

Otorhinolaryngological Presentations of Mucormycosis amid COVID-19 Pandemic in Khyber Teaching Hospital Peshawar

ASGHAR ULLAH KHAN¹, ASGHAR ALI², SANAULLAH BHATTI³, NAJAF ABBAS⁴, JAVED IQBAL⁵, AGHA AFTAB HUSSAIN⁶

¹Associate Professor, Head of Department ENT and Neck Surgery, Pak International Medical College/ Peshawar Institute of Medical Sciences (PIMS), Hayatabad, Peshawar

²Assistant Professor, Department of Neurosurgery, Mardan Medical Complex BKMC, Mardan

³Assistant Professor, Department of ENT, Bakhtawar Amin Medical College, Multan

⁴Associate Professor, Department of ENT, FMH College of Medicine and Dentistry, Lahore.

⁵Associate Professor, Department of ENT, Sahara Medical College, Narowal

⁶Senior Registrar, Department of ENT, The Indus Hospital & Health Network, Karachi

Correspondence to: Asghar Ali, Email: dr.asgharililyn@mail.com

ABSTRACT

Background: Mucormycosis is opportunistic infection which is caused by a filamentous fungus. It is unknown how common mucormycosis-related oto-rhino-laryngological involvement is in COVID-19 patients.

Objective: The aim of this study was to explore the Otorhinolaryngological presentations of mucormycosis amid COVID-19 pandemic in a tertiary care hospital.

Methodology: The current study was conducted at the department of ENT in Khyber Teaching hospital from January 2021 to June 2021 after taking approval from the ethical committee of the institute. People with mucor continued to come in emergencies were enrolled in this study because the elective services were overlooked due to COVID 19. Each individual had either previous evidence of COVID-19 infection at the time of diagnosis or a clinical or histological diagnosis of mucormycosis. The RT-PCR was used to diagnose COVID-19 in subjects. Diagnosis of Mucormycosis was made based on the microscopic examination. Endoscopic ethmoidectomy, sphenoidotomy, and/or frontal sinusotomy, endoscopic medial maxillectomy, orbital clearing, and pterygopalatine fossa investigation for debridement of necrotic tissues were among the surgical debridement procedures. G For data analysis SSPS was Used. A significance level of $p < 0.05$ was used to determine the confidence interval at 95%.

Results: In this study a total of 27 participants age ranged from 20 to 90 years old were enrolled. Out of which 16(59.2%) were males and 11(40.7%) were females. Majority of the individuals 14(51.8%) were in the age group 41 to 60 years old. The Acute Medical Unit accounted for the bulk of patient presentations 12 (44.4%). 18 (66.6%) of the 27 individuals reported positive COVID-19 PCR results. 19 (70%) of the individuals had not received the COVID-19 vaccination. Endoscopic surgery to remove lesions from the left side's nasal cavity, maxillary sinuses, and ethmoid sinuses was the most often performed surgical technique. 10(37.0%) . A heterogeneous lesion affecting the nasal, maxillary, & ethmoid sinuses 13(48.1%) was the most often seen CT scan finding. A heterogeneous lesion affecting the unilateral maxillary, ethmoid, frontal, and sphenoid sinuses 4(14.81%) was found associated with it. The two most frequent presentations 9(33.3%) were nasal obstruction and headache. Among the co-morbidities, diabetes mellitus and hypertension predominated 9(33.3%)

Conclusion: It was concluded that infection with COVID-19 and uncontrolled diabetes are common causes of mucormycosis of the paranasal sinuses with or without orbit and cerebral extension in non-vaccinated individuals.

Keywords: COVID-19 pandemic, mucormycosis, filamentous fungus

INTRODUCTION

Mucormycosis is uncommon opportunistic infection which is caused by a filamentous fungus in the order of Mucorales.¹ Mucorales are fungi that are found in many places, such as dirt, decomposing materials, and hospital wards. They are particularly common when renovation work is being done.² The range of Mucorales species responsible for mucormycosis fluctuates by country,³ it found in plants, soil, rotting fruits and vegetables, the air, and even human mucous secretions. The disease frequently affects the human body's closed cavities, including as the brain, lungs, and sinuses. Individuals with uncontrolled diabetes and immunodeficient state have a higher documented risk of developing Mucor.⁴ A new virus known as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Co V-2) appeared in Wuhan, China, in December 2019. The World Health Organization (WHO) subsequently classified this virus as COVID-19 (Coronavirus Disease 2019). A pandemic was caused by COVID-19, as 206 million people contracted the virus and over 4.3 million of them died worldwide.⁵ The prevalence of mucormycosis was previously reported to range from 0.005 to 1.8 per million people, and it was 0.14/1000 people with diabetes.⁴ It is unknown how common mucormycosis-related oto-rhino-laryngological involvement is in COVID-19 patients. On the other hand, there are more cases of mucor reported among COVID-19 individuals.⁶ Fortunately, Pakistan's rate of mucormycosis is lower than that of India, a neighboring nation. There is no information about

mucormycosis in Pakistan. However, given that the illness is rapidly spreading throughout emerging nations, it is believed that if adequate precautions are not implemented immediately, this disease may really constitute a threat.⁷ The black fungus known as mucormycosis is not transmissible, but it has a strong attraction for immunocompromised individuals, such as uncontrolled diabetics, HIV-positive individuals, organ transplant recipients, and cancer patients.⁸ The severity of signs is determined by the individual's immunological status, co-morbidities, length of illness, and treatment effectiveness.⁹ In our country, research on otolaryngological manifestations of mucormycosis is lacking. Therefore the current study was carried out to determine the Otorhinolaryngological presentations of mucormycosis amid COVID-19 pandemic in a tertiary care hospital.

METHODOLOGY

The current study was conducted at the department of ENT in Khyber Teaching hospital from January 2021 to June 2021 after taking approval from the ethical committee of the institute. People with mucor continued to come in emergencies were enrolled in this study because the elective services were overlooked due to COVID 19. Individuals who met the inclusion criteria and gave their agreement for the research were all included. However, cases of mucormycosis that had spread outside of the head and neck area, older patients with shorter life expectancies, and patients who were unwilling to have surgical debridement were all excluded. Each individual had either previous evidence of COVID-19 infection at the time of diagnosis or a clinical or histological diagnosis of mucormycosis. The RT-PCR of specimens taken from the

Received on 03-07-2023

Accepted on 10-09-2023

oropharynx or nasopharynx was used to diagnose COVID-19 in subjects. When mucormycosis was clinically suspected, the diagnosis was made based on the microscopic examination of scrapings prepared in ten percent potassium hydroxide for the presence of fungal hyphae with unique characteristics of Mucorales fungi. The diagnosis was then confirmed by microbial culture or the diagnostic histopathological characteristics of the biopsy. Following the diagnosis of mucormycosis, an orbit, skull base, brain, and paranasal sinuses were studied using magnetic resonance imaging (MRI) to assess the disease's extent and plan a surgical clearance. These individuals were referred to separate wards for surgical treatment of mucormycosis or for a biopsy to confirm the disease. Participants underwent endoscopic and/or open debridement of mucormycosis after consulting with an anesthesiologist on tolerance for general anesthesia. When the patient was unfit for general anesthesia, a local anesthetic biopsy was performed from the lesion to diagnose the tissue. Following the collection of each patient's informed permission, demographic information about them, including clinical presentations, investigations, co-morbidities, radiological results, COVID-19 vaccinations, and surgical procedures, was gathered on a pre-made proforma. A doctor administered medical care to each patient for COVID-19 and mucormycosis. Endoscopic ethmoidectomy, sphenoidotomy, and/or frontal sinusotomy, endoscopic medial maxillectomy, orbital clearing, and pterygopalatine fossa investigation for debridement of necrotic tissues were among the surgical debridement procedures. Given that the skin of the face and palate were involved, an open surgical technique was selected. For data analysis SSPS WAS Used. Frequency and percentage were used to denote qualitative data, whereas averages and standard deviations (SD) were used for calculating statistical values. A significance level of $p < 0.05$ was used to determine the confidence interval at 95%.

RESULTS

In this study a total of 27 participants age ranged from 20 to 90 years old were enrolled .Out of which 16(59.2%) were males and 11(40.7%) were females. Majority of the individuals 14(51.8%) were in the age group 41 to 60 years old age wise distribution of the participants are shown in **figure 1**. The Acute Medical Unit accounted for the bulk of patient presentations 12 (44.4%), followed by the COVID Complex 5(21.7%), medicine 4(14.8%), pulmonology 4(14.8%) and nephrology department 1(13.7%). 18 (66.6%) of the 27 individuals reported positive COVID-19 PCR results. 19 (70%) of the individuals had not received the COVID-19 vaccination. When it came to their status as diabetics, the majority of these individuals (10, or 37.0%) had HbA1c values between 7% and 8.9% .Endoscopic surgery to remove lesions from the left sides nasal cavity, maxillary sinuses, and ethmoid sinuses was the most often performed surgical technique. 10(37.0%) as described in **table 1**. A heterogeneous lesion affecting the nasal, maxillary, & ethmoid sinuses 13(48.1%) was the most often seen CT scan finding. A heterogeneous lesion affecting the unilateral maxillary, ethmoid, frontal, and sphenoid sinuses 4(14.81%) was found associated with it.

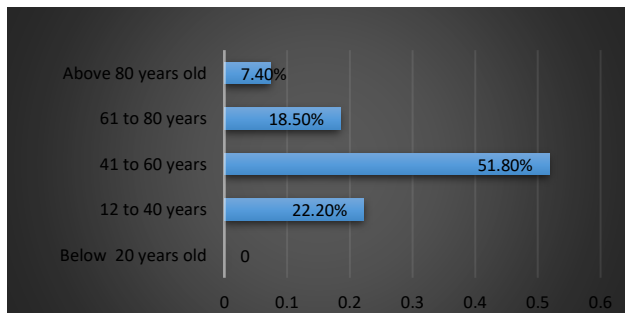


Figure 1: Distribution of the study population by age

The two most frequent presentations 9(33.3%) were nasal obstruction and headache, with eight individuals (29.6%) reporting just nasal obstruction (**table 2**). Among the co-morbidities, diabetes mellitus and hypertension predominated 9(33.3%), with diabetes mellitus and hypertension following separately at (18.5%) and (22.2%), respectively (**figure 2**).

Table 1: Demographics of the study participants

Admission source	N(%)
Acute Medical Unit	12(44.4%)
COVID 19 ward	6(22.2%)
Department of medicine	4(14.8%)
Department of pulmonology	4(14.8%)
Department of nephrology	1(3.7%)
HBA1c Level	
5.5% - 6.9%	5(18.5%)
7% - 8.9%	10(37.0%)
9% - 10 %	8(9.6%)
Above 10 %	4(14.8%)
COVID 19 results	
Positive	18(66.6%)
Negative	9(33.3%)
Vaccination status	
Yes	8(29.6%)
No	19(70.0%)
Surgical method done	
Endoscopic removal of lesion from nose, maxillary and ethmoid sinuses Left side	10(37.0%)
Endoscopic removal of lesion from nose, maxillary and ethmoid sinuses right side	7(25.9%)
Endoscopic clearance of lesion from orbits, pterygopalatine fossa	2(7.4%)
Debridement of involved Palate and Skin	2(7.4%)
Incision Biopsy from nasal mass	3(11.1%)
Full House Functional Endoscopic Sinus Surgery	3(11.1%)

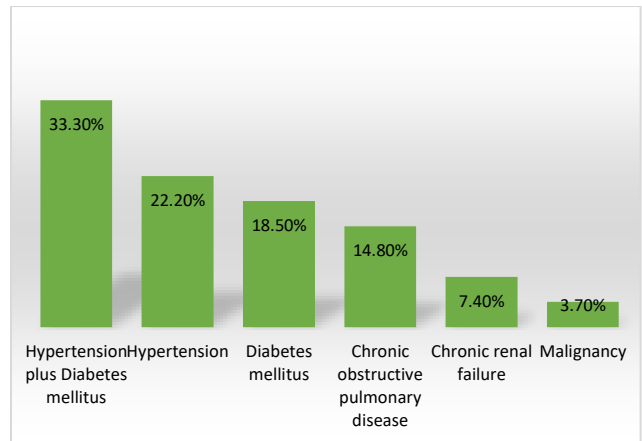


Figure 2: Co-Morbidities Among the Individuals of the Study Participants

Table 2: Clinical presentation of the study participants

Presentations	N (%)
Nasal Obstruction	8(29.6%)
Nasal Obstruction plus headache	9(33.3%)
Nasal Obstruction plus headache plus loss of vision	4(14.8%)
N. O plus HD, plus RV plus Loss of vision	3(11.1%)
Cheek Swelling and ptosis	2(7.4%)
Lesion on Palate	1(3.7%)

DISCUSSION

In the current study we evaluated the Otorhinolaryngological presentations of mucormycosis amid COVID-19 pandemic in a tertiary care hospital. It is a rare and deadly fungal infection brought on by molds of the genus Mucormycetes.

Mucormycosis is spread by inhaling fungal spores, consuming food contaminated with fungi, and getting infections

from fungi on open wounds on the skin. Individuals with uncontrolled comorbidities and those with impaired immune systems are the primary victims of mucormycosis. In addition to clinical signs, analysis of fungal specimens from biopsy and results from CT scans aid in the diagnosis.

The most typical fungal infection that affects humans is called rhino-orbital cerebral mucormycosis. Studies shows that the prevalence of mucormycosis is 34% in Europe, 31 percent in Asia, 28 percent within America, & 3% in each of Australia as well as New Zealand.⁹ Mucormycosis is a fatal disease caused by a fungal infection that affects the blood vessels. The infection causes mycotic embolism, ischemia, and tissue necrosis in the affected areas.¹⁰ According to reports, the incidence of mucormycosis varies between 0.005 and 1.7 per million people globally.¹¹ This study was carried out to determine its precise incidence in Our region. In our study Males constituted 59.2%. These findings are comparable to those of Patel's study from India, which found that 74.6% of the study cohort was male.¹² Arora et al. Similarly support our findings, reporting a mean patient age of 51.9 years and a 66% male preponderance.¹³ Rampkul and associates have also noted similar results.¹⁴ Due to their longer outside activity and oestrogenic protection, males are considered to be more susceptible to fungal spore exposure, which accounts for their predilection.

In our study the two most frequent presentations 9(33.3%) were nasal obstruction and headache, with eight individuals (29.6%) reporting just nasal obstruction. It is contrast to Arora's findings, which showed that nasal obstruction (28.3%), face edema (12.20%), and facial discomfort (35.58%) were the most prevalent symptoms.¹³

In the current study among the co-morbidities, diabetes mellitus and hypertension predominated 9(33.3%), followed by diabetes mellitus and hypertension. In the same way, Osibogun discovered that the most prevalent comorbidities were asthma (10.2%), diabetes (30.3%), and hypertension (74.2%).¹⁵ Uncontrolled hypertension, diabetes mellitus, and the unwise long-term use of steroids for COVID-19 therapy may be the cause of the mucor infection. 18 (66.6%) of the 27 individuals reported positive COVID-19 PCR results in our research. This mimics the Fouad research, in which 50% of patients had positive RT-PCR results.¹⁶ As evaluated in the current research that 70% of the individuals had not received the COVID-19 vaccination which is in line with Arora's Indian study, in which only 11.7% of patients received COVID-19 vaccine and 53 of them (88.3%) were not.¹³ In developing countries like Indo-Pak, low levels of literacy, limited government resources, and incorrect sociocultural beliefs against vaccination are likely the cause of the lower vaccination rates. The majority of participants in the current research (10, or 37.0%) exhibited HbA1c readings in the range of 7% and 8.9%. This is in agreement with published mean HbA1c values in the literature, which are 10.0 2.1%.¹⁷⁻¹⁸

A heterogeneous lesion affecting the nasal, maxillary, & ethmoid sinuses 13(48.1%) was the most often seen CT scan finding in the findings of our study and heterogeneous lesion affecting the unilateral maxillary, ethmoid, frontal, and sphenoid sinuses 4(14.81%) was found associated with it. In a related research, Shamanna discovered that a heterogeneous soft tissue density was present in the paranasal sinuses and nose of 70% patients.¹⁹

CONCLUSION

It was concluded that infection with COVID-19 and uncontrolled diabetes are common causes of mucormycosis of the paranasal

sinuses with or without orbit and cerebral extension in non-vaccinated individuals.

REFERENCES

- Petrikkos G., Skiada A., Lortholary O., Roilides E., Walsh T.J., Kontoyiannis D.P. Epidemiology and Clinical Manifestations of Mucormycosis. *Clin Infect Dis.* 2012; 54(suppl_1):S23–S34.
- Muthu V., Rudramurthy S.M., Chakrabarti A., Agarwal R. Epidemiology and Pathophysiology of COVID-19-Associated Mucormycosis: India versus the Rest of the World. *Mycopathologia.* 2020;186(6):739–754
- Skiada A., Pavleas I., Drogari-Apiranthitou M. Epidemiology and Diagnosis of Mucormycosis: an Update. *JoF.* 2020;6(4)
- Al-Tawfiq JA, Alhumaid S, Alshukairi AN, Tamsah MH, Barry M, Mutair AA et al. COVID-19 and mucormycosis super infection: the perfect storm. *Infection.* 2020; 49:833-853
- Yasmin F, Najeeb H, Naeem A, Dapke K, Phadke R, Asghar MS. et al. COVID 19 Associated Mucormycosis: A Systematic Review from Diagnostic Challenges to Management. *Diseases.* 2020; 9:65.
- Ravani SA, Agrawal GA, Leuva PA, Modi PH, Amin KD. Rise of the phoenix: Mucormycosis in COVID-19 times. *Indian J Ophthalmol.* 2020; 69(6)
- Shakir A, Bhinder K, Asrar A, Sukaina M. Pre and Post COVID-19 Situation of Mucormycosis across the Subcontinent. *J Intensive Crit Care.* 2020;7(8):57
- Ghazi BK, Rackimuthu S, Wara UU, Mohan A, Khawaja UA, Ahmad S, et al. Rampant Increase in Cases of Mucormycosis in India and Pakistan: A Serious Cause for Concern during the Ongoing COVID-19 Pandemic. *Am J Trop Med Hyg.* 2020;0(0):1-4.
- Bonifaz A, Tirado-Sanchez A, Hernandez-Medel ML, Araiza J, Kassack JJ, del Angel-Arenas T, et al. Mucormycosis at a tertiary-care center in Mexico. A 35-year retrospective study of 214 cases. *Mycoses.* 2020;64(4):372-380
- Jeong W, Keighley C, Wolfe R, Lee W, Slavin M, Kong D et al. The epidemiology and clinical manifestations of mucormycosis: A systematic review and meta-analysis of case reports. *Clin Microbiol Infect.* 2019; 25:26-34.
- Selarka L, Sharma S, Saini D, Sharma S, Batra A, Waghmare VT et al. Mucormycosis and COVID-19: An epidemic within a pandemic India. *Mycoses.* 2020; 64:1253-1260.
- Patel A, Agarwal R, Rudramurthy SM, Shevkani M, Xess I, Sharma R, et al. Multicenter Epidemiologic Study of Coronavirus Disease–Associated Mucormycosis, India. *Emerg Infect Dis.* 2020;27(9):2349-235
- Arora R, Goel R, Khanam S, Kumar S, Shah S, Singh S, et al. Rhino-Orbital-Cerebral-Mucormycosis During the COVID-19 Second Wave in 2021 – A Preliminary Report from a Single Hospital. *Clin Ophthalmol.* 2020; 15:3505-3514.
- Ramphul K, Verma R, Kumar N, Ramphul Y, Mejjias S, Lohana P. Rising concerns of Mucormycosis (Zygomycosis) among COVID-19 patients; an analysis and review based on case reports in literature. *Acta Biomed.* 2020;92(4):271-278.
- Osibogun A, Balogun M, Abayomi A, Idris J, Kuyinu Y, Odukoya O, et al. Outcomes of COVID-19 patients with comorbidities in southwest Nigeria. *PLoS One.* 2020; 16(3):1-12 e024828
- Fouad YA, Abdelaziz TT, Askoura A, Saleh MI, Mahmoud MS, Ashour DM et al. Spike in Rhino-Orbital-Cerebral Mucormycosis Cases Presenting to a Tertiary Care Center During the COVID-19 Pandemic. *Front Med.* 2020;8:1-6
- Moorthy A, Gaikwad R, Krishna S, Hegde R, Tripathi KK, Kale PG, et al. SARS-CoV-2, uncontrolled diabetes and corticosteroids—an unholy trinity in invasive fungal infections of the maxillofacial region? a retrospective, multi-centric analysis. *J Maxillofac Oral Surg.* 2020;1-8.
- Santosh ABR, Muddana K & Bakki SR. Fungal Infections of Oral Cavity: Diagnosis, Management, and Association with COVID-19. *SN Compr Clin Med.* 2020; 3:1373-1384.
- Shamanna K, Fathima A, Sowjanya S. Rhino-Orbital-Cerebral Mucormycosis: Our Experience. *Res Otolaryngol.* 2019;8(2):25-29.

This article may be cited as: Khan AU, Ali A, Bhatti S, Abbas N, Iqbal J, Hussain AA: Otorhinolaryngological Presentations of Mucormycosis amid COVID-19 Pandemic in Khyber Teaching Hospital Peshawar. *Pak J Med Health Sci.* 2023; 17(10): 83-85.