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Original Research Article

Demographic and Laboratory Evaluation of the Mucormycosis Received During or Post COVID-19 Treatment

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Abstract

Aim: The aim of the present study was to detect mucormycosis in the clinical species received during or post COVID-19 treatment in our laboratory**.**

Material & Methods: A cross-sectional observational study conducted in a tertiary care hospital for five months in association with Department of Microbiology. 50 patients were included in the study.

Results: Total of n=60 suspected sputum; nasal swab and BAL samples from N=50 of participants were received in our microbiology laboratory during study period. Age, sex and other demography details were collected before sample collection, the average age of the participants was 63.7 ±8.4 years and the majority of participants were male (80%). Although, 44% participants belong to 41-60 year age and 56% of participant belongs to 61-80 year age.

Conclusion: The present study concluded that the cases of life-threatening MC increase day by day in central India as post complication of covid-19 disease.

Keywords: COVID-19; Corticosteroid; Diabetes mellitus; Fungus; Mucormycosis

Introduction

The novel corona-virus 2019 (nCoV-2019) or Serve Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) was an outbreak from Wuhan, China in 2019 and spread rapidly on a global platform forming a global pandemic. [1,2] One may suffer mild to moderate respiratory issues if infected with COVID-19, but in many cases, the virus is affecting different systems of the body at the same time. The covid19 disease causes a range of mild to deadly pneumonia with association of other bacterial, viral and fungal co-infection. Long hospital stay promotes secondary infections in the covid-19 patients and the immune-compromised patients are more prone to develop severe opportunistic infections. [3,4] Apart from attacking the respiratory tract, COVID-19 is also angioinvasive and affects our immunity also. But of late, a number of cases have been reported of mucormycosis in COVID-recovered patients from different states of India. [5]

Although COVID-19- associated pulmonary aspergillosis has been the primary focus in the literature of COVID-19 secondary infections, [6,7] other fungal superinfections, including Candida infections, [8] rare mould infections (fusariosis), [9,10] and COVID-19-associated mucormycosis. [11-13] Mucormycosis is a rare but severe fungal infection caused by the Mucorales species of phylum Zygomycota. Naturally, Mucorales occur in soil, their spores spread by air often contaminate foods, water, and clinical specimens. It is aggressive fungal disease and it mainly affects patients with poorly controlled diabetes mellitus and severely immunocompromised patients. [14]

The risk factors predisposing patients to mucormycosis are uncontrolled diabetes, neutropenia, haematological malignancies, organ transplantation, trauma and burn, and use of immunosuppressants such as corticosteroids. [11,15,16] COVID-19-associated mucormycosis can also be mistaken for other angioinvasive fungal infections, particularly with COVID-19-associated pulmonary aspergillosis being the predominant mould disease in COVID-19-associated acute respiratory distress syndrome. The reversed halo sign, predominantly in the peripheral locations of the lung, has been considered to be suggestive of pulmonary mucormycosis in patients with immunodeficiency and useful for the initiation of pre-emptive antifungal therapy; [17] Although cavitary lung lesions might be more specific for mould disease in COVID-19 than the reversed halo

sign, these lesions are frequently observed in both COVID-19-associated pulmonary aspergillosis and pulmonary COVID-19-associated mucormycosis. [18] In the absence of serum antigenic biomarkers and because the availability of PCR testing is low, particularly in low-income and middle-income countries, COVID-19- associated mucormycosis diagnosis is also challenging, with conventional culture and histopathological demonstration of Mucorales being the mainstay of diagnosis, albeit with low sensitivity. In this Covid19 era, the rate of MC cases rapidly growing in the Covid19 patients in India. Mucormycosis is difficult to diagnose which affects outcomes and results in a poor prognosis. Delay in diagnosis increase the mortality rate by about 35- 66%. [19,20] Hence the aim of the study was to detect MC in the clinical species received during or post covid-19 treatment in our laboratory**.**

Material & methods

A cross-sectional observational study conducted in a tertiary care hospital for five months months in association with Department of Microbiology, Government Medical College, Bettiah, Bihar, India. 50 patients were included in the study.

Methodology

The demographic details and clinical diagnosis were recorded from medical records. During the study period, our microbiology laboratory received various specimens such as nasal swabs, ET secretion, sputum, and tissues from our IPD departments such as ICU, and Covid19 ward for the detection of fungal infection in the specimens. Patients admitted in our hospital with a history of fever, cough, body ache and shortness of breath for 4-5 days with have positive report of nasopharyngeal/ oropharyngeal swab for covid19 RT-PCR were included in the present study. Wound swabs were rejected. If the specimens were transported to the laboratory in a sterile container and swabs, the aspirates were immediately performed direct microscopy, KOH smear preparation and gram's stain. Identification was done on the basis of morphology in the microscopy.

Statistical Analysis

Statistical analysis (Mean, % Value etc.) was done using MS excel 2013.

Results

Table 1: Demographic profile of participants

Gender	**N**	**%**
Male	40	80
Female	10	20
Age in years		
21-40	0	0
41-60	22	44
61-80	28	56
Past history of Disease (Immuno-compromised)		
Male	40	88.88
Female	5	11.12
Positive RT-PCR report of nasopharyngeal/ oropharyngeal swab for covid-19		
Male	40	100
Female	10	100
Total stay in hospital (in days)		
10-20 days	32	64
>20 days	18	36
Type of specimens N=60		
Sputum	30	50
Nasal swab	18	30
BAL	12	20

Total of n=60 suspected sputum; nasal swab and BAL samples from N=50 of participants were received in our microbiology laboratory during study period. Age, sex and other demography details were collected before sample collection, the average age of the participants was 63.7 ±8.4 years and the majority of participants were male (80%). Although, 44% participants belong to 41-60 year age and 56% of participant belongs to 61-80 year age.

Discussion

One may suffer mild to moderate respiratory issues if infected with COVID-19, but in many cases, the virus is affecting different systems of the body at the same time. After months of research, it is now known that apart from attacking the respiratory tract, COVID-19 is also angioinvasive and affects our immunity also. But of late, a number of cases have

been reported of mucormycosis in COVID-recovered patients from different states of India. This post-COVID complication has mainly been seen in diabetics or those treated with steroids. Glucocorticoids are inexpensive, widely available, and have been shown to reduce mortality in hypoxemic patients with COVID-19. [5] The post-COVID-19 state shall be defined as four weeks from the date of being reverse transcription–polymerase chain reaction (RT–PCR) negative (or equivalent laboratory estimation, or clinical criteria constituted by three days without fever and any other symptom. [21]

Total of n=60 suspected sputum; nasal swab and BAL samples from N=50 of participants were received in our microbiology laboratory during study period. Age, sex and other demography details were collected before sample collection, the average age of the participants was 63.7 ±8.4 years and the majority of participants were male (80%). Although, 44% participants belong to 41-60 year age and 56% of participant belongs to 61-80 year age. The genera of Mucorales are one of the best decomposers of organic materials and are often found in decaying organic materials such as rooted fruits and vegetables, plant litter, and animal manure. [22] The Mucor sp., Rhizopus sp., Asidia and Cunningham ella are the main causative agent for MC in humans. [23] Spores of the mucorales are highly prevalent in the air. Patients acquire the infection by inhalation, ingestion or traumatic inoculation of the spores from the environment. [24] Other than environmental factors, uncontrolled diabetes mellitus, inappropriate steroid therapy, increased iron accumulation, and the damage caused by the COVID-19 virus may responsible for the MC. [25] Mortality rate of MC is very high, early diagnosis is very essential to reduce the sever morbidity and mortality of patients. [26] The standard approaches for the treatment of MC are usually based on the combination of antifungal therapy and surgical removal of involved tissues. [27]

Conclusion

Mucormycosis is serious threats in this covid-19 pandemic situation; cases of MC continue to increase in post covid-19 disease patients in India. It is a life-threatening disease that happens due to black mold. The MC occurring in the post Covid-19 patients are a secondary infection and directly linked with the virus, poor glycemia control, widespread use of corticosteroids, and invasive ventilation. Therefore, early screening and diagnosis are much-needed to prevent is a life-threatening event cause by the black mold in post Covid-19 infection.

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