First Case of Mucormycosis Death at a Tertiary Hospital in Sudurpashchim Province of Nepal

Yogendra Shah1,2; Jagdish Joshi3; Ramesh Shahi4; Chet Raj Joshi5; Govind Prasad Gupta6; Deepak Pokharel7; Kamal Singh Khadka8; Dhan Kumar Pant9; Kishor Pandey10; Shyam Prakash Dumre11; Basu Dev Pandey12; Sher Bahadur Pun13; Bikky Shrestha14; Sushil Dhakal14

1,4Seti Provincial Hospital, Dhangadhi, Kailali, Nepal.
2National One Health Alliance for Nepal, Tahachal, Kathmandu, Nepal.
3Health Directorate, Sudurpaschim Province, Rajpur, Doti, Nepal.
4Ministry of Social Development, Sudaupaschim Province, Dhangadhi, Kailali, Nepal.
5Lovely Professional University, Punjab, India.
6Everest International Clinic and Research Center, Kathmandu, Nepal.
7Janapriya Multiple Campus, Kaski, Pokhara, Nepal.
8National Zoonosis and Food Hygiene Research Center, Tahachal, Kathmandu, Nepal.
9Central Department of Zoology, Tribhuvan University, Kirtipur, Kathmandu, Nepal.
10Central Department of Microbiology, Tribhuvan University, Kirtipur, Kathmandu, Nepal.
11Department of Molecular Epidemiology, Institute of Tropical Medicine, Nagasaki University, Japan.
12Sukraraj Tropical and Infectious Diseases Hospital, Kathmandu, Nepal.
13Life Care Diagnostics and Research Center Dhangadhi Pvt Ltd, Dhangadhi, Kailali, Nepal.

Abstract

Fungal infection is mucormycosis, commonly known as black fungus, caused by severe fungal infection developing an epidemic within a global pandemic of COVID-19. Nepal has reported the first cases of black fungus that mostly reported thousands of COVID-19 patients in neighboring countries of India. Therefore, the government of Nepal should be developed for an identification protocol to ensure effective early screening, diagnosis, treatment, and management in the current scenario of Nepal population to tackle against the fungal infection on going global pandemic COVID-19.

Keywords: Mucormycosis; black fungus; COVID-19; Nepal.

Editorial

As the novel coronavirus diseases (COVID-19) continues to increase with infectious and virulent delta variant strains (B.1.617.2 and B.1.617.2.1 or AY.1) in different areas in the world, a rapid increase in the number of opportunistic fungal infection has been reported. It is one of such fungal infection is Mucormycosis, commonly known as black fungus, which is a severe fungal infection caused by a group of molds called mucormycetes [1,2]. Nonetheless aspergillosis and candidiasis are the most reported fungal infections in patients suffering from COVID-19 diseases. However, few cases of mucormycosis have been reported [3]. These molds live throughout the environment but mainly affect those people who have reemerged fungal infection, life-threatening infections particularly in immunocompromised patients including common clinical manifestations including rhino, cerebral, cutaneous, pulmonary, gastrointestinal and disseminated infections and others i.e. organ transplants surgeries kidney dialysis patients[4-6]. “Globally, the reported burden of mucormycotic cases (71% of the global cases) is highest in neighbouring countries i.e. India. In contrast, there are reports of sporadic cases of Mucormycosis intimately linked to COVID-19 infections in other parts of the world” [7]. The study showed that most of the high mortality rates of 38%-56.5% of infection cases were occurred in transplant surgeries, and majority of renal transplant patients. Similarly, commonly affects the sinuses or lungs after inhaling fungal spores from the air [1].

Nepal has reported the first cases of black fungus that mostly reported thousands of COVID-19 patients across a neighboring countries of India and Nepal [8]. The first case was reported in a 65 years old man resident in Kailali district. He was suffering from multiple diseases i.e. critical kidney disease, blood pressure and diabetes with having left face swollen and low lip turned into black who were treated at the intensive care unit at Sudarpaschim Tertiary Hospital. The patient initial diagnosis was performed by Computerized Tomography (CT) scans with temporal lobe encephalitis. In the present report, a patient had signs and symptoms of COVID-19 and tested positive by RT-PCR. Physicians involving in the treatment suggested skin scraping from the black swollen lips and laboratory investigation results showed fungal hyphae in 10% KOH microscopy. Further examination by hematoxylin and eosin stained biopsy samples from the nasal cavity and lower lips sections of patient revealed necrotic debris and admixed inside numerous broad non- septate hyphae with angle branching impression of mucormycosis [9-11]. However, failed to isolate mucormycosis colonies from Sabouraud dextrose agar culture. Based on diagnosis report, physician immediately start treatment with liposomal amphotericin B injection but unable to save the life of suffering mucormycosis patient. Later, the patient was declared died on June 3, 2021 from mucormycosis at Seti Provincial Hospital [9-13].

According to physician revealed that liposomal amphotericin B drug was very expensive in Nepalese market and could not affordable drug cost range from NRS 60,000 in the international market [14]. Overall, 31 confirmed cases of mucromycosis have been reported in different tertiary care hospitals in Nepal from May-June 2021-2022 (details shown in Table 1 & Figure 1). Furthermore, more research studies will be needed to clearly understand the relationship between COVID-19, Non-COVID-19 patients with mucormycosis among immunocompromised patients.

Table 1: Mucormycosis (Black fungus) cases have been reported in different tertiary care hospitals in Nepal from May-June 2021-2022 [14].

<table>
<thead>
<tr>
<th>Date</th>
<th>Number of patients</th>
<th>Hospital</th>
<th>Location</th>
<th>Pre-diagnosis</th>
<th>Diagnosis Fungal infection</th>
<th>Remarks</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>May-June 2021</td>
<td>18</td>
<td>Tribhuvan University</td>
<td>Kathmandu, Nepal</td>
<td>Diabetic COVID-19</td>
<td>Mucormycosis (Black fungus)</td>
<td>2 died and 16 recovered</td>
<td>[14]</td>
</tr>
<tr>
<td>May 2021</td>
<td>1</td>
<td>Lumbini Provincial Hospital</td>
<td>Butwal, Nepal</td>
<td>COVID-19</td>
<td>Mucormycosis</td>
<td>Died</td>
<td>[14]</td>
</tr>
<tr>
<td>May 2021</td>
<td>4</td>
<td>Bheri Hospital</td>
<td>Nepalgunj, Nepal</td>
<td>COVID-19</td>
<td>Mucormycosis</td>
<td>One had died</td>
<td>[14]</td>
</tr>
<tr>
<td>3 June 2021</td>
<td>2</td>
<td>Seti Provincial Hospital</td>
<td>Kailali, Nepal</td>
<td>Both are Kidney diseases having Dialysis patients (Patient 2: Creatinine:24.38 [High] Normal range 0.40-1.40 mg/dl; Potassium (K+): 6.4 [high]; MCV: 92.80 mg/dl [High], Lymphocite: 19.40 mg/dl Low; Monocytes: 6.40 mg/dl</td>
<td>Mucormycosis (Black fungus)</td>
<td>1 died and 1 recovered</td>
<td>[14]</td>
</tr>
<tr>
<td>2 June 2022</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Government of Nepal (GON) and Province government (PG) should take urgent action plan to prevent further devastating outbreak of black fungus among the immunocompromised patients among the COVID-19 patients. However, treatment of mucormycosis is one of challenging for prevention and control of mucormycosis infection in resource settings countries like Nepal. It will be strongly recommendation to GON and PG to establish post-COVID-19 wards and treatment facilities for those patients suffering from COVID-19, post-covid manifestation and other immunocompromised patients. Therefore, the GON should implement a national protocol for the suspicion, screening, diagnosis, treatment and follow-up of this fungal infection in patients suffering from COVID-19.

Contributions
YS, DKP, KP, SPD, SP, KK, GPG and BDP conceptualized and developed the outline for this manuscript. AP, UM, YS, SPD, JJ, DP, RS and KP developed the first draft. YS, GPG, SP, DP, RS, JJ, AP, DKP, SPD, KP, KK, AP, UM and BDP contributed to data acquisition and further review of the manuscript. The authors read and approved the final manuscript.

Acknowledgement
The authors thanks to Seti Provincial Hospital and Life Care Diagnostics and Research Center Pvt Ltd, Dhangadhi, Kailali, Nepal for providing laboratory data.

Contributions
YS, DKP, KP, SPD, SP, KK, GPG and BDP conceptualized and developed the outline for this manuscript. AP, UM, YS, SPD, JJ, CRJ, DP, RS and KP developed the first draft. YS, GPG, SP, DP, RS, JJ, AP, DKP, SPD, KP, KK, AP, UM and BDP contributed to data acquisition and further review of the manuscript. The authors read and approved the final manuscript.

Funding: No funding was received.

Competing interests: The authors declare no competing interests.

Ethical approval and consent to participate
Written and verbal consent was taken from patient family for this current publication.

References
1. Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Foodborne, Waterborne, and Environmental Diseases (DFWED). 2021.
11. Seti Provincial Hospital statement regarding the patients confirmed deaths from black fungus infection. (Attached Information with SPH letter head)