

## ORIGINAL RESEARCH

## Post Mucormycosis Rehabilitation by Prosthodontists in Tamilnadu & Pondicherry: KAP-Questionnaire Based Study

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### ABSTRACT

**Background:** Covid-19 pandemic during 2019 left high mortality rates with mucormycosis (black fungus) as its deadly complication. The spread of black fungus has become global; hence it's crucial to undertake necessary measures to prevent its spread. Prosthodontists have an inevitable role in the management of mucormycosis and educating the patients regarding the same. The diagnosis of mucormycosis is quite challenging. The treatment should start as quick as possible in order to decrease the death rates. Hence, the knowledge of clinical features and risk factors of mucormycosis is necessary for the prosthodontist in order to provide prompt treatment to the patient.

**Materials and methods:** A cross-sectional questionnaire based online survey was undertaken amongst 183 Prosthodontists in Tamilnadu and Pondicherry. The questionnaire consisted of 25 questions which evaluated their knowledge, awareness and practice related aspects towards management of postsurgical mucormycosis patients. Statistical analysis was done by using t-test, ANOVA, Pearson and correlation tests. The statistical significance was defined at  $P < 0.05$ .

**Results:** 93% of the study participants were private practitioners in the age group of 25 – 45 years. 106 out of 183 participants had good knowledge about clinical features, prevalent conditions (n=106) and its mode of spread(n=106). They have reported using various prosthesis, grafts and obturators for management of post surgical mucormycosis defects.

**Conclusion:** Most of the participants were aware about mucormycosis, had reported cases of mucormycosis during Covid-19 and had also employed different methods for prosthetic rehabilitation of patients. However, due to the increase of mucormycosis cases during Covid-19, the practitioners have adopted various methods for rehabilitation. Hollow bulb obturators were found to be the popular mode of rehabilitation. Further research is necessary to develop a standardized protocol for management of post mucormycosis defects.

**Keywords:** Black fungus, Covid-19, Mucormycosis, Obturators, Prosthodontists

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### INTRODUCTION

Covid-19 pandemic during 2019 left high mortality rates with mucormycosis (black fungus) as its deadly complication. Mucormycosis is a life threatening fungal infection characterized by host tissue infarction and necrosis that occurs most commonly in immunocompromised patients. The spread of black fungus has become global; hence it's crucial to undertake necessary measures to prevent its spread.<sup>1</sup> The causative agents are saprophytic fungus from the Phycmycetes class, order Mucorales, and family Mucoraceae. These fungi include Mucor, Rhizopus, Absidia, Cunninghamella, and Apophysomyces elegans.<sup>2</sup> Reduced host immunity as well as conditions like hyperglycemia and iron overload, favour fungal invasion. In immunocompromised patients, the most

common route of infection is inhalation of spores from fungi found in soil or organic debris.<sup>3</sup> In those cases, the fungus develops swiftly and aggressively, generating a well-defined, fulminant and life-threatening disease. Early intervention is essential to prevent long-term neurological disorders and save lives.

Prosthodontists have an inevitable role in the management of mucormycosis and educating the patients regarding the same.<sup>4</sup> Therefore, the prosthodontist need to understand the magnitude of this disease. The diagnosis of mucormycosis is quite challenging. The treatment should start as quick as possible in order to decrease the death rates.<sup>5</sup> Hence, the knowledge of clinical features and risk factors of mucormycosis is necessary for the prosthodontist in order to provide prompt treatment to the patient. It is

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important to stay up-to-date on current guidelines for the diagnosis and treatment of mucormycosis and remain cognizant of emerging literature on the topic.<sup>6</sup>

The aim of this study was to assess knowledge, attitude and practice related aspects of prosthodontic management of postsurgical mucormycosis patients among Prosthodontists in Tamilnadu and Pondicherry.

## MATERIALS AND METHOD

This cross-sectional, questionnaire-based study was conducted among 183 Prosthodontists in Tamilnadu and Pondicherry branch. Teaching prosthodontic faculties from different dental institutions, private practitioners in Tamilnadu and Pondicherry, and members of Indian Prosthodontic Society who gave consent and agreed to take part in the survey were included in the study. The undergraduate students and Interns, general dentists and other specialists and the participants who refused to give consent were excluded from the study.

The custom questionnaire was designed comprising of 25 close-ended questions. The questionnaire was divided into parts which included the demographic details, knowledge, awareness and practice-related aspects of prosthodontic management of postsurgical mucormycosis patients.

Demographic Details		Frequency	Percentage
Gender	Female	91	49.7
	Male	92	50.3
	Total	183	100.0
Age Group	25 - 45	168	91.8
	Above 45	15	8.2
	Total	183	100.0
Designation	Both private practitioner and Teaching faculty	46	25.1
	Private practitioner	120	65.6
	Teaching faculty	17	9.3
	Total	183	100.0
Experience	>10 years	18	9.8
	5-10 years	62	33.9
	Less than 5 years	103	56.3
	Total	183	100.0

Table 1: Demographic Details of the Study Participants

The data was gathered by sending the link of the online form via emails and WhatsApp after obtaining consent from the study participants. If any issue arose while filling out the questionnaire form, it was resolved by the investigator immediately during the study duration. The responses were transferred in a tabular format to conduct statistical analysis of the data and to derive conclusions of the present study.

Statistical analysis:

All the responses were transferred on MS Excel sheet. Statistical analysis was carried out using Statistical Package for the Social Sciences (SPSS)

Software version 23.0. Data was then analysed by using t-test, ANOVA, Pearson and correlation tests with statistical significance defined at  $P < 0.05$ .

## RESULTS

Among 183 participants, 92 were males and 91 were females. 91.8% of them were private practitioners in the age group of 25-45 years. Teaching faculty was minimal among the study groups (9.3%). Almost 103 out of 184 participants had less than 5 years of clinical experience. (Table 1)

Which type of prosthesis do you fabricated for postsurgical mucormycosis patients in your private practice/college?			
		Frequency	Percent
Responses	Cast partial prosthesis	33	18.0
	Implant supported prosthesis	20	10.9
	Simple removable acrylic prosthesis	87	47.5
	Two-part prosthesis	43	23.5
	Total	183	100.0

Table 2: Practice related prosthesis for postsurgical mucormycosis

57.9% of the participants had good knowledge about clinical features, prevalence of mucormycosis (72.1%) and its mode of spread (53.0%) (Table 4) More number of mucormycosis cases were seen in colleges/clinics during Covid-19 as compared to the cases seen before Covid-19.(Table 2) A variety of defects have been observed in mucormycosis patients such as palatal, midfacial, orbital and maxillary.

Have you noticed the increase in number of mucormycosis in your college/clinic during covid 19?			
		Frequency	Percent
Responses	No	27	14.8
	Yes	156	85.2
	Total	183	100.0

Table 3: Awareness regarding post mucormycosis rehabilitation

Knowledge regarding prosthodontic rehabilitation that participants have and its advantages as well. The use of interim (n=56) and hollow bulb obturator (n=54) was the most among practitioners. According to 65.0% participants, hollow bulb obturator offers multiple advantages. However, 41.0% of them faced many drawbacks with an open bulb obturator. Nearly 87 participants favor the use of simple removable acrylic prosthesis for postsurgical

mucormycosis patients. (Table 3) 79.8% of the participants schedule a follow up with frequent intervals with the patient after delivery of definitive prosthesis.

What is the clinical presentation of mucormycosis?			
		Frequency	Percent
Responses	Any of the above	106	57.9
	One sided facial pain, numbness or swelling, blackish discoloration over bridge of nose/palate	30	16.4
	Sinusitis-Nasal blockade or congestion, nasal discharge, blurred vision	23	12.6
	Toothache, loosening of teeth, fever, skin lesion, chest pain, respiratory symptoms	24	13.1
	Total	183	100.0

Table.4: Knowledge regarding post mucormycosis rehabilitation

## DISCUSSION

Coronavirus disease (COVID 19), caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), is a viral infection with severe complications.<sup>7-9</sup> The case fatality rates have shown an astonishing value of 2.3% to 7.2% depending upon the population characteristics.<sup>10</sup> Rhino orbito cerebral mucormycosis (ROCM) is one of the life threatening complications of COVID 19.<sup>11,12</sup> Since the awareness regarding mucormycosis was commendable amongst practitioners as during the PreCovid-19 period, few cases were reported. However, they noticed an increase in the number of mucormycosis cases in their college/clinic during Covid-19. A review of various case series conducted by Balushi AA et al. noticed similar increase in COVID-19-associated mucormycosis cases during the second wave of COVID-19 in 2021 with maximum cases been reported from India.<sup>13</sup> Considering the severity and mortality of this disease, it is crucial to understand the KAP among prosthodontists to detect it at an early stage and derive a systematic protocol for post mucormycosis rehabilitation of patients.

The respondents in our study comprised mainly of private practitioners who had less than 5 years of clinical experience and belonged to 25-45 years of age group. Participants of our study have good and homogenous knowledge about mucormycosis. Mucormycosis is a fungal infection caused by saprophytic fungi with lungs being the most common site of infection. Study participants reported that it is most prevalent in immunocompromised patients and patients on long term corticosteroids. The major risk factor for mucormycosis was use of systemic steroids (87%) and the most common systemic comorbidity was diabetes (78%).<sup>14</sup> Maxilla is most commonly

affected. In our study, most participants witnessed mucormycosis with symptoms such as one sided facial pain, swelling or numbness, blackish discoloration over bridge of nose/palate. As the severity increases and no treatment have been started, respiratory symptoms start showing up.

The post surgical prosthetic rehabilitation treatment is started after complete recovery of the patient. The management of mucormycosis accounts for extensive surgical resection and debridement of the necrosed areas resulting in large maxillary and orbital defects.<sup>15</sup> Most of our respondents also observed minor intraoral small sized palate defects (with or without oro-antral communication). Almost equal number of large volume maxillectomy defects and medium sized palate mucormycosis defects (Orbital floor or rim remains intact) were encountered by the participants in our study. Keratinised mucosa was observed in the defect areas. This could be a possible explanation why many practitioners in our study utilised keratinised mucosa (39.4%) for protection of raw tissues in compromised denture bearing areas encountered in post surgical mucormycosis patients. Equal number of participants suggested the use of skin and bone grafts. However, a study suggested of various flaps for coverage of small and medium sized palatal defects.<sup>16</sup> This would allow the tissue surface to mucosalize resulting in a more natural intraoral lining than skin flaps. Large defects can be reconstructed by non vascularized and vascularized bone grafts, and tissue engineering approaches.<sup>16</sup>

Various types of prosthesis have been describes for management and rehabilitation of post surgical mucormycosis patients. Defects that get created in the hard and soft palate can be managed by prosthetic rehabilitation.<sup>16</sup> Prosthetic intervention brings about rehabilitation of dentition, restores speech, reduces hypernasality and also limit nasal leakage of liquids and food.<sup>17</sup> The participants of our study also aimed at esthetic enhancement and restoration of functional capabilities by prosthetic rehabilitation of post surgical mucormycosis patients. 47.5% of practitioners fabricated simple removable acrylic and 23.5% fabricated two-part prosthesis. In extensive bilateral midfacial defects and total or partial maxillectomy cases, prosthetic rehabilitation is achieved using two-part prosthesis i.e. antral and oral part.<sup>16</sup>

Prosthetic rehabilitation with obturator prosthesis restores functional capabilities such as oral food intake, speech and deglutition by re-creating an anatomic barrier between the oral and nasal cavities.<sup>16</sup> Practitioners in our KAP study derived the same conclusion on the use of interim surgical obturators as it minimises post operative complications, restores normal speech and diet, and safeguards the tissue for complete healing. Hollow bulb obturators offer various advantages such as being light in weight, easily cleansable and

adjustable while relining. Wu and Schaaf studies also agree to this view as they found out that hollow obturator significantly reduces prosthesis weight from 6.55% to 33.06% depending on the size of the defect.<sup>18,19</sup> Practitioners have used additional wrought wire clasps and magnet attachments to improve the retention and stability of the prosthesis. Few have also used osseointegrated implants and soft reliners. They also take a regular follow up of the patient after delivery of definitive prosthesis at an interval of 3 months.<sup>20</sup>

## CONCLUSION

The cases of mucormycosis have been increasing during the Covid-19 period leading to a path of disease and death. Prosthodontists play a crucial role in the management and rehabilitation of patients with defects post mucormycosis. Since mucormycosis has poor prognosis, early detection can reduce mortality rate. Hence, it is necessary for the prosthodontists to stay updated with the current scenario, status of spread of disease, clinical forms of presentation, diagnosis and various ways of managing the surgical defects post mucormycosis.

## CONFLICT OF INTEREST

There is no conflict of interest

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