History of Medicine, 2022, 8(1): 134–143
DOI: 10.17720/2409-5834.v8.1.2022.017

KNOWLEDGE AND ATTITUDE ABOUT MUCORMYCOSIS AMONG DENTIST IN UTTAR PRADESH- A QUESTIONNAIRE BASED STUDY

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Abstract

Background: Mucormycosis is a severe fungal infection with high mortality and morbidity rates. This study aimed to assess the knowledge and attitude of dentists in Uttar Pradesh towards mucormycosis, a condition caused by Mucorales fungi. The clinical manifestations include various types such as rhino-orbital-cerebral, pulmonary, gastrointestinal, cutaneous, renal, and disseminated mucormycosis.

Methods: A cross-sectional study was conducted among dentists in Kanpur, Uttar Pradesh, using a validated questionnaire. The sample size was 120, comprising BDS and MDS graduates, postgraduate students, and academicians. Data collection was done through offline distribution and online surveys via Google Form.

Result: A total of 120 dentists participate in the research. Among them 65% were MDS, whereas 35% were BDS. The study revealed that 76.7% of participants recognized mucormycosis as a very dangerous condition and 70.0% of them thought that Dentist can play a major role in teaching other persons about mucormycosis.

Conclusion: Despite a good level of knowledge and awareness among dentists in Kanpur, there is a need for further training and education to enhance their ability to provide optimal care for mucormycosis patients. Future studies should consider a multi-centric design with a larger sample size for better generalizability

Keywords: Mucormycosis, Fungal Infection, Dentist

INTRODUCTION:

Mucormycosis is an uncommon but widespread fungal condition that has a substantial mortality and morbidity rate. It is distinguished by a rapidly evolving angioinvasion course with thrombosis and tissue disintegration.(1) Mucormycetes belong to the order Mucorales, subphylum Mucoromycotina. It is a condition that has been around for a long time. It is characterised clinically according to anatomic location, such as rhino-orbital-cerebral

(ROCM), pulmonary, gastrointestinal, cutaneous, renal and diffuse mucormycosis, disseminated or other relates to unusual or rare types, including endocarditis, osteomyelitis, peritonitis, renal, etc. (2)

This condition was originally described by Fürbinger in 1876 when he wrote about a patient who died of cancer and whose right lung had a hemorrhagic infarct with fungal hyphae and a few sporangia. The first instance of widely disseminated mucormycosis was first described by Arnold Paltauf in 1885 and was given the term "Mycosis mucorina." He concluded that Lichtheimia corymbifera was most most likely the source of the infection after drawing the etiologic agent and demonstrating the existence of sporangiophores and rhizoid-like structures. Between 1980 and 1990, there was an exponential increase in the number of mucormycosis cases, which were mostly seen in immunosuppressed patients. According to a prevalence analysis, infection amplification was 7.4% annually. (2,3)

Mucormycosis often referred as black fungus, which is a misnomer, since it refers to a different class of fungi called dematiaceous fungi. (4)

It has risen dramatically as a result of the Covid-19 virus outbreak. CAM (COVID-19–associated mucormycosis) has been documented in a number of nations, including Austria, Brazil, Egypt, France, India, Iran, Italy, and the US. According to a recent systematic review, 0.3% of COVID-19 coinfections are caused by CAM. India is not unfamiliar with mucormycosis; the case rate prior to 2019 was about 70 times higher than in developed nations. India is expected to have 140 cases of mucormycosis per million people. (5,6) A GoI website allegedly listed more than 31,000 CAM cases by June 13, 2021, according to an editorial in-press from the Indian Journal of Medical Microbiology. The number of cases increased to 40,000 by July 2021. (7) While India was experiencing difficulties during the second wave of COVID-19, there has been an unexpected increase in CAM cases. As a result, the Government of India declared it a notifiable disease, and several state governments declared it an epidemic. Various control measures and guidance on obtaining and allocating treatment drugs to all states were quickly implemented. (6)

The oral symptoms of mucormycosis include pain, tooth mobility, bad breath, nasal stuffiness and discharge (which can be black purulent), epistaxis, pain in the para nasal sinuses, draining sinuses, nasal and facial erythema, ulcerations in the palate, blackish discoloured skin, erythema and edema of the peri orbital area, ptosis, and pain in the orbit. (8) The earlier mucormycosis is detected, the more effectively it may be treated. Because this deadly disease necessitates immediate and intensive treatment, early imaging is critical for determining the amount of the disease's involvement. The gold standard for radiographic diagnosis is gadolinium enhanced MRI with CT-PNS with contrast serving as adjuvant imaging. (5,6)

Reversal or termination of underlying predisposing factors, early delivery of active antifungal medications at the optimal dose, full excision of all infected tissues and the use

of various adjuvant therapies are all part of a successful therapy strategy for mucormycosis. (3)

Dentists play a critical role in controlling the spread of this fungal infection and are a critical lethal weapon in enabling early detection. With early identification and preventive interventions, this lethal fungal infection can be controlled with little morbidity and death. As a result, dentists must have sufficient knowledge and awareness of the subject. Hence, this research was conducted to assess the knowledge, awareness and practice towards Mucormycosis among dentists in Kanpur, Uttar Pradesh.

MATERIALS AND METHODS:

The ethical clearance was obtained from the ethical committee of Rama Dental College Hospital & Research centre, Kanpur prior to the start of the research. The research participants were notified prior that the survey is completely voluntary based. They were allowed to quit at any moment, and submitting the questionnaire was considered their acceptance for participation.

It was a cross sectional study that was open, prevalidated, and anonymous which emphasized on knowledge, attitude and practices regarding mucormycosis among dentists. This study comprises of Graduates (BDS), post graduate (MDS) students, MDS faculty members working as academicians in dental colleges and private practitioners in the Kanpur region.

The sample size was estimated with the help of study conducted with the help of study conducted by Anuraaga AT et al. margin of error of 5%, and confidence interval 95%. The sample size calculated was 120.

A Pilot study was conducted to ascertain the test-retest reliability of the survey questions among 10 senior specialized dentists. The Cronbach's alpha was used to evaluate the questionnaire's reliability, and it was determined to be 0.89,which indicated high reliability. Following that, a validated survey was constructed after the questionnaire was further improved with changes and exclusions to make it more pertinent and specific to the study's objective.

This cross sectional study was conducted to evaluate the knowledge, awareness and attitude about mucormycosis among registered dentists in Kanpur district, Uttar Pradesh over a period of two months (January 2022 – February 2022). The self administered questionnaire comprises of 14 questions in English language made specifically for the study. Both online and offline methods were used to perform this research. Prior to the data collection, In order to collect offline data, hard copies of the questionnaire were personally distributed to the dentists working in private institutions and private clinics. For the online data collection, the "Google Form" link was shared via social media platforms, such as WhatsApp Messenger, text messaging, and email.

Data was analyzed using the statistical package SPSS 22.0 (SPSS Inc., Chicago, IL) and level of significance was set at $p<0.05$. Descriptive statistics was performed to assess the proportion of each category of the respective groups. Inferential statistics was done using chi square test for proportion.

RESULT

A total of 120 dentists, aged between 21 and 45 years, with a mean age of 25.89 years, participated in this study. Among them, 78 (65.0%) held MDS degrees, while 42 (35.0%) held BDS degrees. (Table 1) Among 78 MDS specialists, 28.2% specialized in Pedodontics and Preventive Dentistry, 20.3% in Conservative Dentistry and Endodontics, 13% in Public Health Dentistry,10.1% in Orthodontics and Dentofacial Orthopedics, and Prosthodontics, 8.5% in Periodontics and Oral Implantology and 5.8% in Oral and Maxillofacial Surgery.

Regarding the Working experiences of the participants, 46 (38.3%), were clinicians, 49 (40.8%) were postgraduate students, 17 (14.2%) were both clinicians and academicians, and 8 (6.7%) were solely academicians. (Table 2)

The Knowledge regarding mucormycosis among dentist was assessed with the help of four questions. In this survey, 82 participants (68.3%) correctly identified mucormycosis as a non-contagious disease. When queried about the mode of transmission of mucormycosis, 78 (65.0%) of participants provided accurate responses. In terms of predisposing factors for mucormycosis, 79.2% (95 participants) correctly identified uncontrolled diabetes mellitus, immunosuppression from steroids, and prolonged ICU stays as primary factors. Additionally, 97.5% of participants correctly identified at least one clinical feature of mucormycosis. (See Table 3for details).

In terms of their understanding of mucormycosis, only 76.7%% regarded it as a highly dangerous condition, while 21.7% perceived it as moderately dangerous. Nevertheless, 98.3% recognized it as a significant health concern. Regarding disease prevention, 95.8% acknowledged the importance of public education about mucormycosis. As for the role of dentists in disseminating information, 84 participants (70.0%) considered it highly significant, 33 (27.5%) moderately significant, and 3 (2.5%) not significant. The average awareness score was approximately 83.52% (See Table 4 for details).

In their self-assessment of attitudes, 59.2% expressed hesitation in treating individuals with mucormycosis, despite 65.8% having encountered such cases and recognizing the necessity for treatment. Furthermore, 84.2% of participants emphasized the importance of dentists taking the lead in treating mucormycosis cases. Out of the 120 participants, 93 dentists (77.5%) demonstrated knowledge of proper mucormycosis diagnosis methods, while 87 dentists (72.5%) were familiar with appropriate treatment approaches. Additionally, 95% of participants expressed willingness to treat patients who had recovered from mucormycosis, with 78.3% highlighting the patients' distinct long-term outlooks (See Table 5 for details)

Table 1: educational background of the participants

Qualification	N	%
BDS	42	35.0%
MDS	78	65.0%

Table 2: educational background of the participants

Qualification	N	%
Only Clinicians	46	38.3%
Postgraduate Students	49	40.8%
Both Clinicians and Academicians	17	14.2%
Only Academicians	8	6.7%

Table 3- Assessment of Knowledge Level

Question	Score
What is the mode of transmission of mucormycosis ?	65.0%
Is mucormycosis a contagious disease?	68.3%
Important predisposing factor of mucormycosis?	79.2%
Clinical features of mucormycosis are?	97.5%

Table 4- Assessment of Awareness Level

Question		N	%age
How do you perceive mucormycosis?	Not Dangerous	2	1.7%
	Moderately dangerous	26	21.7%
	Very dangerous	92	76.7%
Do you know mucormycosis is a serious health issue ?	Yes	118	98.3%
	No	2	1.7%
Is it important to educate the people about mucormycosis to prevent the disease?	Yes	115	95.8%
	No	5	4.2%
What do you think about the dentist's role in teaching others about mucormycosis?	Not significant	3	2.5%
	Moderately significant	33	27.5%
	Highly Significant	84	70.0%

Table 5- Assessment of Attitude level

Question		N	%age
Have you come across any person recently affected by mucormycosis	Yes	79	65.8%
	No	41	34.2%
Do you think dentists should treat mucormycosis in first line?	Yes	101	84.2%
	No	19	15.8%
How will you diagnose mucormycosis?	CT scan of lungs, sinuses etc	18	15.0%
	Fine needle aspiration	11	9.2%
	Tissue biopsy	19	15.8%
	Tissue biopsy, Fine needle aspiration	8	6.7%
	CT scan of lungs, sinuses etc, Fine needle aspiration	9	7.5%
	CT scan of lungs, sinuses etc., Tissue biopsy	9	7.5%
	CT scan of lungs, sinuses etc., Tissue biopsy, Fine needle aspiration	46	38.3%

How will you treat mucormycosis patient?	Antifungal therapy for at least 4 to 6 Weeks	16	13.3%
	Installation of the peripherally inserted central catheter (PICC line)	4	3.3%
	Surgically debriding of necrotic (dead) tissues	5	4.2%
	Antifungal therapy for atleast 4 to 6 Weeks., Surgically debriding of necrotic (dead) tissues	21	17.5%
	Installation of the peripherally inserted central catheter (PICC line), Antifungal therapy for atleast 4 to 6 Weeks., Surgically debriding of necrotic (dead) tissues	74	61.7%
Will you treat the patients who have recovered from mucormycosis	Yes	117	97.5%
	No	03	2.5%

DISCUSSION

Mucorales fungi cause a severe and potentially deadly opportunistic infection known as mucormycosis, also referred to as zygomycosis or phycomycosis. As of 2019-2020 data, the global prevalence of mucormycosis ranges from 0.005 to 1.7 cases per million people. However, the prevalence in India is significantly higher at 0.14 per 1,000 people, which is about 80 times greater than in wealthier countries. Due to the similarity between the cellular structures of these fungi and human cells, there are limited treatment options available for deep-seated fungal infections like mucormycosis.(10) Given the severity and mortality rate associated with this disease, early detection by dentists is crucial. Understanding the level of knowledge, awareness, and attitudes among dentists can be beneficial in this context.

This study employed both online and offline questionnaires to evaluate the knowledge, awareness, and attitudes of dental professionals in Kanpur regarding mucormycosis. While 59.2% of the participants demonstrated strong knowledge about the disease, nearly half mistakenly believed it to be a contagious condition. This highlights a significant gap in their understanding of mucormycosis. Fungal transmission can occur through direct contact with an open oral wound or by inhaling fungal spores. A characteristic feature of this disease is the production of thrombosis by fungal spores through angioinvasion, leading to tissue necrosis. When asked about the transmission mechanism, 63.3% of participants correctly identified that it can spread through skin contact, burns, and inhalation of spores.

Individuals with graft versus host disease and severe neutropenia frequently develop pulmonary mucormycosis, whereas diabetic individuals frequently show with rhino orbital illness. In a comprehensive study by Singh et al., confirmed instances of mucormycosis in people with COVID 19 were reported; 80% of these patients had diabetes mellitus, and 76.3% were using

corticosteroids.(11) In our study, 75.8% of participants accurately responded to the question on predisposing variables.

Piyush Dongre et.al in his review mentioned about the clinical characteristics of the condition that includes Mobility of teeth, halitosis, tooth ache, palatal ulceration, intraoral draining sinuses, stuffy nose, epistaxis-associated nasal discharge, blackish discharge, erythema of the mucosa of the nose, erythema on a single side of the face, facial erythema, blackening of the skin, redness, and edema around the eyes, in our study 98.3% of the individuals had given correct information.(12)

According to our study, 83.53% of them aware that mucormycosis is an alarming condition, and proper education about the condition should be provided to the public by dentists. Regarding the diagnosis and management of mucormycosis, to confirm the diagnosis with contrast-enhanced CT, which is helpful in characterising the extent of the disease, cytopathology, histology, and cultures were performed. MRI is regarded as the gold standard for radiographic diagnosis, while CT-PNS with contrast is the adjuvant imaging. Early therapy initiation, surgical debridement of diseased tissue, antifungal therapy, and care of underlying illness are all required in the treatment of mucormycosis. The first-line treatment of choice is amphotericin B (AmB), after which posaconazole and isavuconazole are administered.(12,13) 84.8 % of the Participants answered questions about the diagnosis and treatment of mucormycosis in this study correctly as well, demonstrating their reliable assessment.

In our study's findings, only a small number of dentists in Kanpur had seen murcormycosis infected patients, and 59.2% of them were hesitant to treat them. Oladele.et al., (14) assessed the knowledge and awareness of invasive fungal infections amongst resident doctors in Nigeria, across 7 tertiary hospitals in 5 geopolitical zones. They concluded that the knowledge and awareness was acceptable and there is need of training for resident doctors.

The study's findings led us to the conclusion that although dentists in the Kanpur region had strong knowledge, awareness, and an acceptable attitude, they still need more instruction and training in terms of providing care.

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 Kanpur city. 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:

Mucormycosis is a rapidly progressing disease that can be severe. Research shows that a team of healthcare professionals using a comprehensive approach, focusing on detailed patient history, thorough clinical examination, early detection and diagnosis, antifungal preventive measures, surgical intervention, prosthetic rehabilitation, and addressing surgical complications, can lower mortality rates and improve quality of life. It's crucial to be aware of studies highlighting the benefits of injectable posaconazole, a triazole antifungal drug that significantly alleviates symptoms and provides timely treatment options. Simple measures like saline nasal rinses are also beneficial in managing this condition. To effectively contribute to public health and well-being, dentists and other healthcare providers should continue to expand their knowledge and understanding of mucormycosis.

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