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"Mucormycosis Succeeding Covid 19: A Calamity"

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Abstract:

INTRODUCTION *- COVID-19 originated in Wuhan, China and has now infected practically the entire world. It has been connected with a broad array of opportunistic bacterial and fungal diseases. Lately several cases of mucormycosis have been reported globally, in particular from India. There are few research that look at the general public's knowledge and attitudes of post-covid mucormycosis, hence this study was formulated.*

AIM*–To evaluate knowledge and attitude of patients of dental college towards post covid mucoormycosis.*

MATERIALS AND METHODS *- A complete questionnaire with 16 questions was developed and delivered to 500 patients who reported to Dental College and Hospital. The distribution of responses was presented as frequencies and percentage.*

RESULTS *– Overall, dental patients had less knowledge and attitude. When knowledge and attitude were compared, younger people had more knowledge than older people, and males had more knowledge than females. However, there was no statistically significant difference in attitude between gender and age groups.*

CONCLUSION *- The majority of people were unaware of mucormycosis before and even after Covid 19, thus providing timely information about the crisis and disseminating it through the media can help to improve people's knowledge, attitudes, and practices.*

I. Introduction

COVID-19 originated in Wuhan, China and has now infected practically the entire world. Coronaviruses such as Severe Acute Respiratory Syndrome-Coronavirus (SARS-Cov) and Middle East Respiratory Syndrome-Coronavirus (MERS-Cov) were identified previously in 2003 and 2015, and were similar to COVID-19. [1]

SARS-COV-2 can spread via direct touch (droplets and human-to-human transmission) as well as indirect contact (infected objects and airborne contamination). SARS COV 2 is thought to spread from person to person mostly through respiratory droplets, which occur when a patient sneezes, coughs, or even talks. Droplets are typically unable to travel more than six feet [almost two metres] and stay only few seconds in the air. Still, SARS-COV-2 remains intact and infectious in droplets [less than five microns in diameter] and can be suspended in air for up to three hours. [2]

COVID 19 has a wide spectrum of clinical manifestations, from asymptomatic forms to clinical illness characterized by severe respiratory failure necessitating mechanical ventilation, septic shock, and multi-organ failure. Fever, cough, and shortness of breath are common symptoms in symptomatic patients, while sore throat, dysgeusia, anorexia, nausea, anosmia, myalgias, malaise, and diarrhoea are less common. Laboratory anamolies can be Lympopenia, elevated cardiac enzymes, elevated C-reactive protein levels, and abnormal liver and kidney function tests, D-dimer elevation, leucopenia, leukocytosis, high erythrocyte sedimentation rate, raised procalcitonin, and so on. [3]

Coronavirus disease 2019 (COVID-19) has been connected with a broad array of opportunistic bacterial and fungal diseases. [4] The predominant fungal pathogens for co-infection in persons with COVID-19 have been identified as Aspergillosis and Candida. [5] Lately Several cases of mucormycosis have been reported globally, in particular from india.

Mucormycosis is caused by the fungus Mucor (phycomycetes, order Mucorales), which has the ability to distribute its spores into craniofacial compartments such as the paranasal sinuses, orbit, throat, and intracranial cavity.[6] As a result, the invasion is highly lethal and rapidly progressing, necessitating a multidisciplinary response and quick treatment. Nasal stuffiness, mucoid, purulent, red, or black nasal discharge, periorbital edema and discolouration, speech problems, visual impairment, and severe headache are only a few of the indications and symptoms of mucor-derived angioinvasion. [7]

Mucormycosis is uncommon in otherwise healthy people, but it is common in people with predisposing conditions such as uncontrolled diabetes, haematological and other cancers, immunosuppressive and corticosteroid use, acquired immunodeficiency syndrome (AIDS), intravenous drug abusers, and open wounds after trauma and etc. According to the most recent research, the prevalence of mucormycosis in COVID-19 patients is growing. [8]

However, there are few researches that look at the general public's knowledge and attitudes of post-covid mucormycosis. Hence this study was formulated to determine the general public's knowledge and attitudes about post-covid mucormycosis among Bagalkot residents who visited Dental College for their regular dental check-ups and treatment.

II. Methods

A cross-sectional survey was done in the English and Kannada languages among 500 dental patients of dental college and hospital from October 16 to October 31, 2021. The following formula was used to compute the sample size for this investigation.

Sample size n = [DEFF x Np(1-p)]/ [(d 2 /Z 2 1-α/2 x (N-1)+p x (1-p)]
Population size (for finite population correction factor or fpc) (N): 3000
Hypothesized % frequency of outcome factor in the population (p): 50% ± 5
Confidence limits as % of 100 (absolute ± %) (d): 5%
Design effect (for cluster surveys-DEFF): 1

Substituting the values in the formula, a sample size of 341 was derived. However, an additional 20% were included in the study [N = 409.2 (rounded off to 410)] in order to compensate for potential refusals. The sample size of the present study was thus estimated to be 410 at 95% confidence interval. However, a larger sample size of 500 was collected.

Respondents were promised that their participation would be voluntary, secret, and anonymous due to the ethical concern.

QUESTIONS FOR THE SURVEY

The closed-ended questionnaire was divided into three sections: the first included four demographic questions, while the second and third sections together had 16 questions: five attitude-based questions and eleven

knowledge-based questions. Name, gender, age, and signature were in the 1st section demographic data. The public's attitude towards post-covid mucormycosis is assessed in the second portion, which includes five items. The public's knowledge of post-covid mucormycosis is assessed in the third segment, which contains eleven items. Each negative response received a score of 0 and each positive response received a score of 1, with some of the positive responses totalled and dichotomous responses dichotomized. SPSS [Statistical Package for Social Sciences] software was used to examine the data. [1]

STATISTICAL ANALYSIS

The information gathered was loaded into a computer and evaluated with the SPSS programme. In this study, descriptive and inferential statistical analyses were performed. Continuous measurement results were reported as Mean +/- SD, where as categorical measurement results were presented as Number (percent). The statistical significance level was set at p=0.05, and any value less than or equal to that was considered statistically significant.

The relevance of study parameters on a categorical scale was determined using Chi square analysis.
The significance of research parameters on a continuous scale between two groups was determined using a Student t test (two tailed, unpaired).

III. Results

The survey had 500 participants, with 324 males (64.8%) and 176 females (35.2%) completing it. Among them 417 (83.4%) were between the ages of 16 and 49, while 83 (16.6%) were above 50. Males had a higher frequency (percentage) than females, and younger age group frequency was more than elder age group.

Demographic characteristics of the study participants (N=500)

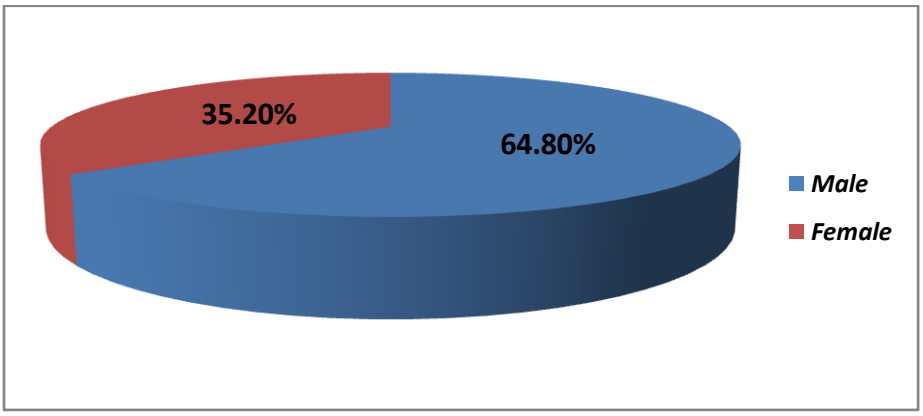

figure 1- gender

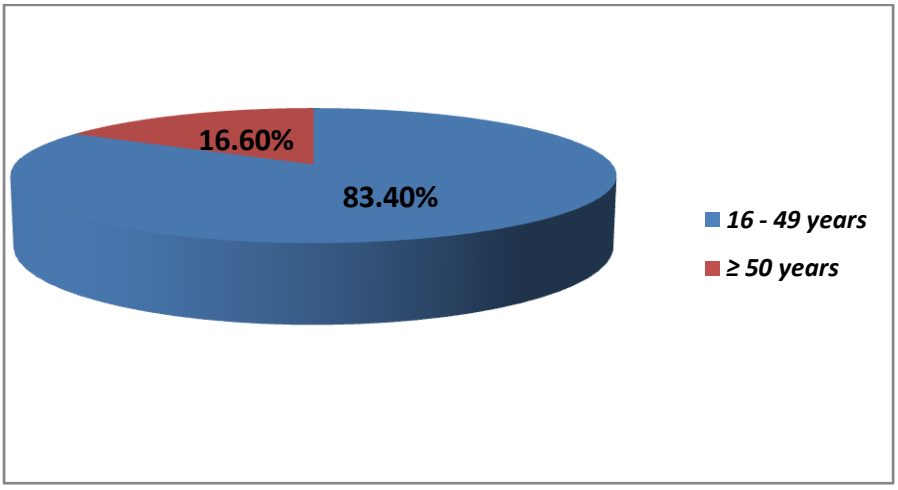

figure 2- age groups

Table 1 Comparison of attitude and knowledge in terms of {Mean (SD)} among males and females using unpaired t test

The mean knowledge score for females was 3.56 and 7.94 for males, with a highly significant difference found in knowledge between males and females, with males having more knowledge than females.

The mean attitude score for males was 3.32 and 3.03 for females; there was no significant difference in the attitude of males and females.

Variable	*GENDER*	*N*	*Mean*	*Std. Deviation*	*t value*	*P value*
Attitude	***Male***	324	3.32	0.505	**5.931**	**<0.001****
	Female	176	3.03	0.523		
Attitude Percentage	***Male***	324	66.3580	10.09283	**5.931**	**<0.001****
	Female	176	60.6818	10.45212		
Knowledge	***Male***	324	7.94	3.009	**17.033**	**<0.001****
	Female	176	3.56	2.190		
Knowledge Percentage	***Male***	324	72.1942	27.35182	**17.033**	**<0.001****

	Female	176	32.3347	19.91045		

(p< 0.05 - Significant*, p < 0.001 - Highly significant)**

Table 2 Comparison of attitude and knowledge in terms of {Mean (SD)} among both the age groups using unpaired t test

The average knowledge score for the younger age group (16-49 years) was 6.90, while the average knowledge score for the older age group (>/= 50 years) was 3.87. The knowledge gap between the younger and older age groups was found to be quite significant, with the younger age group having greater information than the older age group.

The mean attitude score for the younger age group was 3.24, while it was 3.11 for the older age group; the difference in attitude between the two age groups was not statistically significant.

Variable	***Age group***	***N***	***Mean***	***Std. Deviation***	***t value***	***P value***
Attitude	***16-49 years***	417	3.24	0.550	**2.076**	**0.038***
	≥50 years	83	3.11	0.383		
Attitude Percentage	***16-49 years***	417	64.7962	11.00783	**2.076**	**0.038***
	≥50 years	83	62.1687	7.65860		
Knowledge	***16-49 years***	417	6.90	3.446	**7.725**	**<0.001****
	≥50 years	83	3.87	2.146		
Knowledge Percentage	***16-49 years***	417	62.7425	31.33046	**7.725**	**<0.001****
	≥50 years	83	35.1588	19.50667		

(p< 0.05 - Significant*, p < 0.001 - Highly significant)**

In knowledge-based questions, more than half of the respondents [57.2%] had never heard of black fungus before Covid 19. Many of them [69.8%] were aware that black fungus is a fast-spreading, deadly, and non-contagious disease. The majority of them [55.2%] were aware of the early indications of black fungus related covid 19, which include sinuisits, periorbital enlargement, unilateral facial swelling, and multiple oral abscesses.

It affects the oral cavity, according to the majority of the survey participants [79.4 percent]. Diabetic patients and immune compromised people are at higher risk for black fungus, according to 64.2 percent of respondents. Black fungus induces necrosis of the affected region, according to less than half of the study participants (42.6 percent). Emergency care is needed, according to 58.6% of participants.

In attitude-based questions, the majority of the survey population [92.6 percent] wear masks on a regular basis, while only a small percentage [20 percent] change their masks on a daily basis. After covid 19, a large number of them (96.2 percent) increased the frequency of washing their hands. Around 95.6 percent of them claimed they keep their distance from others. Only 18.2 percent of participants in the study said they would consult a doctor if they had symptoms of covid 19, while the rest said they would start taking drugs on their own or consult someone who had previously been affected by covid 19 and recovered.

IV. Discussion

There has been little research done on public attitude and knowledge of post-covid mucormycosis. The purpose of the study was to assess the level of knowledge and attitudes about post-covid mucormycosis among patients at the dental college. Males had higher knowledge [72.19 percent] than females [32.33 percent], which could be because males watched more news about COVID-19, and also because most males in the area where this survey was conducted are employed, and the number of male participants in the survey [64.8 percent] was higher than the number of female participants [35.2 percent].

Younger the age [16-49 years old], more the knowledgeable [62.74 percent]. This could be due to younger people's constant and continuous exposure to social media, as well as their higher level of education. The majority of survey participants were in the younger age group [83.4 percent]. Knowledge among the older age group [>/= 50 years] was 35.15 percent, which could be due to less exposure of old age people to social media and low level of education found in them in comparison with younger age group people.

Only after covid 19, more than half of the study participants had heard of black fungus. About 70% of the participants were aware of the key characteristics of mucormycosis, including that it is rapidly spreading [Spellberg B et al 2005 [9]], fatal [Prakash H et al 2021[10], Patel A et al 2020[11], Afroze SN et al 2017[12]], and non contagious, which is consistent with the fact about mucormycosis by national organisation for rare disorders.[13] The majority of them (68.8%) believe that black fungus enters the host by contaminated food, inhalation, or abraded skin. [Petrikkos G. et al. 2021[14], Baldin C. et al. 2017[15]]

The majority of the participants in the survey [64.2%] were aware that immune-compromised people and people with diabetes are more likely to get black fungus. This was in line with the facts stated by Honnavar SG et al 2021[7], Selarka et al 2021[16], and Revannanavar SM et al 2021[17] in a case report.

About 55.2% of the individuals were familiar about the initial symptoms of black fungus, that are sinuisitis [Carzo Leon DE et al 2017[18], Szarpak L et al 20211[19], Ravani SA et al 2021[6]], facial swelling [Szarpak L et al 2021[19]], swelling around the eye [Carzo Leon DE et al 2017[18] ,Ravani SA et al 2021[6]], multiple abscess in the oral cavity. [Sung HK et al 2019[20]].

Black fungus affects the oral cavity, according to the majority of survey participants [79.4 percent] [Szarpak L et al 2021[19]]. The majority of the participants in the survey [70.8 percent] were aware of the common dental symptoms of mucor, such as tooth pain [Szarpak et al 2021[19]], tooth mobility [Szarpak et al 2021[19]], and multiple oral abscesses. [Sung HK et al 2019[20]].

Few of them stated that the covid 19 patients who were treated with oxygen therapy were at an increased risk of black fungus, which contradicted Agnihotri AK et al 2021. [21] More than half of the participants in the survey (57.4%) said that black fungus does not produce necrosis in the affected area. This contradicted the findings of Aggarwal D et al 2015. [22] and Selarka L et al 2021. [17]

Approximately 58.6 percent of those polled believe that mucormycosis requires immediate treatment. This was supported by the fact stated by Johnson AK et al 2021. [23] as well as the case report by Revannanavar SM et al 2021. [17]

Males have a 66.35 percent positive attitude, while females have a 60.68 percent positive attitude. 64.79 and 62.16 % among younger age group [16-49 years] and older age group [>50 years] respectively. This could be because almost all of the attitude-based questions were related to Covid 19, and by this time, everyone is aware of Covid 19, its severity, and complications, so the survey participants responded better to attitude-based questions than knowledge-based questions about mucormycosis.

Almost all of the study individuals [96.2%] have increased the frequency of washing hands after covid 19 outbreak, in accordance with the study done by Qalati SA et al 2021.[1] [82%], Ferdous MZ et al 2020.[24] [93.5%].

Ample amount [92.6%] of the study individuals are wearing their mask regularly, in accordance with the study by Ferdous MZ et al 2020. [24] [87.22%] and Feng S et al 2020. [25] But only around 20% of the population are changing their masks once daily.

About 95.6% of the individuals are maintaining social distance, in accordance with Qalati SA et al 2021.[1] [73.1%], Ferdous MZ et al 2020.[24] [93.5%].

Only about 18.2 percent of people said they would see a doctor if they get covid 19. The rest of the people said they would take medicines on their own or consult someone who had previously been affected and recovered from covid 19.

Further studies needs to be conducted with larger amount of sample size and covering larger geographical area that could be either an entire city, district or etc where in this study only the dental patients who have visited the particular dental college for their regular dental check ups and treatments were taken which could be the limitation.

V. Conclusion

Our findings suggest that useful and personalised health education initiatives aimed at increasing understanding of post-covid mucor are needed, paving the way for more agreeable attitudes and the implementation and maintenance of safe behaviours.

Virtual training courses can help people improve their knowledge, attitudes, and practices by providing up-to-date and detailed information in times of crisis and disseminating it through information media.

People must perform preventive and safety behaviours at all times during emergencies and health crises, as the unpredictability and unfamiliarity of epidemics may exceed a health system's potentiality to a remarkable degree.

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