerations with necrotic tissues.[3] The samples were collected from the affected area , as nasal scraping or mucosal tissues[4]. The sample were received in mycology section of Department of Microbiology.

As early diagnosis of mucormycosis is necessary for the better outcome of the patients and in deciding the line of treatment for the clinician , So received samples are work up for culture and the direct microscopic examination by clearing the tissue with 10% KOH mount.

All sample were inoculated on SDA at37^0 C and 25^0 C .

Some samples were reported on the same day and some took overnight time to dissolve the tissue. On KOH mount Mucorales were seen as hyaline, wide (5-20µm), thin walled , ribbon –like hyphea with no or few septation and right angled branched. Other hyaline mould shows narrow, septate and acute- angle branching[4]. The direct microscopy help in presemptive diagnosis.

Culture of specimens is essential for the diagnosis of mucormycosis since it allows identification to the genus and species level.

The growth on SDA were noted 24-48hrs of inoculation . the growth of mucorales are 'floccose cotton candy colony first white then turns grey'. Reverse is white.

Identification is based on colonial and microscopic morphology and growth temperature.

On LPCB mount the Mucorales were seen as non pigmented, wide (5-20µm), thin walled , ribbon –like hyphea with no or few septation and right angled branched. These morphological structure confirm the the mucorales group.

The slide culture were done to study the detailed morphology of the species.

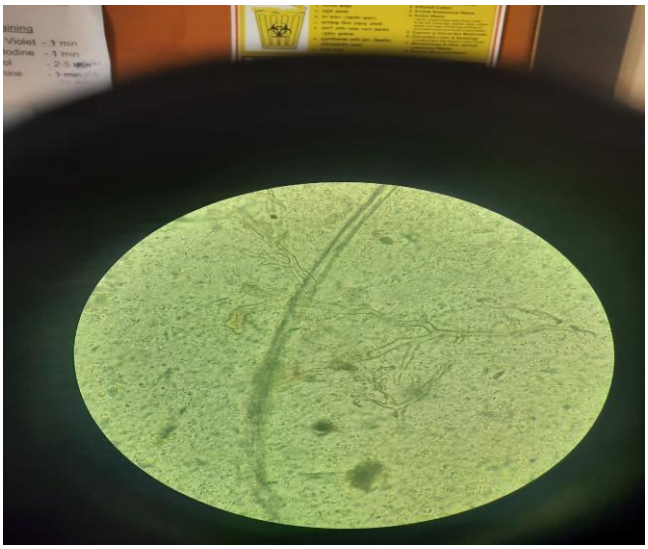


Figure 1 Shows KOH Mount of nasal scapping having mucorales present in it

Figure2 Hyaline, wide (5-20µm), thin walled , ribbon –like hyphea with no or few septation with wide angled branch.

Figure 3 Shows growth as 'floccose cotton candy colony first white then turns grey'. Reverse is white.

Figure 4 shows LPCB mount which shows broad aseptate hyphae, with extention of columella into sporangium.

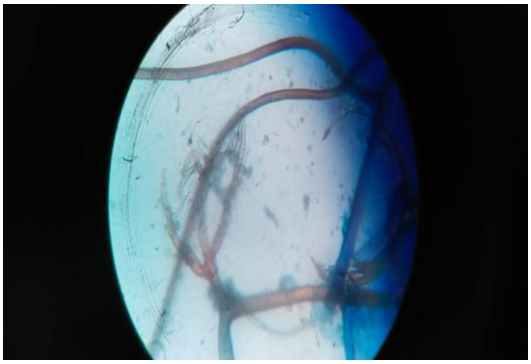


Figure 5 shows broad aseptate hyphae,with rhizoid present.

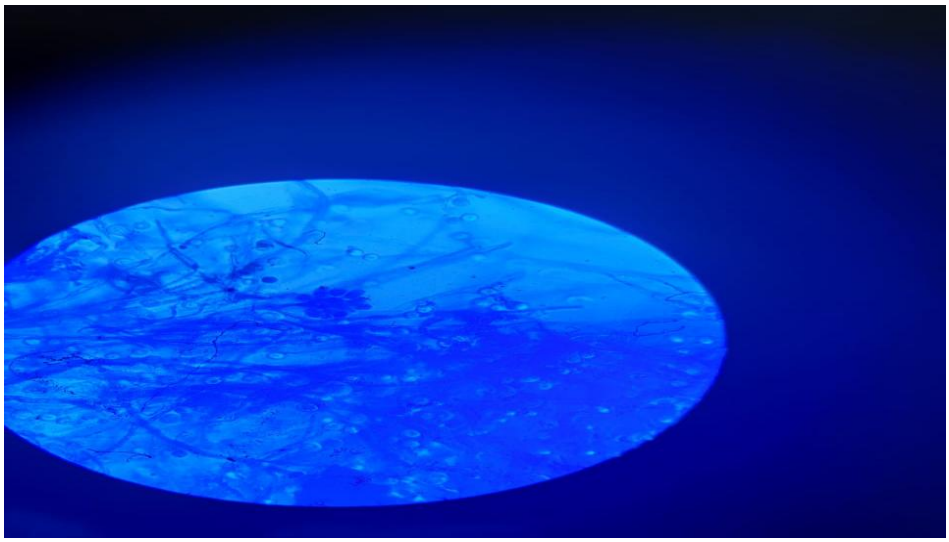


Figure 6 LPCM mount showing Cunnighemella sporangiophore covered with sporangiola.

III. Result

Total samples received were 328 in study period of eight months from December 2020 to September 2021and 81 were positive for Mucorales group. The positive percentage in our center in that period was 24.6% for Mucorales group. out of 328 sample received we got Aspergillus flavus 45(,aspergillus fumigates 38(some sample also showed the growth of Candida albicans in 50 recieved sample and Candida non albicans in 40 samples. 74 sample out of 328 were sterile on culture. Confirm diagnosis for operative procedure was essential. Our study help the ENT surgeons for taking operative decision.

Table 1 Maximum infection were seen in male as shown in table 1.

	Male	Female
Negative for mucorales	138	109
Positive for mucorales	57	24
Total	195	133
Positive Percentage	41%	22%

Table 2 the age limit in our study was from 20 to 80 yrs . The Mucormycosis was more prevalent in less than 40yrs of age in this study.

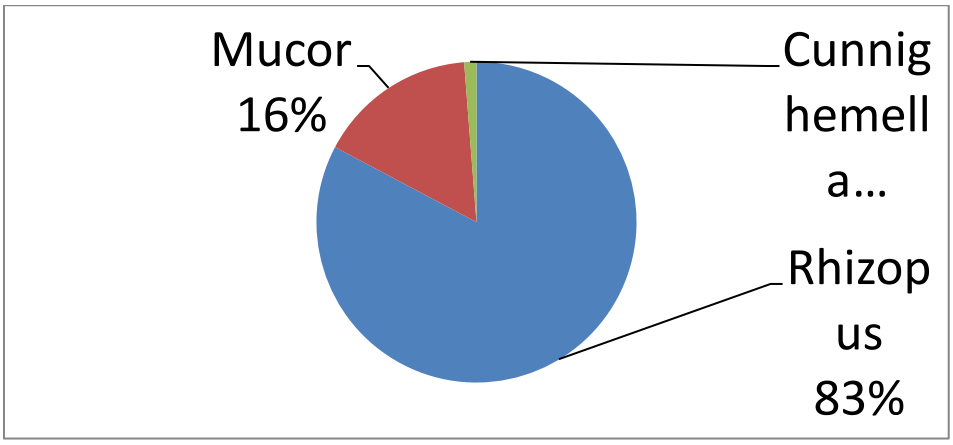
Total	Less than 40 yrs	More than 40 yrs
Positive for mucorales	23	58
Negative for mucorales	60	187
Total	83	245
Positive percentage	27%	

Table 3 shows the association of risk factors in development of Mucormycosis.

Total	Diabetic	Steroid therapy
328	320	295
Positive for mucorales	288	295

Table 4 shows speciation of mucorales grown in the received sample.

Total positive mucorales	Rhizopus	Mucor	cunnighemella
81	67	13	01



IV. Discussion

The mucormycosis are ubiquitous in Nature. They may easily be acquired and may pose a threat during Covid 19 pandemic as it has been observed in India.[2] Due to the high rise in cases of mucormycosis in the second COVID-19 pandemic wave and association of it with severe complications and higher fatality rate in post COVID-19 patients, so it is now a disease of concern in India. It is postulated that the use of non-sterile medical supplies might be associated with spore contamination and higher exposure of patients to mucormycosis[7]. COVID-19 patients had severe pneumonia requiring intensive care, intubation and ventilation. In addition, most patients had underlying diabetes mellitus and had received steroids [5,7,8]. The diabetes mellitus is a major predisposing factor for mucormycosis as described in Kamlesh et al 10 (50%) of 34 patients with rhino-orbital–cerebral mucormycosis[1]. On the basis of anatomical site involved, mucormycosis is classified into the following forms: rhino-cerebral, pulmonary, gastrointestinal, cutaneous, and disseminated.[5] Most common form of mucormycosis reported in present study is rhino-cerebral mucormycosis.

The diabetes mellitus among patients with COVID-19 was 74% in present study which is higher than other study which correlates with other study like 54–76% in Iyer Mahalaxmi et al study[9,10]. Corticosteroid are currently the main effective treatment of COVID-19 in clinical trials therapy[11].The high dose corticosteroid had been used in patients with COVID-19 disease [11]. In the similar studies of Kamlesh et al it shows the use of corticosteroid as 60% and present study the use of corticosteroid is 82%. In many studies it has been seen that males were more affected than females.[3,9,10] The present study also correlates with the other study. The patients requiring ICU was 9% of the total positive mucorales in our study. Anna Skiada et al study shows 11.11% patients requiring ICU. Jafal at al shows the rate of admission to ICU was 5% of all COVID-19 patients. The age group which shows more of mucormycosis was in 22-86 yrs of age. This shows that the the range of affected age was wide. In present study the mucormycosis of more seen in age of less than 40yrs with positivity of 27%. The speciation was done for mocorales group.out of 81 positive mucorales 67(82.71%) were rhizopus spp. 1 cunninghemella was isolated in present study. Most common isolated mucorales were Rhizopus in different study. Kamlesh et al study shows 25% of rhizopus, 31% Was seen in Iyer Mahalaxmi et al.

The outcome of the patient was favourable when they were detected earlier and the debriebment was done of the localized lesion. The outcome was favorable who had gone through surgical debridement in 40 cases in present study. An effective approach for aspergillosis in COVID-19 was developed[12] and a similar line of treatment is needed for mucormycosis in SARSCoV-2 infected patients The unfavourable outcome was more when it became disseminated. The use of Amphotericin B was wide and it shows favouable result. In present study the mortality of positive confirmed cases were 10 which was due to dessimination of the disease.

The presence of all the pre-disposing factors in association with high fungal spore burden in certain localities and communities may set the storm for the development of mucormycosis in COVID-19 patients. Early diagnosis of cases of mucormycosis and timely treatment with antifungal drugs and surgical operations are required for pandemic situation to control. Glycemic levels and use of corticosteroids in patients with COVID-19 is important to lower the chances of mucormycosis in this pandemic. Appropriate hygienic and sanitization measures would aid in limiting the rising cases of this fungal infection. Research are required to study COVID-19, how come mucormycosis infections cases are being reported from India as compared to other countries in second wave of ongoing pandemic.

V. Conclusion

The Mucormycosis of the Rhinocerebral form must be given serious consideration. Morbidity and mortality are linked to the invasive nature of the underlying disease. However, even with COVID-19, early intravenous anti-fungal treatment and surgical debridement were associated with favorable outcomes.

Uncontrolled diabetes and use of steroids are main factors showing increase in the illness. Early identification of the disease and screening help in early treatment and saving patients. This is important step in deciding the outcome of the patient. Adopting appropriate hygienic and sanitization measures would act as barrier for limiting the rise of cases of this fungal infection. The clinician should also be inspired to have regular random blood glucose checks for non-diabetic patients along with their diabetic cases of COVID-19. Proper preventive measures, early diagnosis, and appropriate care, for any infective disease for containment of any pandemic which is going on in the world.

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