Section A - Research Paper
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A NOVEL APPROACH FOR THE PRODUCTION OF O2

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Abstract

The ongoing pandemic has unfavorably impacted oxygen creation and production network, where oxygen treatment is fundamental for the crisis treatment convention of patients contaminated by the infection. This work discusses the difficulties associated with oxygen production, storage, and transportation as well as the various oxygen generation methods. Besides, this study offers a relative investigation of different oxygen creation strategies utilizing Multi-Rules Dynamic Techniques (MCDM). Multiplicative Exponential Weighting (MEW) and Simple Additive Weighting (SAW) are selected as the statistical analysis and ranking tools for Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), in addition to the weighting methods. Cost, performance, the impact on the environment, and safety are the ranking criteria. Besides, this paper uses the Entropy Weight Strategy (EWM), Standards Significance through between rules Relationship (Pundit) technique, and the Stochastic Predominance (SD) technique to appropriate the measures loads. Based on all of the tools and criteria provided, the results demonstrate that the most effective method for oxygen production is membrane technology. As it reached the TOPSIS method's maximum Entropy and Sd value of 0.548 and the SAW and MEW methods' highest CRITIC values of 0.260 and 0.236, respectively.

Keywords: Oxygen produc/tion; TOPSIS; MCDM; Algae; Cryogenic separation; Pressure swing adsorption

1. Introduction

As of November 20, 2021, more than 255 million confirmed cases of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) had been identified worldwide, and more than 5 million deaths had been reported. Although respiratory tract symptoms and fever were the most common clinical presentations among symptomatic patients, extra-pulmonary involvements by COVID-19 include cardiac, gastrointestinal, hepatic, renal, neurological, olfactory, gustatory, ocular, cutaneous,

and hematological symptoms infections like flu, Covid, rhinovirus/enterovirus, parainfluenza, metapneumovirus, and human immunodeficiency infection, and parasites, for example, Aspergillus spp. notwithstanding these co-microorganisms, many instances of mucormycosis among Coronavirus patients have been accounted for recently. Mucormycosis is an uncommon however forceful contagious illness and it basically influences patients with ineffectively controlled diabetes mellitus and seriously immunocompromised patients. rather than aspergillosis, mucormycosis was seldom detailed following viral infection. as of now, the investigations and information about Coronavirus related with mucormycosis (CAM) have been restricted. To provide up-to-date information, we conducted a comprehensive literature review on mucormycosis in COVID-19 patients.

The study of disease transmission

Since the flare-up of Coronavirus, an ever increasing number of instances of CAM have been reported. In UK, the posthumous investigation of 10 a few deadly Coronavirus cases in the early pandemic (between 1 and April 30, 2020) showed one patient who had surprising scattered mucormycosis including the lungs and brain. In US, Placik et al. reported a COVID-19-related fatal case of mucormycosis in Arizona with necrosing pulmonary infections and a bronchopleural fistula25. demonstrated a diabetic patient with COVID-19-associated rhino-orbital mucormycosis. In Brazil, Monte Junio et al. showed a surprising instance of gastric mucormycosis in an older patient with Coronavirus 19. In Italy, Paserol et al. As of May 28, 2021, at least 14, 872 cases of CAM have been found in India, with the state of Gujarat having the highest incidence, with at least 3726 cases, followed by the state of Maharashtra.37 The same trend was reported in another large retrospective study of 2826 patients with COVID-19 associated rhino-orbital-cerebral mucormycosis, in which the states of Gujarat (22%) and Maharashtra (21%) had the highest cases.38 At the same time, In a review testing the in-vitro development of Rhizopus oryzae, a typical etiologic specialist of mucormycosis, in DKA serum, the acidotic circumstances (pH 7.3-6.6) of serum would diminish the limit of transferrin to tie iron, in this way offering the unbound iron in the DKA serum to help the lavish development of R. oryzae. Clinical and animal model data have demonstrated that the presence of elevated available serum iron predisposes the host to mucormycosis due to the critical role of Mucorales' ability to acquire host iron as a virulence factor. Rhizopus invades the epithelium via fungal spore coat proteins (CotH) binding to the host receptor of glucose-regulated protein 78 (GRP78) on the nasal and alveolar epithelial cells. Indirectly, BHB reduced transferrin's capacity to bind iron, thereby raising serum iron levels. In addition to administering corticosteroids as part of routine treatment for COVID-19 patients, this combination can further upregulate CotH3 and nasal GRP78,60, thereby entangling the fungal cells within the rhino-orbital epithelium and causing subsequent invasive diseases. These BHB-created acidotic serum conditions very incline toward mucormycosis, however not to aspergillosis.

Communications between Coronavirus and mucormycosis

Most instances of mucormycosis are transiently connected to Coronavirus 19. The flood in the quantity of instances of CAM is pertinent to natural qualities and general glucocorticoid use for extreme Coronavirus cases, notwithstanding a past notable segment component of unfortunate control for diabetes mellitus particularly with DKA. The foundational utilization of corticosteroids is a situation with two sides in the treatment for cytokine storm and setting off for mucormycosis in the Coronavirus patients that requires basic care. The mix of steroid treatment and diabetes mellitus can expand immunosuppression and hyperglycemia, expanding the gamble of mucormycosis. Most cases were accounted for from India in the literature. Despite the fact that a somewhat high local predominance in India, a 2.1-overlay ascend in mucormycosis during the Coronavirus pandemic than earlier year was noted. The middle time span between Coronavirus determination and the principal proof of a mucormycosis contamination was 7-15 days.

Instances of mucormycosis may happen in Coronavirus patients without diabetes mellitus and just with gentle to-direct illnesses outside escalated care units, as detailed in the Netherlands. Albeit

extreme or basic Coronavirus in inadequately controlled diabetic patients is the absolute best tempest for mucormycosis, getting corticosteroids could add to the development of mucormycosis in Coronavirus patients even without basic seriousness and a gamble comorbidity.

High includes of Mucorales spores in both the indoor and open air conditions are conceivable extra inclining factors. The natural elements could add to the "problem area" districts of CAM on the planet, like the urban communities of Bangalore, Ahmedabad, Jaipur, and Mumbai in India. Different parts of India's soil samples contained mucorales, the most common of which was Rhizopus arrhizus (24.6 percent), followed by Lichtheimia spp. Cunninghamella spp. (23.2%) (21.7 percent), Rhizopus microsporus (14 percent), and Apophysomyces spp. However, there are few studies that link environmental levels of zygomycete sporangiospores and zygomycosis, particularly in areas where zygomycosis is common. Additionally, therapy with an IL-6 receptor antagonist may increase the risk of fungal infections, and severe COVID-19 disease is linked to an increase in pro-inflammatory markers like interleukin (IL)-1 and IL-6. COVID-19 may affect the immune system, resulting in lymphopenia.

Outcomes

CAM-related mortality and morbidity remain high. Buil et al. detailed that three of 4 CAM cases created in the ICU and three passings happened in the Netherlands. In a progression of 187 CAM cases in India, the revealed generally mortality was 37.4% (70/187) and 44.1% (75/170) inside 6 and 12 weeks respectively. The death rates were considerably higher in non-predominant districts (>50%-100 percent in US and the European nations) than pervasive locales (around 40%-half in the center East and Egypt) and most minimal (13%) in India. The largest study of 2826 patients with COVID-19 associated rhino-orbital-cerebral mucormycosis in India reported that all-cause mortality was 14% (n = 305) of 2128 patients with available outcome data. However, the prognosis of mucormycosis may differ depending on the site of involvement. thrombosis of the superior ophthalmic vein or occlusion of the central retinal or ophthalmic artery; inclusion of prevalent orbital gap, second rate orbital crevice, orbital zenith, loss of vision; stage 3d: bilateral involvement in the orbits; paranasal sinus debridement and orbital exenteration could significantly reduce the mortality rate in patients with stage 4 of intracranial extension (52 percent versus 39 percent, p 0.05), according to this study.

Conclusion

The emergence of CAM during the COVID-19 pandemic has raised serious concerns, particularly in India. Corticosteroid use and uncontrolled diabetes mellitus with DKA are the most common conditions among CAM patients. The most common site of involvement is the rhino-orbital-cerebral region, but CAM can also affect the lungs, skin, and stomach. The key to successful CAM patient care is high suspicion and early diagnosis. First-line high-dose liposomal amphotericin B and the right surgical treatment can help improve the outcome of CAM, despite the poor prognosis.

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