Comparative Evaluation Of Knowledge And Awareness About Mucormycosis In Dental And Medical Practitioners In Western Maharashtra.

Dr. Fazal S Mujawar, Dr Sameer A Zope*, Dr Girish F Suragimath, Dr Siddhartha Varma, Dr Apurva V Kale, Dr Vaishali Mashalkar

Department of Periodontology, School of Dental Sciences, Krishna Institute of Medical Sciences Deemed to be University, Karad, Maharashtra, India

*Corresponding Author: Dr. Sameer A. Zope
Department of Periodontology, School of Dental Sciences, Krishna Institute of Medical Sciences Deemed to be University, Karad, Maharashtra, India. E-mail: aoldentist@gmail.com Phone number: 9890669053
DOI: 10.47750/prr.2022.13.509.155

Abstract

Introduction: The estimated mucormycosis mortality rate in India ranges from 28-52%. High morbidity and mortality have been linked to delayed diagnosis and treatment. Medical and dental practitioners play a crucial role in identifying the disease and formulating a treatment plan. Hence, it is important for medical and dental practitioners to have adequate knowledge about mucormycosis.

Objective: To evaluate and compare knowledge and awareness about mucormycosis amongst dental and medical practitioners.

Methods: This cross-sectional survey was conducted among Medical and Dental practitioners in Western Maharashtra. A specially designed prevalidated questionnaire was developed, consisting of 15 questions. It was distributed through electronic mode utilizing google form during July 1st 2022 to August 31st 2022. SPSS Version 21 software was used for statistical analysis. The data obtained was statistically analysed using paired T-test.

Results: A total of 604 responses were obtained among which 266 (44.04%) were medical practitioners and 338 (54.96%) were dental practitioners. Variations in responses indicated that practitioners from both the groups were nescient regarding causative organisms, predisposing factors, and guidelines for drugs used in treatment of mucormycosis. There was no significant difference observed in the level of knowledge and awareness among both the groups.

Conclusions: Majority of the dental and medical practitioners lacked adequate knowledge and awareness about causative agents, predisposing factors, clinical symptoms, and drug regimens used to treat mucormycosis. Periodic continuing professional education programs are required to impart updated knowledge about mucormycosis among these practitioners.

Keywords: Covid-19, fungal infection, medical education, mucormycosis, pandemic, practitioners.

INTRODUCTION:
Mucormycosis is a rare fungal infection that typically affects patients with immune deficiency. (1) The main causative agents are Zygomycetes and Mucorales fungus present in soil and debris. (2) The clinical presentation of mucormycosis includes rhino-orbital-cerebral, pulmonary, gastrointestinal, renal, and disseminated mucormycosis. (3) Symptoms of mucormycosis differ with change in its location in the body. (4) Mucormycosis can be confused with intraoral findings such as chronic periodontitis or an ulcer. (5)

Recent evidences states that excessive use of steroids in COVID-19 patients may have contributed to the increased prevalence rate. Immunosuppressive medications and supportive oxygen are needed in advanced cases of Covid-19 patients. This regimen of treatment promotes ergosterol biosynthesis, a critical component of fungal cell membranes. (6) The angioinvasive fungi present in mucormycosis stimulate thrombosis leading to necrosis of affected tissues. (7)

The mainstay of mucormycosis treatment is early intervention, surgical debridement of infected tissues, and antifungal treatment. Amphotericin B is the drug of choice for the treatment of mucormycosis. (8) Medical practitioners and Dental practitioners play a critical role in the diagnosis of the condition by identifying the cause and formulating a treatment plan based on the prognosis. Considering the fatality of mucormycosis, it is necessary to get an insight into the knowledge and awareness of mucormycosis among medical and dental practitioners. Maharashtra state reported a massive number of mucormycosis cases during the COVID-19 pandemic. Hence, this cross-sectional survey was conducted to assess knowledge and awareness about mucormycosis among dental and medical practitioners in western Maharashtra, India.
MATERIALS AND METHODS:
Study design and setting
This cross-sectional survey evaluated knowledge and awareness about mucormycosis in medical and dental practitioners of Maharashtra. From July 1st, 2022 to August 31st, 2022.

Study participants and sampling
The survey was conducted from July 1st, 2022 to August 31st, 2022. In a fixed period of 2 months to ensure maximum participation from the participants.

Data collection tool and technique:
In order to collect data from participants who were willing to participate in the study, a google form was fabricated comprising of two steps - a two-page configuration. On first-page information sheet was provided along with consent form. After taking an informed consent the participant is taken to page two where an open-ended questionnaire comprising 15 semi-structured questions fabricated in English language were placed. In this survey no correspondence data was collected thus maintaining the anonymity of the study participants. The questions were related to knowledge about Covid-19 associated complications, mucormycosis and some questions regarding disease awareness and side effects associated with the treatment. Which is then distributed/mailed to the participant. Regional Indian Dental Association (IDA) office was approached and email addresses of the IDA members in Maharashtra were obtained. The email addresses of registered physicians were also obtained from Indian medical associations in respected districts. The survey was conducted from July 1st, 2022 to August 31st, 2022. In a fixed period of 2 months to ensure maximum participation from the participants.
A pilot study was carried out among 20 medical and dental practitioners to validate the reliability and indulgence of questions.

Ethical consideration
The study protocol was duly reviewed and approval was obtained from the ethics review committee of Krishna institute of medical sciences (KIMSDU) before commencing the study, (reference number KIMSDU/IEC/395/2021-2022 dated 24/06/2022).

Statistical analysis
The questionnaires were reviewed and incomplete forms were omitted. The data were coded, entered, and analysed using the Statistical Package for Social Sciences (SPSS) IBM version 21 for Windows (SPSS Inc, Chicago, IL). Descriptive quantitative data were expressed in mean, standard deviation, and percentage/proportion. The confidence interval was set at 95%, and the probability of alpha error (level of significance) was set at 5%. A paired t-test was used to determine if there is any significant difference (P-value) in the knowledge and awareness of dental and medical practitioners. The access to the data obtained was only by the principal investigator. Data retrieved were entered into the Excel database. The results were collated and summarized as percentages, and the p-value was calculated.

Results:
The present study assessed the knowledge and awareness about mucormycosis in dental and medical practitioners in western Maharashtra. A total of 604 participants participated in the study. Among the participants 266 (44.04%) were medical practitioners and 338 (54.96%) were dental practitioners.
Table 1. represents responses to questions that were designed to assess respondents’ knowledge and awareness of mucormycosis. In the present study, more than 60% of dental and 52% of medical practitioners knew about the WHO’s 3'C (Crowded places, Close settings, and Confined spaces) of Covid-19 transmission. More than 90% of participants from both groups could identify the exact signs and symptoms of Covid-19 disease.

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Questions</th>
<th>Dental practitioner</th>
<th>Medical practitioner</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The 3Cs of Covid 19 transmission according to WHO are?</td>
<td></td>
<td></td>
<td>0.447621</td>
</tr>
<tr>
<td></td>
<td>A. Crowd, Cough, Contact</td>
<td>32%</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. Crowded places, Cough, Confined Places</td>
<td>7%</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C. Cluster, Cough, Contact</td>
<td>4%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D. Crowded places, Close setting spaces, Confined spaces</td>
<td>57%</td>
<td>52%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Which one of the following is common signs and symptoms of COVID-19?</td>
<td></td>
<td></td>
<td>0.382341</td>
</tr>
<tr>
<td></td>
<td>A. Brain infarct</td>
<td>3%</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. Seasonal flu-like</td>
<td>93%</td>
<td>98%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C. Neurological problems</td>
<td>1%</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D. Lower limb pain</td>
<td>3%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Following Post, COVID-19 complications could be fatal, EXCEPT?</td>
<td></td>
<td></td>
<td>0.433941</td>
</tr>
<tr>
<td></td>
<td>A. Disseminated intravascular coagulation</td>
<td>13%</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. Mucormycosis</td>
<td>14%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C. Lung fibrosis</td>
<td>8%</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D. Laryngeal inflammation</td>
<td>65%</td>
<td>69%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mucormycosis has a _______ origin</td>
<td></td>
<td></td>
<td>0.452813</td>
</tr>
<tr>
<td></td>
<td>a. Bacterial</td>
<td>8%</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b. Viral</td>
<td>13%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c. Fungal</td>
<td>77%</td>
<td>76%</td>
<td></td>
</tr>
</tbody>
</table>
Our study reported that participants from both groups possess adequate knowledge about the origin, commonest species, and predisposing factors for the development of mucormycosis. But more than 50% of practitioners in both groups were unaware of the normal habitat of mucor mould. Only 41% of dental practitioners and 24% of medical practitioners were aware of industrial oxygen being a contributing risk factor to the development of mucormycosis.

It should also be noted that the majority of participants from both groups had sufficient knowledge about the drug of choice but almost 31% of dental and 43% of medical practitioners failed to identify the ways in which the disease could manifest in the body.

Our study reported that the majority of participants in both groups were aware of the fact that immunocompromised patients are most commonly prone to mucormycosis. More than 30% of participants from both groups were unaware of .
MoHFW (Ministry of Health and Family Welfare) guidelines to treat mucormycosis. But a majority of them were aware of the adverse reactions associated with amphotericin B treatment, which makes it a key finding of the study. Medical practitioners possessed a good level of awareness about the gold standard diagnostic method for diagnosis of mucormycosis when compared to dental practitioners. On intergroup comparison, no statistically significant difference was observed in the level of knowledge and awareness among dental and medical practitioners.

DISCUSSION:
Mucormycosis had created an epidemic during the pandemic situation in the second wave of COVID-19 infection in India. The incidence varies from 0.005 to 1.7 per million population, and the global case fatality is as high as 46%. (7) Considering the mortality rate, it is crucial to make dental and medical practitioners capable of identifying the disease, in order to rule out the disease in its early stage. Understanding and assessing the knowledge and awareness regarding mucormycosis is valuable in this regard. It is noteworthy that no comparative research study is available on knowledge and awareness of mucormycosis among dental and medical practitioners in western Maharashtra. This is the first study that evaluated and compared the knowledge and awareness of both dental as well as medical practitioners.

World health organization in the year 2020 during the Covid-19 pandemic proposed a 3°C model. It asks people to avoid crowded places, close settings, and confined spaces in order to prevent Covid-19 transmission. (9) In the present study majority of the participants from both groups were knowledgeable about this 3°C model.

In the year 2020, the Center for disease control released the list of common signs and symptoms of Covid-19 which included loss of taste, headache, and seasonal flu-like symptoms. (10) A study done by Xiaoyan Song et al in march 2020, in the united states on the difference between the symptoms of Covid-19 and seasonal influenza concluded that patients with Covid-19 and seasonal flu had similar features. (11) In our study, more than 90% of the participants from Both groups had satisfactory knowledge about seasonal flu-like symptoms being the most common sign and symptom of Covid-19.

A study done by Meng Jin in the year 2021 reported the most fatal complications of post-Covid-19 as, disseminated intravascular coagulation, ARDS, heart failure, mucormycosis, etc. In our study more than 65% of patients from both groups had knowledge about the fatal complications post Covid-19. Also, Awadhesh Kumar Singh in his systemic review on mucormycosis in Covid-19 patients in India, proposed that mucormycosis has a fungal origin and The Rhizopus species is the most common species accounting for nearly 60% of mucormycosis cases in humans. (12) In accordance with this, the majority of participants from both groups in our study possessed adequate knowledge about the origin and most common species in mucormycosis.

National organization of rare disorders (NORD) in their research about mucormycosis published that fungal infection is caused by certain types of moulds. These moulds are known as mucoromycetes. And are mostly found in soil and decaying matter present in nature. Corelating with these facts in our study it is found that the majority of practitioners from both groups possess a good level of knowledge regarding the habitat of mucor moulds. (13)

Kazem Ahmadikia in 2021, found that steroids being a double-edged sword was a prominent risk factor for the development of mucormycosis in 66.7% of patients with Covid-19 specifically. (14) Also, Shyam Kishor in 2021 proposed that medical oxygen is highly purified. Before being used, it undergoes different processes such as compression, filtration, and purification. Its cylinders are cleaned and disinfected but due to the sudden rise Covid-19 in cases and shortage of medical oxygen, hospitals were diverted to use industrial oxygen. these criteria for purification and disinfection are not fulfilled by industrial oxygen supplies. So, the use of impurified industrial oxygen was considered to be a probable cause of the black fungus surge. (15) In our study, we discovered that the majority of participants from both groups had knowledge about this possible risk factor.

Mucormycosis can invade different body systems. The clinical manifestations largely depend on the route of entry of the fungus and the predisposing disease. But sometimes it could mimic chronic periodontitis, (16) palatal ulcer, (18) and necrosed maxilla. (19) Our study stated that more than 30% of participants from both groups were unaware of these variations in clinical manifestations.

Hariprasath Prakash in 2021 based on the anatomical site of involvement in mucormycosis found that ROCM mucormycosis is the commonest form (45–74%), followed by cutaneous (10–31%), pulmonary (3–22%), renal (0.5–9%), gastrointestinal (2–8%), and disseminated infections (0.5–9%). (20) Our study reported that more the 45% of practitioners in both groups were aware of ROCM being the most fatal form of the disease. These results are in agreement with a study conducted by Kaur et al on north Indian physicians. (21)

Amphotericin B is the lifesaving drug of choice for the treatment of mucormycosis. (22) In our study, we found that more than 64% of medical and 73% of dental practitioners were aware of this fact. Rafael Laniado-Laborín in 2009 observed the adverse reactions of amphotericin B as hyper or hypotension, hypoxia, and nephrotoxicity. (23) In the current study, more than 50% of participants in both groups were aware of the adverse effects of this drug.
Brad Spellberg 2010 found that treatment with liposomal amphotericin B (LAmB) was associated with a 67% survival rate, compared with 39% survival with plain amphotericin B. Ministry of Health and Family Welfare (MoHFW), India has also recommended the use of liposomal amphotericin B in guidelines for treating mucormycosis. (24) About this, in the present study more than 35% of participants from both groups were unaware of these guidelines.

Mucormycosis is a rare invasive fungal infection that affects immunocompromised patients and is fatal when not identified and treated early. Although, Ariel M Brettholz in her study concluded that, the use of polymerase chain reaction is a novel tool that is being investigated. But, the gold standard for diagnosing mucormycosis is biopsy. (25) In our study, we discovered that more than two third of medical and dental practitioners were aware of immunocompromised patients being most prone to the disease. When it came to the gold standard in diagnosis, medical practitioners had comparatively better awareness than dental practitioners.

LIMITATIONS AND RECOMMENDATIONS:
The current study has some limitations. The generalizability of the study may be affected as sample size was small and the samples were selected via purposive sampling. The study was conducted only in western part of Maharashtra. For better generalizability, future studies with multi-centric design and larger sample size can be carried out among the dental and medical practitioners across the country.

CONCLUSION
Within the limitations of the study, it can be concluded that majority of the study participants had good knowledge and awareness about Covid-19 and possible complications associated with it. But signifying area of concern is that several dental and medical practitioners in Western Maharashtra still lack knowledge and awareness about causative organisms, predisposing factors, clinical features, and guidelines for drugs used in treatment of mucormycosis. Therefore, it is vital to disseminate knowledge and awareness among medical and dental practitioners about various aspects of invasive fungal diseases to manage further outbreaks of mucormycosis. This can be achieved by coordinated efforts from government, dental and medical associations in the state for imparting periodic updated knowledge to dental and medical practitioners through CME, CDE programs, e-learning methods, workshops, scientific publications, etc.

ACKNOWLEDGEMENT:
The authors would like to acknowledge the medical and dental practitioners in western Maharashtra for their participation in their study.

FINANCIAL SUPPORT AND SPONSORSHIP: - Nil

CONFLICTS OF INTEREST: - There are no conflicts of interest.

REFERENCES:


