

To Assess the Perception, Attitude, and Practice Related to Mucormycosis during COVID-19 Era: A Community-based Cross-Sectional Survey Using Online Platform among the Population of Gujarat, India

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Abstract

Background: Recently, mucormycosis cases were increasingly reported in people with coronavirus disease-2019 (COVID-19), particularly from India. With the subsequent waves of COVID 19 in India, mucormycosis cases may rise again. Besides, people's perception, attitude, and practice toward mucormycosis can be explored with the web-based survey so its outcome can be used in spreading awareness among the general population. **Aim and Objectives:** The study's aim and objective were to assess the perception, attitude, and practice related to mucormycosis in the COVID-19 era and the associated sociodemographic factors among the general population of Gujarat. **Materials and Methods:** A cross-sectional community-based study was carried out for 2 months (June 21–July 21) using semistructured questionnaire in the local language. The form was circulated through WhatsApp application. The principle of the snowball technique was used for data collection. Information related to sociodemographic profile, followed by questions on perception, attitude, and practice related to mucormycosis was collected and analyzed. **Results:** A total of 998 responses for sociodemographic variables were obtained for the study. Seven hundred and eighty-six participants were part of the study for the assessment of perception, attitude, and practice of mucormycosis. A total of 61.45%, 61.83%, and 63.99% of participants had good perception, attitude, and practice, respectively. Binary logistic regression revealed that education and relation with health-care workers for perception, sex, and place of residence for attitude and occupation for practice were independent determinants. **Conclusion:** Good perception, attitude, and practice toward mucormycosis among respondents show that good efforts have been done toward Information, Education, and Communication by health authorities and mass media. Still, there is a need for more collaborative actions in spreading awareness toward the remaining population.

Keywords: Attitude, India, mucormycosis, perception, practice

INTRODUCTION

The pandemic coronavirus disease-2019 (COVID-19) has been associated with opportunistic bacterial and fungal infections.^[1] Aspergillosis and *Candida* are commonly observed fungi among COVID-19-infected patients.^[2] The incidence of mucormycosis has risen more rapidly during the second wave at unprecedented rates throughout India. The prevalence of mucormycosis varied from 0.005 to 1.7/million population globally, whereas in a recent estimate of the year (2019–2020) it is nearly 80 times higher (0.14/1000) in India compared to developed countries.^[3–5] From May 5, 2021, to July 12, 2021, a total of 41,512 cases and 3554 deaths were

attributed to this rare disease. The state of Gujarat alone contributed to the highest number of cases, with at least 3726 cases of mucormycosis in patients with active and recovered COVID-19, followed by the state of Maharashtra.^[6]

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Following the surge of COVID-19-associated mucormycosis and the Government of India directive, several states in India made mucormycosis a notifiable disease in May 2021.^[7]

Mucormycosis is an angioinvasive disease caused by mold fungi with high mortality rates.^[8] Mucormycosis is mainly found in immunosuppressed hosts, including those with haematological malignancies, transplant recipients, and in people with uncontrolled diabetes mellitus.^[3,9] In India, various risk factors associated with mucormycosis are undiagnosed diabetes mellitus with concomitant use of corticosteroids, COVID-19 infection, preexisting comorbidity, and the use of immunosuppressive drugs.^[9,10] Mucormycosis is associated with high mortality (45% to 90%) in low- and middle-income countries including India.^[11,12] There is a high management cost of mucormycosis and delayed diagnosis to be probable reasons for this. In India, there is a difference in the epidemiology of mucormycosis than in the developed world.^[11-14]

During the COVID-19 era, inaccurate and misleading information was spreading rapidly. This inadequate information gave birth to different psychological and mental issues for social media users and the general population.^[15] The impact of mucormycosis may affect people in the same way. With the subsequent waves of COVID 19 in India, mucormycosis cases may rise again. Besides, people's knowledge and behaviour toward mucormycosis need to be explored for effective prevention and control.

The study aimed to assess the perception, attitude, and practice related to mucormycosis in the COVID-19 era and associated factors among the general population of Gujarat, India.

MATERIALS AND METHODS

Study design and study period

The web-based cross-sectional study was carried out for 2 months (June 2021–July 2021) immediately after the decrease in the second wave of COVID-19 and mucormycosis, among the general population of Gujarat, India.

Sampling technique and data collection tool

A Google Form having semistructured questionnaires was prepared based on guidelines by the Indian Council of Medical Research^[16] and the Centers for Disease Control and Prevention (CDC).^[17,18] This Google Form was circulated as a link on WhatsApp platform media to the contacts and various groups of all investigators and other health staff of the college. The snowball technique was used to include more participants in the survey. The study tool was finalized after pilot testing of questionnaires. The survey form contained the consent part and two sections. The first section includes sociodemographic details such as age, gender, occupation, education, place of residence (rural/urban), and relation with health-care workers along with questions related to their and family's history of COVID infection. To ascertain COVID-19 infection, self-reported response (reverse transcription-polymerase chain reaction/antigen test positive) was taken into consideration as

COVID positive. The second section contains questions related to perception, attitude, and practices of mucormycosis.

Inclusion criteria

Participants with access to the Internet, who use WhatsApp, age more than 18 years, able to understand the Gujarati language, and willing to give informed consent were included in the survey. Incomplete and duplicate entries were excluded from the survey.

Ethical issue

The survey was anonymous and informed consent was given by participants after reading the objective of the study in the Google Form. This study was approved by the Institutional Ethical Committee of the organization.

Statistical analysis

The 10-item questionnaire (four related to perception, five related to attitude, and one related to practice) was used to calculate the score. In the perception part, a score of "1" for the correct answer and "0" for the incorrect/do not know answer was assigned. In the attitude part, responses were measured on a 3-point Likert scale ranging from 1 to 3 with "1" for completely agree, "2" for partially agree, and "3" for disagree. In the practice part, the score was assigned as "0" if the practice was unsatisfactory and "1" for satisfactory. Considering the median of a particular score, levels of perception and attitude were assessed.

All statistical analyses were performed using Microsoft Excel Windows 2010 and Epi Info™ Statistical software package (Version 7.2) developed by Centers for Diseases Control and Prevention (CDC), Atlanta, Georgia, USA.^[19] Descriptive measures were denoted as percentages. To determine the relationship between dependent and independent variables, Chi-square test, followed by binary logistic regression was applied. A calculated $P < 0.05$ was considered statistically significant.

RESULTS

Table 1 depicts the sociodemographic characteristics of respondents. The mean age of respondents was 32 ± 11 years. Out of 998 respondents, the proportion of males (62.02%) was higher than females. Most of the respondents (82.36%) were highly educated (undergraduate and postgraduate). Nearly one-fourth (23.45%) of participants were students and more than half (58.92%) were doing a job. Majority (85.37%) were urban residents and nearly half (48.9%) of respondents had a relation with health-care workers. About two-third (30.66%) had a history of COVID infection and nearly half (49.9%) had mentioned positive COVID infection history in the family.

Nearly two-third (786, 78.76%) of respondents had basic information about mucormycosis. Majority of respondents got this information from social media (487), followed by TV/radio (368), newspaper (340), health staff (248), hospital (180), and family/friends (127).

Table 2 represents the level of perception, attitude, and practice of respondents. More than half of respondents had a

Table 1: Sociodemographic characteristics of respondents (n=998)

Characteristics	Frequency (%)
Sex	
Male	619 (62.02)
Female	379 (37.98)
Age (completed years)	
18-30	490 (49.10)
31-45	378 (37.88)
46-60	84 (8.42)
>60	46 (4.61)
Education	
Primary	14 (1.40)
Secondary	44 (4.41)
Higher secondary	118 (11.82)
Undergraduate	438 (43.89)
Postgraduate	384 (38.48)
Occupation	
Student	234 (23.45)
Farming	8 (0.80)
Housewife	57 (5.71)
Laborer	7 (0.70)
Retired	32 (3.21)
Job	588 (58.92)
Business	62 (6.21)
Unemployed	10 (1.00)
Residence	
Urban	852 (85.37)
Rural	146 (14.63)
Relation with health-care worker	
Yes	488 (48.90)
No	510 (51.10)

Table 2: Distribution of respondents according to the level of perception, attitude, and practice of mucormycosis (n=786)

Variables	Level	Frequency (%)
Perception	Good	483 (61.45)
	Poor	303 (38.55)
Attitude	Good	486 (61.83)
	Poor	300 (38.17)
Practice	Good	503 (63.99)
	Poor	283 (36.01)

good perception (61.45%), good attitude (61.83%), and good practices (63.99%) for the prevention of mucormycosis.

On applying Chi-square test, education ($\chi^2 = 29.2$, $P = 0.00$), relation with health-care workers ($\chi^2 = 89.27$, $P = 0.00$), and family history of COVID infection ($\chi^2 = 4.81$, $P = 0.02$) were found significantly associated with level of perception. Statistically significant association was observed between age ($\chi^2 = 8.14$, $P = 0.04$), sex ($\chi^2 = 12.4$, $P = 0.00$), and place of residence ($\chi^2 = 4.97$, $P = 0.02$) in relation with attitude. Factors associated with good practice were age ($\chi^2 = 16.4$, $P = 0.001$) and occupation ($\chi^2 = 21.66$, $P = 0.00$).

Significant factors were assessed using binary logistic regression. Binary logistic regression revealed education ($P = 0.01$) and relation with health-care workers ($P = 0.00$) were independent determinants of perception related to mucormycosis. Among the assessed variables, sex ($P = 0.001$) and place of residence ($P = 0.04$) were independent determinants of attitude. Occupation was found as independent determinant of practice ($P = 0.001$) [Table 3].

DISCUSSION

Emerging and reemergence of diseases such as COVID and mucormycosis can affect the population and create challenges. Lack of knowledge and awareness generally leads to unconcern attitude and improper practices. To the best of our knowledge, there is no such similar study conducted in India. Hence, the present study was carried out to assess perception, attitude, and practice related to mucormycosis of the general population of India.

Study respondents were predominantly male, young adults, and highly educated which may be due to relatively more use of WhatsApp like application by this group of individuals. In the present study, respondents from the rural area were only 14.63%, these may be due to lesser use of social media in rural areas or they may not be acquainted to use Google Form like technology. These findings were consistent with the study done by Hasan *et al.*^[20] in Bangladesh on health workers to find predictors of mucormycosis during COVID-19 pandemic.

Two-third of respondents achieved the score above the median for perception, attitude, and practice. Due to the sudden increase of cases, the serious outcome of the disease, and the overwhelming news reports on this health crisis, most of the respondents have actively learned the perception of this disease from various channels of information such as social media, TV/Radio, newspapers, family, and friends.

Regression analysis results revealed that significant positive association between education and relation with health-care workers with mucormycosis perception score. A similar association was elicited by Hasan *et al.*^[20] in Bangladesh. The reason for the high perception level among the well-educated population could be due to their positive response in the period of outbreak by gaining knowledge from reliable resources. Relatives of health-care workers were in more favorable situation to access and assimilate perception on mucormycosis which might be the reason for high perception among them.

Usually, good attitude and practice are a reflection of good perception, which was also reflected in this study. The good attitude was found significantly associated with urban residence and gender. These could be possible because males and urban population have easy access to health care. Good practice was found more among job-doing respondents. Reasons for that may be good perception and attitude, high education, and strict hygiene rules, followed by their institution/place of working.

Table 3: Binary logistic regression analysis showing independent determinants of perception, attitude, and practice related to mucormycosis (n=786)

Variable	Perception			Attitude			Practice		
	β coefficient (OR)	95% CI	P	β coefficient (OR)	95% CI	P	β coefficient (OR)	95% CI	P
Age	-	-	-	0.01 (1.01)	0.99-1.02	0.07	0.01 (1.01)	0.99-1.02	0.47
Sex	-	-	-	-0.51 (0.60)	0.45-0.81	0.001	-	-	-
Education	-0.24 (0.79)	0.66-0.95	0.01	-	-	-	-	-	-
Occupation	-	-	-	-	-	-	0.12 (1.13)	1.05-1.22	0.001
Place of residence	-	-	-	-0.45 (0.64)	0.42-0.97	0.04	-	-	-
Relation with health-care worker	1.36 (3.89)	2.85-5.30	0	-	-	-	-	-	-
Family history of COVID infection	0.13 (1.14)	0.83-1.55	0.41	-	-	-	-	-	-

CI: Confidence interval, OR: Odds ratio

CONCLUSION

Good perception, attitude, and practice toward mucormycosis among respondents show that good efforts have been done toward the Information, Education, and Communication by health authorities and mass media. Still, there is a need for more collaborative actions in spreading awareness toward the remaining population. This study finding may help the policymakers and government to establish a proactive health system to sensitize the general population during the forthcoming surge of such diseases. These might help in more efficiently control the disease in future.

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Conflicts of interest

There are no conflicts of interest.

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