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DETECTION OF MUCORMYCOSIS DURING COVID ERA IN A RURAL HEALTH CARE CENTRE: INDIA

Seema Mittal — Associate Professor, Microbiology, BPS GMC, Khapurkalan, Sonepat-131305, India

Priyanka soni — Sr. Resident, Microbiology, BPS GMC, Khapurkalan, Sonepat-131305, India

Diksha Budhani

Surinder Kumar — HOD and Professor, Microbiology, BPS GMC, Khapurkalan, Sonepat-131305, India

ABSTRACT **Background:** Coronavirus disease (COVID-19) remains a major health concern with new challenges emerging as the pandemic progresses. COVID-19 patients outcomes is further complicating with the recent emergence of opportunistic infections especially mucormycosis and aspergillosis. COVID-19 treatment largely remains systemic steroids and other immunomodulators that add to the risk of invasive fungal infection. **Aim:** The present study was done to know the prevalence of Mucormycosis cases in Covid era in a teritiary care centre. **Methods:** The study was carried out over a period of 1year from Jan 2021 to Dec 2021. A total of 219 non-duplicate clinical specimens (BAL, Nasal swab and sputum) was sent to the Microbiology Laboratory. The isolates were subjected for either direct microscopy or Culture or both according to the investigation slip of the patient. Culture was done on Sabouraud dextrose agar. **Results:** Out of total 219 samples 69 patients were positive in direct microscopy and 62 were showing growth in culture. The most common age group was 30-40% (18.3%). In our study, Males were more predominant with (18.3%). However our study revealed, Mucor (33.3%) followed by Dematiaceous (39.13) fungi showed highest growth in microscopy and in culture Dematiaceous (43.54%) followed by Mucor (19.35%) showed highest growth. **Conclusion:** Increase in mucormycosis in Indian context appears to be due to rampant use of corticosteroid. All efforts should be made to maintain optimal hyperglycemia and only judicious evidence-based use of corticosteroids in patients with COVID-19 is recommended in order to reduce the burden of fatal mucormycosis.

KEYWORDS :

INTRODUCTION

Coronavirus disease 2019 (COVID-19) pandemic continues to be a major health problem worldwide. COVID-19 presentation has been diverse, ranging from mild (flu-like symptoms) to severe life-threatening pneumonia with multiorgan involvement [1].

The definitive treatment of COVID-19 continuous to be controversial despite being more than one year into this pandemic. However, systemic steroids have shown some survival benefits [2]. But, On the other side Several cases of fungal infections especially mucormycosis and aspergillosis in people with COVID-19 have been increasingly reported world-wide, in particular from India. The primary reason that appears to be facilitating Mucorales spores to germinate in people with COVID-19 is an ideal environment of low oxygen (hypoxia), high glucose (diabetes, new-onset hyperglycemia, steroid-induced hyperglycemia), acidic medium (metabolic acidosis, diabetic ketoacidosis [DKA]), high iron levels (increased ferritins) and decreased phagocytic activity of white blood cells (WBC) due to immunosuppression (SARS-CoV-2 mediated, steroid-mediated or background comorbidities) coupled with several other shared risk factors including prolonged hospitalization with or without mechanical ventilators [3].

Less than 1% of secondary infections were fungal in the early part of the pandemic. However, In India recent reports of a rise in systemic fungal infections, particularly invasive mold, have raised a lot of concern. In the general population, in the pre-COVID era, the incidence of mucormycosis was very low, varying from 0.005 to 1.7 per million [4]. In the 2003 outbreak of SARS CoV infection, the incidence of fungal infection was 14.8-27%, and it was the main cause of death for severe acute respiratory syndrome patients, accounting for 25-73.7% of all causes of death. The lesson learned from 2003 shows that there was a high probability of increased incidence of fungal infection in SARS CoV affected or recovered patients, like the finding being seen now with SARS-CoV-2 [5-7].

MATERIAL AND METHOD

This retrospective study was carried out from Jan 2021 - Dec 2021 in a tertiary care centre. Study group includes patients of all age groups attending Inpatient and Outpatient department.

A total of 219 non-duplicate clinical specimens (BAL, Nasal swab and sputum) was sent to the Microbiology Laboratory over the study period were processed by conventional microbiological techniques.

The isolates were subjected for either direct microscopy or Culture or both according to the investigation slip of the patient. Mucorales are saprophytes found in soil and decomposing organic waste. They thrive at temperatures ranging from 25 to 55˚C on fungal culture media (e.g., Sabouraud dextrose agar). Mucorales in clinical specimens grow at 37˚C, forming fluffy white, grey, or brownish colonies that quickly fill the Petri dish in 1–7 days. Although fungal cultures were shown to be positive in only 28% of cases, For direct microscopic, treatment with potassium hydroxide was done. Koh mount shows characteristic broad, non-septate, ribbon-like hyphae with wide-angle or right-angle branching. Culture was done on Sabouraud dextrose agar.

RESULT

A total of 219 samples were isolated, during a period of one year (Jan 2021-Dec 2021). Out of which 69 patients were showing fungal elements in direct microscopy and 62 were showing growth in culture. The most common age group was 30-40% (18.3%) followed by 40-50% (16.9%) [Table1]. In our study, Males were more predominant with (18.3%) followed by (16.9%) [Table 1]. However our study revealed, Mucor (33.3%) followed by Dematiaceous (39.13) and aspergillus (17.39%) fungi showed highest growth in microscopy [Table-2] and in culture Dematiaceous (43.54%) followed by Mucor (19.35%) and Aspergillus (19.35%) showed highest growth [Table-3]. Mucor (52.2%) and Dematiaceous (81.5%) fungus was mainly isolated from OPD patients [Table-4]. Majority of the positive samples were isolated from Nasal swab followed by BAL specimen [Table-5].

Table1-Showing age and sex wise distribution of patients

Age Group	Sex	
	Male (%)	Female (%)
0-10	2 (0.91)	4(1.82)
10-20	1 (0.45)	1(0.45)
20-30	9 (4.10)	4(1.82)
30-40	40 (18.3)	13(5.93)
40-50	37 (16.9)	12(5.5)
50-60	34 (15.52)	8(3.65)
60-70	25 (11.41)	12(5.5)
70-80	10 (4.6)	3(1.4)
80-90	3 (1.4)	1(0.45)
Total	161/219(73.5)	58/219(26.5)

Table2 -Identification of fungus on the basis of microscopy

Identification	Candida n=69	Mucor n=69	Dematiaceous n=69	Aspergillus n=69
Microscopy	7(10.14)	23(33.33)	27(39.13)	12(17.39)

Table3-Identification of fungus on the basis of culture

Identification	Candida n=62	Mucor n=62	Dematiaceous n=62	Aspergillus n=62
Culture	11(17.74)	12(19.35)	27(43.54)	12(19.35)

Table4-Ward wise distribution of patients according to microscopy and culture

Ward	Type of fungus							
	On the basis of Microscopy				On the basis of Culture			
	Candida n=7	Mucor n=23	Dem. n=27	Asp. n=12	Candida n=11	Mucor n=12	Dem. n=27	Asp. n=12
OPD	2	12(52.2)	22(81.5)	3(25)	4(36.4)	6(50)	22(81.5)	3(25)
IPD	4	9(39.1)	5(18.5)	7(58.3)	5(45.4)	4(33.3)	5(18.5)	7(58.3)
NICU	1	2(18.2)	00(00)	2(16.7)	2(18.2)	2(16.7)	00(00)	2(16.7)

Table5-Specimen wise distribution of Fungus

SAMPLE	Type of fungus							
	On the basis of Microscopy				On the basis of Culture			
	Candida n=7	Mucor n=23	Dem. n=27	Asp. n=12	Candida n=11	Mucor n=12	Dem. n=27	Asp. n=12
Nasal swab	4(57.1)	15(65.2)	14(51.8)	8(66.7)	6(54.5)	8(66.7)	14(51.8)	8(66.7)
BAL	1(14.3)	7(30.4)	7(25.9)	2(16.7)	3(27.2)	2(16.7)	7(25.9)	2(16.7)
Sputum	2(28.6)	1(4.3)	6(22.2)	2(16.7)	2(18.2)	2(16.7)	6(22.2)	2(16.7)

DISCUSSION

Mucormycosis are ubiquitous in nature and thus may easily be acquired, and its global epidemiology has been studied by several investigators [8], During the second COVID-19 pandemic wave there was a sudden rise in mucormycosis cases with severe complications and associated higher fatality rate in post COVID-19 patients, this rare disease is now a notifiable disease in India. The use of non-sterile medical supplies might be associated with spore contamination and higher exposure of patients to mucormycosis [9-10]. As summarized in Tables 1 , The average age group affected in our study was around 30–40 years and more commonly affected were males which similar to the study done by AwadheshHYPERLINK "h ttps:/ /www .nc bi. nlm.nih.gov/pubmed/?term=Singh%20AK%5BAuthor%5D&cautho r=true&cauthor_uid=34192610" Kumar Singh et.al and balai et al [11-12].

The study shows Dematiaceous (39.13) followed by Mucor (33.3%) fungi showed highest growth in microscopy and in culture also Dematiaceous (43.54%) followed by Mucor (19.35%) showed highest growth. The reason behind mucor showing less growth in culture may be due to hyphae are friable in nature and hence may be damaged during tissue manipulation (avoidance of excessive tissue homogenization is recommended). In contrast to our study Poorna priya et.al who have shown mucor as most common fungus reported in COVID era [13]. Chen et al. found 5% cases of fungal coinfections out of 99 cultures isolated from COVID-19 positive cases, including one case of Aspergillus flavus, one case of Candida glabrata, and three cases of C. albicans [14]. A German study found COVID-19 associated invasive pulmonary aspergillosis (IPA) in five (26.3%) of 19 critically ill patients with moderate to severe ARDS [15]. In Netherlands, there were six patients (19.4%) presumed IPA in 31 ICU patients, of which five were identified as A. fumigatus [16]. Amongst all fungal co-infections, the incidence rate of mucormycosis was 0.005 to 1.7 per million population [17].

Mucor (52.2%) and Dematiaceous (81.5%) fungus was isolated from OPD patients and mainly from Nasal swab followed by BAL specimen.In contrast to our study Sindhu et al. reported mucormycosis at 12% in ICU patients at a single centre from North India. Scarce data exist regarding it [18].

CONCLUSION

Mucormycosis is an emerging problem in individuals with COVID-19 as well as the healed cases and denotes a poor prognosis. Increase in mucormycosis in Indian context appears to be due to rampant use of corticosteroid. All efforts should be made to maintain optimal hyperglycemia and only judicious evidence-based use of corticosteroids in patients with COVID-19 is recommended in order to reduce the burden of fatal mucormycosis. The multisystem involvement and rapid progression associated with the disease warrants additional medical intervention and must be given priority.

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