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A Study on Covid Associated Mucormycosis (Cam) With Reference To Diabetic Patients in Vizianagaram District, Andhra Pradesh, India.

Koneru Neha
Student, Andhra University, Visakhapatnam, Andhra Pradesh.

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ABSTRACT: Mucormycosis infection is widely observed in people recovering from COVID-19 infection caused by the B.1.617.2 (Delta) variant. It is a serious fungal infection, usually seen in people with reduced ability to fight infections. Mucormycosis commonly cause head, neck, facial tissues and bones with possible intracranial spread. High/over doses administration of corticosteroids, zinc and iron during COVID-19 infection causes to this infection. The eyes, nose, optics and sinus are major infected part/organ should be removed to stop further contamination. The present study observed the associated risk factors and treatment challenges in COVID associated mucormyosis patients.

KEYWORDS: Mucormycosis, Black fungus, B.1.617.2, Corticosteroids, Zinc, Iron, Covid-19, Amphotericin, Tocilizumab, Diabetes, Aspergillosia, Mucorales, Dexamethasone, Covid associated mucormycosis(CAM), Risk factors, Treatment challenges.

I. INTRODUCTION

The emerging complications associated with COVID-19 are being reported, with the fungal infection mucormycosis became a serious issue in India due to its unprecedented surge and high morbidity. In India the first case of mucormycosis is reported on May, 2021 in Chikkamagaluru, Karnataka (e-paper, THE HINDU). Mucormycosis known as Zygomysis (a human pathogen), is the disease caused by many fungus that belong to the fungal family Mucorales. This family mucorals usually found in soil (often associated with decaying organic material such as fruit and vegetable).

[1].The members of this family often responsible for infection in humans called Rhyzopus oryzae. In Indiathrough, another member called Apophysomyces found in tropical and subtropical climates, is also known (**Brad Spellberg; Ashraf s. Ibrahim, 2005**). According to Union government of India, Mucormycosis is a fungal infection that affectsthe people who are on medication and reduces their ability to fight environmental pathogens.Sinuses or lungs of such individual get affected after fungal spores are inhaled from air and may turn fatal if not cured for. The use of high-dose liposomal amphotericin B as a first-line treatment is strongly suggested.

[2].The main objectives of this study are:

1. To study the cause of Mucormycosis infection.
2. To evaluate the relation between COVID-19 and mucormycosis infection.
3. To concentrate on the correlation between mucormycosis infection and chronic health condition like diabetes.

II. MATERIAL METHODS

For the present study, COVID associated mucormycosis patients were selected from three different hospitals (i.e, Tirumala multispecialty hospital, Maharaja Government hospital and Surya hospital), of Vizianagaram town Andhra Pradesh, India.

The data of various parameters is collected from patients by interviewing about 250 patients and hospital records (secondary data) with the permission of authorities.

Observation

The mucormycosis is a prevailed during the COVID-19 period which is resulted as a more dangerous life threatening infection occurred in covid patients throughout the world.

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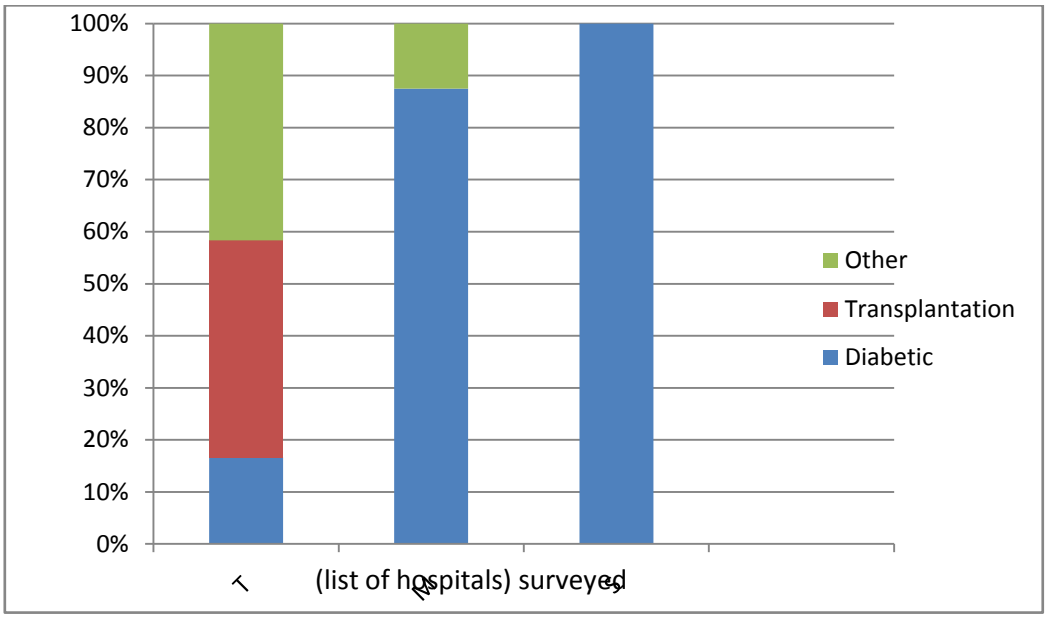
	Tirumala multi-speciality hospital	Maharaja Govt. hospital	Surya hospital
Diabetic	2	7	1
Transplanted	5	0	0
Other	5	1	0
Total	12	8	1

After the first covidwave and before the second one (i.e, between September 1 and December 31, 2020) there observed about 250 are active covid-19 cases among which 120 cases are noted in diabetic patients of age group between 30-50 years. Among them 21 are conformed COVID associated mucormycosis cases in about 3 healthcare centres (i.e, Tirumala multispecialty hospital, Maharaja Government hospital and Surya hospital) across Vizianagaram district, Andhra Pradesh. Among the 21 conformed mucormycosis cases, 10 cases noted in diabetic patients of age 30-50years taking insulin (i.e, 2 in Tirumala multi-speciality hospital, 7 in Maharaja government hospital and 1 in Surya hospital), 5 cases noted in patients who have recently undergone transplantation in Tirumala multi-speciality hospital and 6 cases noted in patients with other health issues (i.e, 5 in Tirumala multi-speciality hospital and 1 in Maharaja government hospital).



Graph: Percentage of total number of COVID associated mucormycosis (CAM) observed in threedifferent hospital in Vizianagaram town.

The above graph shows, among three health care centres, 12 (57.1%) cases are from Tirumala multi-speciality hospital, 8 (38.09%) cases are from Maharaja Government hospital and 1 (47.1%) are observed from Surya hospital.

III. CAUSES AND SITES OF INFECTION.

Fungi in the mucorales family are usually infect people with impaired immune system, or with damaged tissue. Use of drugs which suppress the immune system such as corticosteroids can lead to impaired immune function **(Georgious Hamilos et al., 2012)**. Damaged tissue can occur after trauma or surgery and also patients with hyperglycaemia, acidosis, diabetes, leukaemia, AIDS and other post-operative conditions are also affected with this infection **(John Webster and Roland W. S. Weber, 2007)** because they impair the ability of phagocytes to move towards and kill

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the organism by both oxidative and non-oxidative mechanisms. When diabetes is poorly controlled, blood sugar is high and the tissues become relatively acidic which is a good environment to mucorales fungi to grow. This was identified as a risk in India where diabetes is increasing prevalent and often uncontrollable.

There are three ways human can contact mucormycosis:

1.By inhaling spores
2.By swallowing spores in food or medicine
3.When spores contaminate wounds

Inhalation is most common. We actually breathe in the spores of many fungi everyday. But our immune system and lungs, if healthy, generally prevent them from causing an infection. When our lungs are damaged and our immune system suppressed, such as in case of patients being treated for severe Covid-19, these spores can grow in our airways or sinuses and invade body tissues.

Mucormycosis can manifest in the lungs, but the nose and sinus are most common sites of mucormycosis infection. From there it can spread to eyes- potentially causing blindness or in severe cases leads to loss of vision**(Jagadish Chander's book of Medical Mycology, 2018)**. It can also affect skin. Life-threatening wound infections have been seen after injuries sustained during natural disasters or on battle fields where wounds have been contaminated by soil and water.

Relation between Mucormycosis and Covid-19 infection.

People with diabetes and obesity tend to develop severe Covid-19 infection. This means they're more likely to receive corticosteroids, which are frequently used to treat Covid-19 infection. But the corticosteroids- along with diabetes- increase the risk of mucormycosis. Meanwhile, the virus that causes Covid-19 can damage air tissues and blood vessels, which could also increase susceptibility to fungal infection. So damage to tissue and blood vessels from Covid-19 infection, treatment with corticosteroids, high background rates of diabetes in the population most severely affected by the coronavirus and importantly more widespread exposure to fungus in environment are likely to playing a part in the situation with mucormycosis in India.

The demand for immune boosting supplements has increased during the pandemic and a large number of people are consuming them without any basic evidence could be a reason for increase in fungal attack. The high levels of sugar, iron and zinc create a favourable condition for the fungus to grow. According to health experts, the commonly used drugs such as steroids and Tocilizumab lower the immunity of patients and use of such drugs without the supervision of a doctor will make the patient vulnerable to covid-19- associated mucormycosis (CAM), loosely described as black fungus infection. The steroids would raise the blood sugar level of patients, weaken their immune system and make them vulnerable to fungus attack. CAM is observed among 94% diabetic patients in India. This is because of high blood sugar levels leads to low p^H (acidic conditions) levels which is suitable environment for growth of mucormycosis in the body.

IV. SYMPTOMS OF MUCORMYCOSIS INFECTION AND TREATMENT CHALLENGES.

The individuals that are affected with black fungus infection show some symptoms like Black crusts in nose, obstruction, swelling in eyes or cheeks or in orbits.

Diagnosis and intervention as early as possible is important. Early recognition can be treated using some anti-fungal drugs like Amphotericin-B, Iron chelator therapy, control of blood sugar levels in case of diabetics and sometimes even urgent removal of dead tissues can also be performed. Late recognition may lead lo loss of organ and also death of the affected.

Role of iron in treatment of mucormycosis infection

Iron is an essential element for cell growth and development, contributing to many vital processes of cell. Therefore, successful pathogens use multiple processes for obtaining iron from the host. A study finds that the level of available, unbound iron in serum plays a critical factor in developing mucormycosis infection among diabetic patients. Patients with diabetes who have suffered from Covid-19 infection are observed to have elevated levels of free iron in their serum, and such serum supports the growth of R. oryzae at acidic p^H (7.3-6.88). These findings raise the possibility that Iron Chelator therapy may be useful to treat the infection. It helps to reduce the availability of unbound iron in serum, thus proving an unfavourable condition for the growth of fungi (i.e, mucormycosis). This may help to treat mucormycosis infection.

V. SUMMARY

Fungi belonging to order Mucorales often cause acute angioinvasive infections in patients with uncontrolled diabetes, transplants and physical trauma. Due to its increasing incidence and high

morbidity and mortility rate, Zygomycosis is a major concern among medical mycologists. High intake of zinc and iron supplements in order to boost immune system also a reason for this infection as they provide favourable conditions for fungal growth. The covid associated mucormycosis is observed more in diabetic patients as their blood glucose levels are very high which make more acidic environment that favours the fungal growth. Early recognition of this infection can be cured by administration with some anti-fungal drugs like Amphotericin-B and also with Iron chelator therapy. Late recognition may lead to organ loss or may also lead to death.

REFRENCES

[1]. Jagadish Chander (2018), Antifungal therapy. Text book of Medical Mycology.4. 104.
[2]. Chakrabarti, A., Singh R. (2014). Mucormycosis in India: Unique features. Mycoses, diagnosis therapy and prophylaxis of fungal diseases. 57. 85-90.
[3]. Burekovic, A., Dizd orevic- Bostandzic, A., Godinjak, A. (2014): Poorly regulated blood glucose in diabetic patients- predictions of acute infections. Med arch. 68. 163-166.
[4]. John Webster and Ronald W. S. Weber (2007). Zygomycota. Introduction to fungi. 3. 165-180.
[5]. Georgious Hamilos.(2012) Pulmonary Mucormycosis. Semin Respir Crit Care Med. 32. 693-702.
[6]. Ashraf S. Ibrahim, Brad Spellberg, Thomas J. Walsh, Dimitrios P. Kontoyiannis (2012). Pathogenesis of Mucormycosis, Clinical Infectious Diseases. 75. 16-22.