



DETERMINATION OF NASAL FUNGAL INFECTIONS AMONG PATIENTS AFTER COVID-19 INFECTION AT A TERTIARY CARE HOSPITAL, HYDERABAD

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ABSTRACT

Background: Mucormycosis is a life-threatening invasive fungal infection that occurs commonly in immunocompromised patients. There is increase in number of mucormycosis cases during second wave of COVID-19 pandemic. The delay in early diagnosis and treatment leads to rapid progression of the disease, with reportedly increased mortality rates due to intra-orbital and intracranial complications (50–80%). **Objectives:** To determine the prevalence of nasal fungal infections and to identify causative agents and associated risk factors in nasal cavity fungal infections in post covid-19 patients. **Methods:** A prospective cross-sectional study was conducted at a tertiary care centre during June 2021 to August 2021, involving all post covid-19 patients with nasal cavity infections. **Results:** Out of 102 samples, total 60 (58.82%) were culture positive for fungal elements. Among these confirmed positive cases, 59 (98.3%) were positive on KOH mount and 1 (1.66%) was negative on KOH mount. Among isolates, Mucormycosis was seen in 44 (73.33%) followed by aspergillus in 13 (21.6%). **Conclusion:** COVID-19 is associated with a higher incidence of secondary infections, including invasive fungal infection especially with history of diabetes and other comorbidities. Early diagnosis with appropriate surgical excision and debridement, prompt antifungal treatment and management of risk factors leads to subsequent reduction in mortality and morbidity.

KEYWORDS : Nasal fungal infections, Covid-19, Mucormycosis, Post covid infection

INTRODUCTION

Mucormycosis a rare opportunistic infection caused by fungi belonging to order Mucorales and family Mucoraceae^[1]. During the second wave of covid-19 pandemic, in India there was a rapid rise in mucormycosis cases in post covid infected patients. Many reports suggested attributing factors for this rise are steroid administration, diabetes mellitus, oxygen therapy and ventilator / ICU management. Use of industrial oxygen and excessive zinc also have major role in etiology of mucor^[2]. All these factors lead to complex coaction in COVID-19 infected patients resulting in post covid sequelae of secondary Mucormycosis^[3]. The disease has burgeoned to such a high extent that it has been declared as an epidemic in many states of India^[4].

The important element for successful attenuation of this infection is early diagnosis, prompt medical care, surgical debridement and control of associated diseases^[5].

AIMS & OBJECTIVES :

- 1) To determine the prevalence of nasal fungal infections in post covid-19 patients.
- 2) To identify causative agents in nasal cavity fungal infections.
- 3) To identify the risk factors associated with nasal cavity fungal infection in post covid-19 patients.

MATERIALS & METHODS:

It is the prospective study, conducted in the Department of Clinical Microbiology, Osmania Medical College, Hyderabad, between June 2021 to August 2021. All the Nasal cavity specimens collected from post covid-19 patients of both genders and all age groups with clinical features suggestive of fungal infections were included in the study. Specimens from patients, who are not affected by Covid-19 and who were already on antifungal therapy were excluded from the study.

study period. Nasal cavity specimens included nasal biopsy tissue, polypoidal tissue, necrotic tissue, debris, nasal crusts, fungal balls, nasal mucopurulent discharge from vestibule, turbinates, septum, lateral wall, floor and roof of nostrils. Clinicians in Koti-ENT Hospital, Hyderabad, collected the samples through nasal endoscopy or surgical debridement procedures under strict aseptic conditions. Specimens collected were sent in sterile containers and processed immediately at Department of clinical microbiology, Osmania Medical College, Hyderabad.

Preliminary KOH mount of all specimens were done and reports disseminated earliest to ENT department for early treatment initiation. All specimens were inoculated in Saboraud's dextrose agar (SDA), incubated and examined at 48hrs, 72hrs, 4th day and 5th day for growth. Fungal growth on SDA were further identified by preparing Lactophenol cotton blue (LPCB) wet mount. Negative for fungal growth were reported after 5 days of incubation.

RESULTS:

During study period a total of 102 nasal cavity specimens from post covid - 19 patients were processed. Out of 102 samples, total 60 were confirmed as fungal culture positive. So prevalence of nasal fungal infections in post covid-19 patients in our study is 58.82%.

Among these samples, males showed preponderance (81.37%) than females (18.62%). Among different age groups, above 40yrs (79.4%) were more commonly infected, followed by 20-40yrs (20.5%). Most of the fungal infections were seen in patients after post -covid duration of 2nd week (25.0%) and 3rd week (41.6%). Among all patients with fungal infections, 73.52% had comorbidities and showed predominance of Diabetes Mellitus (47%) followed by Hypertension (20%). History of corticosteroid administration was observed in 20% and need for oxygenation in 10% patients.

A total of 102 samples from nasal cavity were collected during

Out of 102 samples, 59 (57.84%) samples were positive for

fungal elements and 43 (42.15%) were negative for fungal elements on KOH mount microscopic examination. All 59 KOH positive samples showed fungal growth on Saboraud's dextrose agar (SDA), whereas among 43 KOH negative samples, only 1 sample showed fungal growth and rest showed no growth. Fungal growth on SDA was further examined by preparing LPCB Mount for speciation. Out of 60 culture growth, LPCB mount examination showed 36 (60%) Mucor followed by 13 (21.66%) Aspergillus spp, 8 (13.33%) Rhizopus, 2 (3.3%) candida albicans and 1(1.66%) SDA Slant had mixed growth of Mucor and aspergillus spp.

Table 1: Demographic and clinical data of confirmed cases

Variable	n (%)	
Gender	Male	49(81.3%)
	Female	11(18.6%)
Age	≤ 20 years	NIL
	21– 40 years	12(20.5%)
	≥ 41 years	48(79.4%)
Post Covid duration	2 weeks	15(25.0%)
	3 weeks	25(41.6%)
	4 weeks	11(18.3%)
	5 weeks	06(10.0%)
	7 weeks	03(5%)
Comorbidities	Comorbid conditions Present	44(73.5%)
	Diabetes mellitus	28(47.0%)
	Hypertension	12(20.0%)
	Coronary artery disease	02(3.3%)
	Cerebrovascular accidents	01 (1.6%)
	Hypothyroidism	01 (1.6%)
History of treatment	Steroid usage	12(20%)
	Oxygenation	06(10%)
	Antivirals usage (Remedesvir)	01(1.6%)

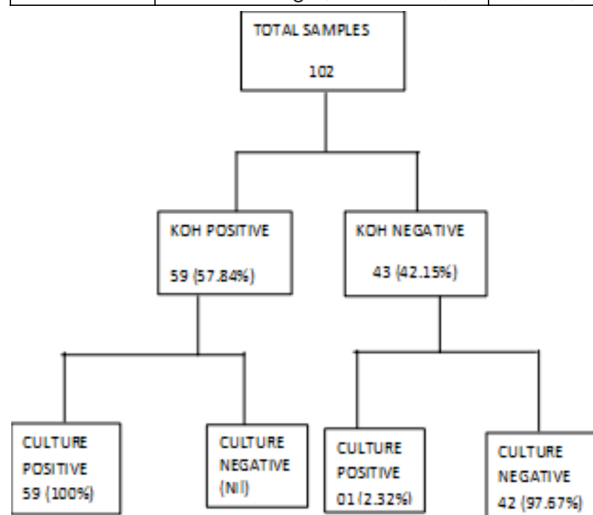


Fig:1 Overview of processed nasal specimens for isolating fungal pathogens

Table2: Overview of isolated fungal pathogens

Mucor spp	36(60%)
Rhizopus spp	8 (13.33%)
Aspergillus spp	13 (21.66%)
Candida albicans	02 (3.3%)
Mucor- Aspergillus spp (Mixed growth)	01 (1.66%)

DISCUSSION:

During second wave of Covid-19 in India, the rapid rise in cases of mucormycosis was reported^[4]. This sudden rise of opportunistic infections like mucormycosis was attributed to factors such as widespread unsupervised and superfluous over the counter use of corticosteroids and antibiotics in treatment, management of COVID-19 which led to

disturbance of normal glucose and gut homeostasis and thus weakening the already debilitated COVID-19 cases^[4]. The route of infection of these fungal infections is through inhalation, and consequently spread of fungal spores is via paranasal sinuses to orbit, meninges, brain leading to invasive fatal fungal infections. Successful management and good prognosis includes early identification of the disease, prompt and appropriate antifungal therapy, surgical interventions and reversal of the underlying predisposing factors, if possible to prevent the high morbidity and mortality^[4].

Out of 102 samples, total 60 (58.82%) were culture positive for fungal elements. Among these confirmed positive cases, 59 (98.3%) were positive and 1 (1.66%) was negative on KOH mount for fungal elements. KOH results correlated with culture better in our study compared to the study conducted by Priyanka Vaghasiya et al, study^[6] which reported 40 samples to be culture positive, among them 31 correlated with KOH results but 19 were KOH negative.

Out of 60 culture positives, 36 (60%) were Mucor spp, followed by 13 (21.66%) Aspergillus spp, 8 (13.33%) Rhizopus, 2 (3.3%) Candida albicans and 1(1.66%) coinfection of Mucor-Aspergillus. Our findings were similar to various other studies like El-Kholy et al, Priyanka Vaghasiya et al^[5,6]. Higher percentage i.e, 91.8% of mucormycosis were isolated in R. Meher et al. study^[2].

The most common comorbidity associated with post covid 19 cases in our study was DM followed by HTN, prolonged corticosteroid usage. Similar findings were reported in R. Meher et al, S Sharma et al, studies^[2,7]. During pandemic with 'lockdowns' in most places, people were confined at home with no opportunities for regular exercises and added considerable mental stress with alterations in the daily routine which could affect the dietary intake as well. All these factors must have led to glucose dysregulation and predisposed patients to complications like invasive fungal infections. Similar hypothesis was explained by Satish D et al, Singh et al^[8,9] in their studies.

In our study, male predominance was noted with male to female ratio of 4.4:1. Correlating with findings of R. Meher et al, El-Kholy et al, Sharma S et al studies^[2,5,7]. In contrast, female predominance (ratio 1:1.2) was seen in F.C.P Valera et al study^[10].

Elderly age group patients were most effected in our study, similar to R. Meher et al, El-Kholy et al studies^[2,5]. As elderly patients suffer with comorbidities and are immunocompromised so they are more prone to fungal infections. Priyanka Vaghasiya et al^[6] study states that critically ill patients, especially those admitted to intensive care units with longer hospital stay duration are more likely to develop fungal coinfections. Hence, it is important to be aware that Covid-19 patients, especially severely ill patients, can develop further fungal infections during the middle and latter stages of this disease. So, probably due to this reason, mean duration of appearance of symptoms was 2-3 weeks post -covid in our study. Studies^[11,12] have reported poor prognosis with mortality rates of 33.3-80%, rising upto 100% in disseminated fungal infections even with aggressive surgery and medical management.

CONCLUSIONS

COVID-19 is associated with a higher incidence of secondary infections, including invasive fungal infection especially with history of diabetes and other comorbidities. Unless diagnosed and treated early, they are often fatal due to cerebral involvement. Early diagnosis with appropriate surgical excision and debridement, prompt antifungal treatment and

management of risk factors leads to subsequent reduction in mortality and morbidity.

Widespread use of glucocorticoids in COVID-19 causes deterioration of preexisting fungal diseases. So, the clinicians must be aware of possibility of invasive fungal infection in such COVID patients especially with comorbidities.

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