Section: General Medicine

Original Research Article

A STUDY OF CORRELATION OF INFLAMMATORY MARKERS IN PATIENTS OF MUCORMYCOSIS IN COVID-19 ERA, IN WESTERN PART OF UTTAR PRADESH

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Abstract

Background: Mucormycosis is an opportunistic fungal infection that typically affects immune compromised patients, particularly patients with uncontrolled diabetes mellitus. India has reported a surge in cases of post covid 19 mucormycosis patients due to the increasing frequency of risk factors in the patients. To study the correlation of inflammatory markers – CRP, Serum Ferritin, and D-dimer. To suggest measures for prevention and control of mucormycosis. **Materials and Methods:** The work was conducted in L.L.R.M MEDICAL COLLEGE and associated SVBP HOSPITAL, MEERUT. All the mucormycosis Patients attending medicine OPD/ IPD/ COVID HOSPITAL/ EMERGENCY WARD/ MUCORMYCOSIS WARD were included. **Result:** A maximum (32.3%) of cases were in the age group of 41-50 while the least (5.3%) were less than 30 years of age and the majority of the patients (90.3%) were diabetic. On analysis, it was observed that CRP, S. ferritin, and D-dimer were significantly ($p<.05$) associated with the covid status of mucormycosis patients in the second wave of covid 19 in the year 2021.**Conclusion:** There has been an upsurge of mucormycosis cases in India in the second wave of COVID-19. A major portion of cases has been of rhino-orbit-cerebral mucormycosis affecting those who have co-existent COVID-19 or have recently recovered from COVID-19.

INTRODUCTION

Mucormycosis is an opportunistic fungal infection that typically affects immunocompromised patients, and particularly patients with uncontrolled diabetics mellitus. The fungi that cause mucormycosis belong to the order Mucorales: Rhizopus, Mucor, Rhizomucor, Cunninghamella and Absidia.[1] Broad, irregularly branched with rare septations are seen on microscopy. These fungi are ubiquitously found everywhere, particularly in soil and decaying vegetation and are routinely exposed to humans without causing any infections.[2]

Traditional risk factors that increase the chances of acquiring mucormycosis include diabetes mellitus, hematological malignancies, stem cell transplant, organ transplant, iron overload, treatment with deferoxamine, malnutrition, burns, extensive use of broad-spectrum antibiotics, critical care admissions.[3] Early recognition, diagnosis and prompt administration of appropriate antifungal treatment and surgical debridement (if needed) are important for improving outcomes for patients with mucormycosis.

Imaging tests such as a CT scan of the lungs, sinuses, or other parts of the body, depending on the location of the suspected infection, may also be used to support the diagnosis.[4]

These fungi are angioinvasive and cause thrombosis with the death of affected tissues. Rhino-orbital-cerebral mucormycosis is the most commonly observed manifestation, followed by cutaneous and pulmonary mucormycosis.[5] In a susceptible individual, mucormycosis is caused by the inhalation of spores and typically starts with acute sinusitis. Symptoms such as facial pain, nasal discharge, headache, fever, or nasal congestion may develop.[6] COVID-19 is a pandemic disease which predominantly affects the respiratory system with high critical care mortality and morbidity; however, it also causes multi-organ dysfunction in a subset of patients. Covid 19infection involves a multiplex

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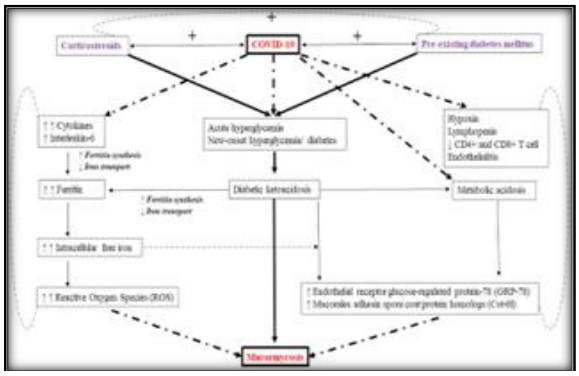
interaction of the inflammatory as well as immunological responses. Serum levels of CRP, ferritin and D Dimer were determined and compared between covid positive(or a recent history of covid infection) and covid negative mucormycosis patients.



Flowchart demonstrating the pathogenesis involved in the development of covid 19 associated mucormycosis.

MATERIALS AND METHODS

Patient Source

The work was conducted in L.L.R.M MEDICAL COLLEGE AND ASSOCIATED SVBP HOSPITAL, MEERUT.

Included patients were diagnosed clinically and all the mucormycosis Patients attending medicine OPD/ IPD/ COVID HOSPITAL/ EMERGENCY WARD/ MUCORMYCOSIS WARD were included in the study following approval of institute's ethical committee

Eligibility Criteria

Inclusion Criteria

1. Mucormycosis patients with covid-19 positive status with or without comorbidities.
2. Mucormycosis patients with covid-19 negative status with or without comorbidities.

Exclusion Criteria

Patients less than 18 years of age.

We conducted an observational study for assessing the correlation of inflammatory markers such as CRP, D-dimer, and Serum ferritin in patients of mucormycosis in the study period of March 2021 to December 2021.

Study participants

In this observational study, the clinical record analysis included all patients who fulfilled the criteria of mucormycosis who were admitted to LLRM Medical College and associated SVBP Hospital between March 2021 and December 2021

Sample size

Our study enrolled 300 MUCORMYCOSIS patients in the time period of March 2021 to December 2021.

RESULTS

It was observed that a maximum (32.3%) of cases were in the age group of 41-50 years followed by 23.0% (31-40 years), 22.7% (51-60 years), 13.0% (61-70 years), 5.3% (less than 30 years of age).

The least (3.7%) of the study population belonged to those who had age of more than 70 years of age. [Table 1]

Table 1: Age wise distribution of mucormycosis cases.

Age group	No. of cases (n)	Percent (%)
< 30	16	5.3
31-40	69	23.0
41-50	97	32.3
51-60	68	22.7
61-70	39	13.0
> 70	11	3.7
Total	300	100.0

Table 2: Gender-wise distribution of study population

Gender	No. of cases (n)	Percent (%)
Female	116	38.7
Male	184	61.3
Total	300	100.0

[Table 2] shows the distribution of the study population on the basis of gender.

In the present study, it was found that the majority (61.3%) of them were males while females constituted 38.7% of the study population.

Table 3: Covid-19 status of study population.

Status of Covid Positive	No. of cases (n)	Percent (%)
Negative	111	37.0%
Positive	189	63.0%
Total	300	100.0%

The above table shows the distribution of the study population on the basis of their covid 19 status. As inferred from the above table out of 300 sample size majority (63.0%) of the study population tested covid positive whereas 37.0% of the study population tested covid negative.

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Table 4: Status of Diabetes Mellitus among study population

Diabetes	No. of cases (n)	Percent (%)
Present	271	90.3
Absent	29	9.7
Total	300	100.0

[Table 4] depicts the distribution of the study population based on diabetes mellitus status among the patients of mucormycosis in covid 19 era. It was found that the majority (90.3%) of the mucormycosis cases were diabetic.

Table 5: Comparison of various parameters with Covid status of the patients

Parameters	Covid status of patients	N	Mean	Std. Deviation	Std. Error Mean	t	p-value
CRP	Positive	189	58.46	23.56	1.71	6.330	0.001
	negative	111	41.69	19.55	1.86		
S.Ferritin	positive	189	936.33	262.71	19.11	2.378	0.018
	negative	111	860.68	271.80	25.80		
Ddimer	positive	189	927.60	202.42	14.72	4.002	0.001
	negative	111	835.76	172.50	16.37		

[Table 5] shows the association of various factors (CRP, S. ferritin, D-dimer) with Covid status. On analysis, it was observed that CRP, S.ferritin, and D-dimer were significantly ($p<.05$) associated with covid status of the patients.

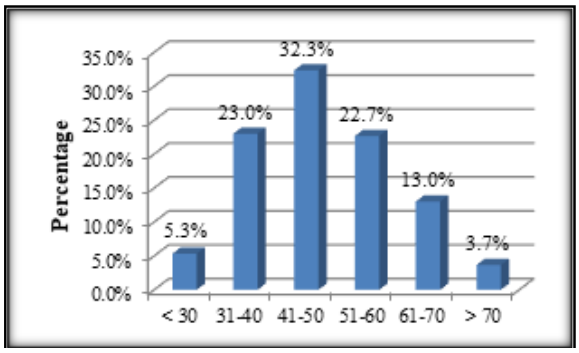

Figure 1: Age wise distribution of mucormycosis cases

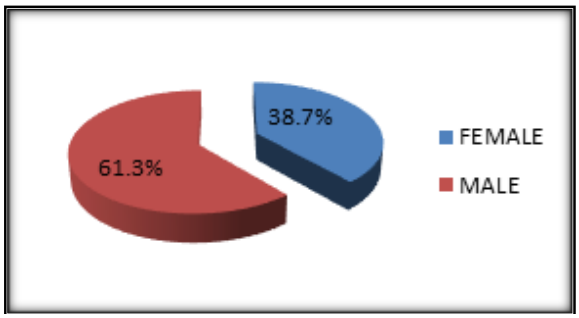

Figure 2: Gender-wise distribution of study population

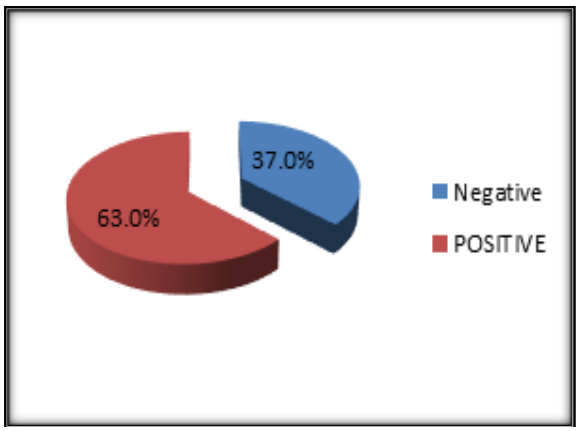

Figure 3: Covid-19 status of study population.

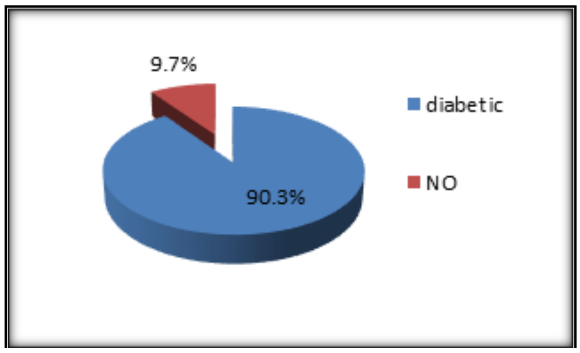

Figure 4: Status of Diabetes mellitus among study population

DISCUSSION

There has been an upsurge of mucormycosis cases in India in second wave of COVID-19. A major portion of cases have been of rhino-orbito-cerebral mucormycosis affecting those who have co-existent COVID-19 or have recently recovered from COVID-19. In present study we found that most of the patients affected by mucormycosis were males constituting 61.3% of the cases. The mean age of presentation was 48.8±12.3. majority of the study population 63.0% tested COVID- RTPCR positive or had a recent/past history of infection with the covid-19 virus whereas 37% of the study population tested covid-19 negative and had no recent /past infection with covid-19 virus. Most of our study patients (90%) were diabetic whereas only 9.7% were non-diabetic. It was found in our study that the inflammatory markers CRP, S. Ferritin, and D-Dimer were significantly associated with the covid-19 status of the patient. The values of inflammatory markers were significantly higher in patients of mucormycosis those who were covid-19 positive or had recent /past infection with covid-19.

Sussana et al 2022 in their cross-sectional study found that serum ferritin and plasma d dimer levels

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were significantly elevated in covid 19 patients with mucormycosis.

Therefore, it is postulated that the recruitment of inflammatory cells during mucormycotic infections is likely dependent on pre-existing primary diseases in the patients. Nevertheless, more studies are needed to understand the correlation among these clinical observations.

Recommendations

1. Strict glycemic control in all patients especially in patients with other comorbidities.
2. Judicious use of systemic steroids as they are known to cause dysglycemia in patients.

CONCLUSION

It was found that a mean of 48.8, 9.8, 52.3, 914.7, 893.6 was observed in Age, HbA1c, CRP, Serum ferritin, and D-dimer respectively. Similarly,the standard deviation of 12.3, 1.8, 23.6, 267.4, 196.7 and 1.0 was observed for Age, HbA1c, CRP, Serum ferritin, and D-dimer respectively.

It was observed that a maximum (32.3%) of cases were in the age group of 41-50 years followed by 23.0% (31-40 years), 22.7% (51-60 years), 13.0% (61-70 years), 5.3% (less than 30 years of age). The least (3.7%) of the study population belonged to those who had age of more than 70 years of age.

In the present study, it was found that the majority (61.3%) of them were males while females constituted 38.7% of the study population.

The majority of the cases were diabetic constituting 90.3% of the population.

On analysis, it was observed that CRP, S.ferritin, and D-dimer were significantly ($p<.05$) associated with the covid status of the patients.

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