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Original Research Article

Profiling of mucormycosis in district of central rural India during COVID-19 pandemic: a record-based study

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ABSTRACT

Background: Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been associated with a wide range of opportunistic bacterial and fungal infections. Several cases of Mucormycosis 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).
Methods: Secondary data was obtained from District health office Wardha. We took Mucormycosis related data for May 2021 to August 2021. A Secondary data analysis was done as an age wise distribution, Sex wise distribution, classification of Mucormycosis and case load in Wardha district.
Results: Total cases (overall) was about 132. 91% cases are totally recovered. In overall cases, 106 males and 26 females were affected due to Mucormycosis. Out of 132 cases, 128 cases were of Rhino cerebral type of Mucormycosis. 48% cases of Mucormycosis were from 45 to 60 years old patients.127 cases of Mucormycosis were related with COVID history and only 5 cases of Mucormycosis were not related with COVID history. 53% cases were needed oxygen support prior onset of case.
Conclusions: A multidisciplinary strategy should incorporate early diagnosis, antifungal therapy, any necessary surgical consultation and treatment, as well as reversal of the underlying illness. Identification of individuals at risk, strict glycaemic control and avoidance of unnecessary corticosteroid in non-severe COVID-19 cases (normal oxygen saturation on room air) can help in preventing this complication.

Keywords: Mucormycosis, COVID-19, Record based study

INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that causes coronavirus disease 2019 (COVID-19) has been linked to a variety of opportunistic bacterial and fungal diseases.[1] Aspergillus and Candida have both been identified as the primary fungi that co-infect COVID-19 patients.[2] An rising number of instances of mucormycosis in COVID-19 carriers have been documented worldwide, particularly in India. An ideal environment of low oxygen (hypoxia), high glucose (diabetes, new onset hyperglycaemia, steroid-induced hyperglycaemia), 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.[2] According to a recent estimate for the years 2019-2020, the prevalence of mucormycosis ranged from 0.005 to 1.7 per million people worldwide, however it is approximately 80 times more common (0.14 per 1000) in India than in wealthy nations.[2] The majority of the world's mucormycosis cases are in India. Despite this, India was the world's diabetes capital and already has the second-highest prevalence of diabetes mellitus (DM).[2] Even a brief course of corticosteroids has lately been documented to link with mucormycosis, particularly in persons with diabetes mellitus. While long-term usage of corticosteroids has frequently been associated with many opportunistic fungal infections, including aspergillosis and mucormycosis. Immuno-compromised individuals are predisposed to mucormycosis by a cumulative prednisone dose of more than 600 mg or a cumulative dose of 2-7 g of methyl prednisone given in the preceding month.[2] Spores can be inhaled to spread the disease, or they can be directly injected into damaged skin or mucous membranes to spread the disease. The etiologic agents, particularly in diabetes individuals who are immunocompromised, can result in infections with a high fatality rate.[3] Several species of the order Mucorales, which are known for their propensity to disseminate, are involved in infections of the rhino cerebral, pulmonary, cutaneous, gastrointestinal, and other less common organs in immunocompetent and immunocompromised people. The majority of isolates collected in a clinical environment are Rhizopus species members, with Rhizopus arrhizus showing up most commonly. While Cunninghamella, Apophysomyces, (Lichtheimia), Saksenaea, Rhizomucor, and Cokeromyces, Syncephalastrum each make up a much lesser fraction of clinical isolates, members of the genus Mucor follow Rhizopus in terms of frequency.[3] Patients with haematological illnesses and transplant recipients frequently experience pulmonary type, which is the second most prevalent location of involvement.[4] In pulmonary mucormycosis, haematological malignancy was the leading risk factor (32-40%), followed by diabetes mellitus (32-56%), haematopoietic stem cell transplant (1-9.8%), solid organ transplant (6.5-9%), and renal illness (13-18%).[4]

Although rhinoorbitocerebral mucormycosis (ROCM) is the most prevalent form observed in clinical practise globally, mucormycosis can affect the nose, sinuses, orbit, central nervous system (CNS), lung (pulmonary), gastrointestinal tract (GIT), skin, jaw bones, joints, heart, and mediastinum (invasive kind).[5] Invasive mucormycosis cases have increased as a result of the widespread use of voriconazole for prevention or treatment of aspergillosis in individuals with haematological malignancies. Patients who have high iron serum concentrations as well as phagocytic dysfunctions brought on by neutropenia or ketoacidosis are more likely to develop mucormycosis. The most frequently reported localised symptom is the rhinocerebral form of presentation, which is followed by pulmonary, cuta- neous, gastrointestinal, and widespread infections.[6] Amphotericin B is the preferred method of treatment for mucormycosis. Because amphotericin B has a high incidence of nephrotoxicity, it is crucial to keep an eye on kidney function when administering it. Second-line therapy may be considered in cases of severe illness. A second-line therapy that is advised is a combination therapy using echinocandins and amphotericin B. The rhinocerebral form of presentation is the most frequently reported localized symptom, followed by pulmonary, cuta-neous, gastrointestinal, and disseminated infections.[7] Aspergillus species identification in this cohort was extremely rare, occurring in just 4 respiratory cultures. This figure is significantly lower than recent reports showing that up to 19% of COVID-19 ICU patients had Aspergillus infections.[8]

Aim and objectives

Aim and objective of current study was assessment of epidemiological profile of mucormycosis in district of central rural India

METHODS

A cross sectional study was done with the help of data taken from the district health authority from May 2021 to August 2021 for Mucormycosis cases. Mucormycosis cases were managing in the tertiary care centre. COVID 19 Portal website was used for analysis and monitoring preparedness for Covid Pandemic. District health authority used to update COVID 19 portal website for monitoring availability of ICU for management of Mucormycosis cases. Data analysis was done by using MS Excel.

RESULTS

Among the 132 Patients the Mean age was 52 with the standard Deviation 12 (Table 1). Total cases of Mucormycosis reported was about 132. Out of these 124 cases were cured and 8 death were occurred (Table 2).

Table 1: Details of data distribution (patients age).

Parameters	Observations
Mean	52.5
Median	53
Mode	45.0
Standard deviation	12.0
Minimum	15
Maximum	85

Table 2: Distribution of cases of Mucormycosis.

Overall cases	N	%
Cured	124	93.93
Death	8	6.06
Total cases (overall)	132	100

Table 3: Age group wise distribution of cases.

Age group (years)	N	%
<18	1	0.75
>18 and <45	37	28.03
>45 and <60	64	48.48
>60 age	30	22.72

Table 4: Classification of Mucormycosis.

Mucormycosis cases (Classified)	N	%
Rhinocerebral	128	96.96
Pulmonary	1	0.75
Cutaneous	0	0
Gastrointestinal	0	0
Disseminated	0	0
Uncommon presentation	3	2.27

Table 5: Mucormycosis cases with COVID or non-COVID history.

COVID/Non COVID history	N	%
With COVID history	127	96.21
Non COVID	5	3.78

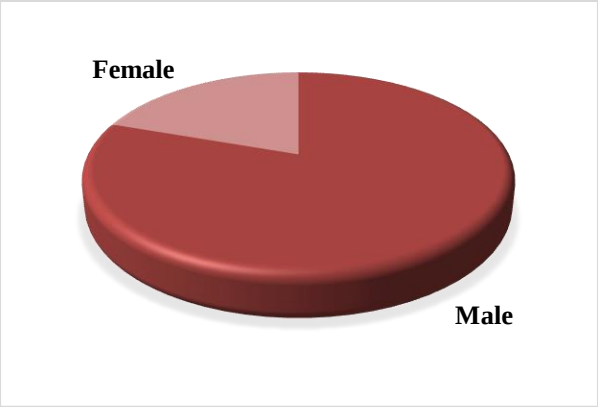

Figure 1: Gender wise distribution of Mucormycosis cases.

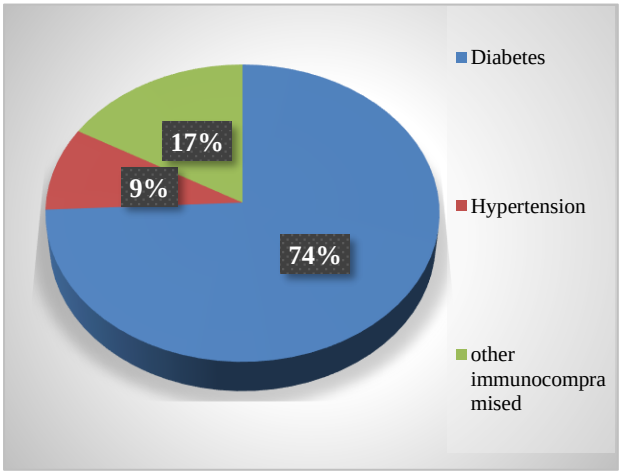

Figure 2: Mucormycosis with comorbidities.

DISCUSSION

The COVID-19 epidemic has caused unprecedented-scale social and economic changes as well as massive mortality and morbidity. To advance knowledge of the novel viral infection, international scientific cooperation and the dissemination of new information are essential.[9] As a co-infection and a result of COVID-19, rhinoorbitocerebral mucormycosis is predicted to become more common. The likelihood of survival can be increased by early identification, treatment with effective and aggressive antifungals, and surgical debridement.[9] Although mucormycosis is relatively rare in healthy people, it is more common in people with immune system weakness. These conditions include uncontrolled diabetes mellitus (uncontrolled DM) with or without DKA, haematological and other cancers, organ transplantation, protracted 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 users, malnutrition.[9] Although ROCM is the most prevalent variant encountered in clinical practise around the world, mucormycosis can affect the nose, sinuses, orbit, central nervous system (CNS), lung (pulmonary), gastrointestinal tract (GIT), skin, jaw bones, joints, heart, kidney, and mediastinum (invasive kind).[2] In a recent systematic study, diabetes mellitus was recorded in 93% of cases while 88% were receiving corticosteroids. The review covered 41 confirmed mucormycosis cases in people with COVID-19.[10] These results are in line with those of a much larger case series of 101 mucormycosis cases (95 confirmed and 6 suspected) from COVID-19, where 80% of cases had DM and more than two-thirds (76.3%) had received a course of corticosteroids. Collectively, these results point to a well-known link between mucormycosis, hyperglycaemia, and steroids in COVID-19 patients.[2]

Alveolointerstitial pathology and severe pulmonary disease are common side effects of COVID-19 illness. This alone may put people at risk for invasive fungal infections of the sinuses, lungs, and other airways.[11]Due to immunological dysregulation brought on by COVID-19, which is characterised by reduced T lymphocytes, especially CD4 and CD8 cells, there is also a change in innate immunity.[12] As a result, when treating individuals with COVID-19 sickness, all medical professionals, including ophthalmologists, should be aware of the potential for the development of fungal infections such mucormycosis.[13] 68 (82.9%) of the patients received antifungal medication, of which 64 (78%) received amphotericin B. (either conventional or liposomal formulation). The majority of patients made a full recovery, however 25 passed away. The remaining patients left against doctors' recommendations. There are a number of factors that contribute to the poor prognosis in Mucormycosis; these mostly include the necessity for continuous antifungal therapy together with surgical

intervention, which necessitates extensive debridement. By the time the patient presents to the clinician, the infections are frequently fairly advanced and have a severe tendency to spread quickly. Since Mucormycosis typically has a poor prognosis, it is important to be alert about host populations, risk factors, epidemiology, and early management to ensure a positive outcome.[14] Previously study had also reported the mean age of Mucormycosis patients to be 38.8 years, with median age 40.0 years and a total of 65% of the infections in males.[15] Similarly, in a data of 465 cases of Mucormycosis without COVID-19 in India, Patel et al has shown that rhino-orbital presentation was the most common (67.7%), followed by pulmonary (13.3%) and cutaneous type (10.5%). The predisposing factors associated with Mucormycosis in Indians include diabetes mellitus (73.5%), malignancy (9.0%) and organ transplantation (7.7%).[16] A major disadvantage of using secondary data is that it may not answer the researcher's specific research questions or contain specific information that the researcher would like to have. Or it may not have been collected in the geographic region desired, in the years desired, or the specific population that the researcher is interested in studying. Since the researcher did not collect the data, he or she has no control over what is contained in the data set. Often times this can limit the analysis or alter the original questions the researcher sought out to answer. Major disadvantage to using secondary data is that the researcher/analyst does not know exactly how the data collection process was done and how well it was done. The researcher is therefore not usually privy to information about how seriously the data are affected by problems such as low response rate or respondent misunderstanding of specific survey questions.

CONCLUSION

A multidisciplinary strategy should incorporate early diagnosis, antifungal therapy, any necessary surgical consultation and treatment, as well as reversal of the underlying illness. Identification of individuals at risk, strict glycemic control and avoidance of unnecessary corticosteroid in non-severe COVID-19 cases (normal oxygen saturation on room air) can help in preventing this complication. To save individuals from unnecessary deaths, improving local diagnostic capacities and formation of multidisciplinary teams are essential in providing early diagnosis and treatment.

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