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Etiology of Post-Covid Fungal Infections among Various Age Groups at Teritiary Care Hospital

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Abstract

Background: In patients with comorbid illnesses, COVID 19 disease is a severe acute respiratory syndrome that is linked to a variety of opportunistic bacterial and fungal infections. Finding the cause of fungal infections among post-covid patients in tertiary care hospitals is the aim of the study.

Objectives: To study the etiology of post-covid fungal infections among various age groups

Methods: Out of 578 samples (pus/tissue/biopsy) collected from patients attending Koti ENT hospital with complaints of pain in eye, cheek swelling, headache. All samples were subjected to direct KOH mount and inoculated on SDA, incubated for 1 week at 25°C.

Result: Out of 578 samples 214 are KOH positive and 291 are culture positive with fungi isolated – Mucor species, Aspergillus species and Candida species.

Conclusion: As post covid fungal infections are rapidly progressive and devascularised disease, timely diagnosis helps in effective management and treatment of patients.

Keywords: Mucormycosis, COVID-19, diabetic, KOH, SDA, fungi

Introduction

Coronavirus (COVID-19) causes a severe acute respiratory illness and is linked to a variety of opportunistic bacterial and fungal diseases.[1] Super infections caused by bacteria or fungi are a known risk factor for poor outcomes, particularly in individuals with co-morbid disorders. The two most common fungi causing co-infection in COVID-19 patients have been identified as Aspergillosis and Candida.[2] Recently, there have been an increasing number of instances of mucormycosis in patients with COVID-19 reported globally, particularly from India.[3]

Fungal infections associated with COVID-19 can cause serious morbidity and even mortality. The signs of several fungi infections, such as fever, coughing,

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and shortness of breath, might resemble those of COVID-19. Some people may simultaneously have COVID-19 and a fungus infection.[4]

A person has to undergo laboratory testing to identify whether they have COVID-19, a fungal infection, or both. Mucormycosis is an acute opportunistic ailment brought on by a number of fungus from the phylum Glomeromycota. Low oxygen (hypoxia), High glucose (diabetes, denovo-diabetes, and steroid-induced hyperglycemia), Acidic medium (metabolic acidosis, diabetic ketoacidosis [DKA]), and High iron levels are the primary factors that facilitate Mucorale spore germination in COVID-19 patients (increased ferritins). White blood cells' (WBC) decreased phagocytic activity as a result of immunosuppression (SARS-CoV-2 mediated, steroid-mediated or background comorbidities).[5] Hospitalization for an extended period of time, with or without artificial ventilation. Mucormycosis is a quickly developing devascularizing illness that can be fatal if not treated promptly.

Materials and Methods

Study Design: Cross sectional study

Study setting: Patients attending ENT government hospital, with clinical features suggestive of fungal infection after recovery from COVID 19 infection.

Study duration: The study would be conducted over a period of 3months.

Sample Size: Samples collected during the study period

The present cross sectional comparative study was carried out at Government ENT hospital, Koti, Hyderabad, Telangana from May 2021 to July 2021. All the patients with features of fungal infection who presented to the ENT hospital either, as an out-patient or following departmental referral were included in the study. A total of 578 samples were collected from patients admitted at the Government ENT hospital, with clinical features suggestive of fungal infection.

Inclusion Criteria:

- Patients of all age of both sex,
- Patient with history of covid -19,
- Patients on antivirals / steroids and
- Patients willing to give consent

Exclusion Criteria:

- Patients without H/O COVID- 19 and
- Patients not willing to give consent.

Both pre-operative and post-operative material was collected in sterile screw capped, leak proof universal containers with sterile normal saline. All the samples were examined by performing KOH wet mount and visualized under 10x and 40x for presence of any fungal elements and where then inoculated on Sabourads dextrose agar (SDA) and incubated for 48hs at 37°C for 5days.Any growth of SDA after 48hrs, Lactophenol cotton blue (LPCB) tease mount was made for further identification of morphology of fungus.

Statistical Analysis: The SPSS 22 software was used for statistical analysis. The data was presented in the form of means and percentages.

Observation and Results

Total number of sampled collected from patients admitted at Govt ENT Hospital are 578. Number of samples from Female Patients and Male Patients are 134 and 444 respectively. Mean Age is 47.4. Mean Age group for Female and male are 50.4 and 46.8 respectively.

Correlation between KOH and Culture

KOH+	Culture+	KOH -	Culture -
214	267	364	287

Organism Isolated in Culture

Total Culture positive Samples: 267

Organism	Total	KOH +	KOH -
Aspergillus Niger	12	7	5
Aspergillus Flavus	37	19	18
Aspergillus Fumigatous	3	1	2
Mucor	169	120	49
Rhizophus	27	18	9
Candida	19	14	5

Age Distribution

Gender	Total Samples	Age Group	Patients associated	Percentage
Female	61	20-40	8	13.1
		41-60	46	75
		> 60	7	11.4
Male	199	20-40	58	29.14
		41-60	116	58.2
		> 60	24	12.0

POST OPERATIVE SAMPLES

Gender	Age Group	Patients associated	Patients with Comorbidities	Patients with Risk Factor	KOH +	KOH -	Culture +	Culture -	Organisms Isolated
Male	20-40	11	-	-	-	11	0	11	-
	41-60	15	-	-	-	15	-	15	
	> 60	2	-	-	-	2	-	2	
Female	20-40	4	-	-	-	4	-	4	-
	41-60	8	-	-	-	8	-	8	-
	> 60	1	-	-	-	1	-	1	-

Discussion

The etiologic agent of fungal infections is ubiquitous in nature and thus may easily be acquired. According to studies by Giri M. et al. (2021)[6] and Yin T., 9% and 17%, respectively, of COVID-19 patients were estimated to have diabetes mellitus (2021).[7] In this study, a 38 % prevalence of diabetic Miletus was estimated among COVID 19 patients.The majority of patients needed critical care, intubation, and ventilation due to severe COVID-19 pneumonia. The majority of patients also got steroids and had underlying diabetes mellitus. The only medicine that has currently been proven to be indisputably successful in the treatment of COVID-19 in clinical studies is corticosteroids. Systemic steroids may intensify the underlying glycemic control and impair the immune system of the body.[8] In order to survive in hypoxic host conditions and contribute to the development of Aspergillosis, Candidiasis, Cryptococcosis, Mucormycosis, and other fungal diseases, fungi have evolved a variety of adaptations.[9] This increases the likelihood of COVID-19 and fungal coinfection. A hypoxic environment also results from the requirement for and consumption of oxygen by the host and pathogen.[10]

The majority of the individuals in this study have either Miletus diabetes or de novo diabetics. When compared to females in this study, males have a higher percentage of fungal infections (77 % vs 23 %, respectively). The majority of patients get oxygen and steroid medication while being hospitalised to the ICU. In this investigation, the nasal cavity was the portion most frequently linked to fungus infections. The study's median age range for fungal infections is 40 to 60. According to a research by Noha Ahmed et al. (2021) the two most frequent organisms recovered in culture are Aspergillus spices (30%) and Mucor (78.8%). Most often isolated organisms in this study were Mucor (63.2%), Aspergillus flavus (13.8%), Rhizopus (10.1%), candida (0.071%), Aspergillus niger (0.044%), and Aspergillus fumigatous (0.01%), and we can see that this study is similar to earlier studies.[11,12]

There should be implementation of protocols for early detection of fungal infections and prompt treatment with recommended medications using corticosteroids sparingly in COVID-19 patients and surgical procedures, regular glucose levels monitoring, as well as implementation of proper hygiene and sanitization procedures.

Conclusion

Because fungal infections are severe illnesses, quick vigorous actions are essential. Good glycemic control with COVID-19 treatment. Use of masks by sensitive populations to decrease Mucorales exposure even at home, as well as avoidance of construction sites

The majority of people acquire the condition after being discharged from the COVID-19 facility. Patients may be recommended to seek emergency medical assistance if they develop early symptoms and signs of the disease after the COVID clinic. Fungal infection detection and management training for healthcare personnel should be conducted.

Ethical Clearance: Ethical Clearance was obtained from institutional ethics committee.

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Conflict of Interest: No Conflict of interest

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