

Knowledge and awareness on usage of mouth masks among dental fraternity during this pandemic COVID-19: A cross-sectional study



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ABSTRACT

Background: The pandemic caused by novel coronavirus (SARS-CoV-2) in Wuhan, China, in December 2019 is a highly infectious disease. The World Health Organization (WHO) has declared the outbreak of Corona Virus Diseases (COVID 19) as a global public health emergency. Currently, research on novel coronaviruses is still in the primary stage.

Aims and Objective: The aim of this study is to assess knowledge and awareness on the usage of mouth masks among dental fraternity during this pandemic COVID-19.

Materials and Methods: A total of 507 dentists from the Andhra Pradesh (India) region completed a questionnaire-based survey on knowledge, awareness, and infection control measures, such as usage of mouth masks during the pandemic COVID -19. The questionnaire was tailored from the guidance and the information provided for healthcare workers issued by the US Centres for Disease Control and Prevention (CDC). A suitable sampling method was used for the collection of data, and the distribution of responses was presented as percentages. Explanatory statistics were performed for all groups based on the percentage of correct responses. **Results:** A total of 530 participated in the survey, out of which 507 dentists completely answered the survey, and the response rate was 95.6%. Among the respondents, general practitioners and postgraduates accounted for 58.8% and 41.2%, respectively. There was a statistically significant difference for all the questions solicited among the respondents. General or private practitioners seem to be more aware than postgraduates, as they have answered correctly (> 65%) for almost all the questions. **Conclusion:** The inputs from the study help us to throw some light and fill up space where required. There is a specific and strong need to implement periodic educational programmes and training sessions on infection control practices for COVID-19 among dentists in particular.

Key words: Awareness; Covid-19; Questionnaire; Survey

INTRODUCTION

In the event of any pandemic such as severe acute respiratory syndrome (SARS), it is likely that antiviral drugs and vaccines will be in short supply or that delivery could be delayed. Therefore, non-pharmaceutical

interventions such as usage of mouth masks, hand washing, and other hygiene measures might be effective as early control strategies.¹ Medical masks are a type of personal protective equipment used to prevent the spread of respiratory infections. These masks cover the mouth and nose of the wearer and, if worn properly, may be

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effective at helping prevent transmission of respiratory viruses and bacteria.²

Various devices are used in healthcare and community settings worldwide, ranging from cloth, cotton, or gauze masks (cloth masks); medical, surgical, or procedure masks (medical masks); and N95, N99, N100, P2, P3, FFP2, and FFP3 respirators (respirators). The difference between the products arises from their design and intended use. Medical masks and cloth masks (hereafter “facemasks”) were designed to prevent the spread of infection from wearers to others but are commonly used to protect the wearer from splashes or sprays of blood or body fluids. Dentists are more prone to get contracted due to Face-to-face communication with the patients and also due to consistent exposure to blood and saliva which predisposes the dental care workers at a greater risk for 2019-nCoV infection. Accordingly, dental practice setup can be a more potential risk for dentist and clinic staff, and there will be a high risk of cross-infection also.³

Face masks greatly reduce the risk of dental care workers inhaling aerosols from patient airways, which can contain pathogenic microorganisms related to diseases ranging from influenza to tuberculosis, meningitis or even severe acute respiratory syndrome, and large quantities of saliva, microorganisms, blood, tooth particles and restorative materials.⁴ It can also be transmitted indirectly either through contaminated needle stick injury or improper handling and contact with unsterilized instruments. According to the guiding principles of CDC, it is mandatory to wear face masks, eyewear, gloves, properly disinfected clothes and use adequate high-speed suction while using high- and low-speed rotary instruments. One of the infection control measures is the routine use of face masks. Therefore, dental practitioners and clinical auxiliary staff must wear suitable fluid-resistant masks. However, there is evidence that DHCPs (dental health care professionals) have inadequate knowledge, negative attitudes and poor practices regarding infection control measures.⁵

The objective of this study was to investigate knowledge and awareness about the usage of mouth masks among dental fraternity (general practitioners and postgraduates) in Andhra Pradesh (India). This was a questionnaire-based survey and was tailored from the guidance and information for healthcare workers issued by the US Centres for Disease Control and Prevention (CDC).

MATERIALS AND METHODS

Participants and procedure

A descriptive cross-sectional study was conducted between 02-06-2020 and 25-06-2020 among practitioners and post graduates in the state of Andhra Pradesh on knowledge

and awareness on usage of mouth masks in the form of a questionnaire.

Questionnaire

Initially, the questionnaire was distributed to a group of ten post graduate students as a pilot study to evaluate their understanding of the questions. After student feedback, amendments were made to the questionnaire. A total of 18 questions were prepared in Google Docs on knowledge and usage of mouth masks, and an online survey was conducted. They were sent to a total of 530 participants, including practitioners and post graduates. The information obtained during the data collection was strictly kept confidential. The inclusion criteria for the study were post graduates and general practitioners who were practicing.

Sampling method

The convenient sampling method was used for data collection, and the distribution of responses was presented as frequency and percentages. Sub-groups were classified based on the profession (post graduates and general practitioners).

Statistical analysis

The data were tabulated in Excel, and descriptive statistics and Pearson chi square tests were performed. Pearson chi square test was used to evaluate the correlation between the application of facemasks with dental students and dental practitioners. The software used for statistical analysis was SPSS version 3.

RESULTS

A total of 507 participants returned the questionnaire by responding to all the questions. Among those 507 participants, 298 participants (58.8%) were practitioners, and 209 participants (41.2%) were post graduate students. When inquired regarding the type of masks preferred during aerosol generation procedures, 218 participants (43%) answered as N95 masks, and among which, 50.9% were practitioners and 49.1% were post graduate students. A 3 ply mask/surgical mask over N95 were chosen by 142 participants (28.0%), of which 70.4% were practitioners and 29.6% were post graduates. A statistically significant difference was observed with a p value of 0.001. Likewise, when inquired about the type of masks preferred during non-aerosol generation procedures 154 participants (30.4%) opted for N95 masks and practitioners (57.1%) and post graduates (42.9%). A total of 118 (23.3%) preferred to use 3 ply masks, of which 50.0% were practitioners and 50.0% were post graduates. A statistically significant difference was observed with a p value of 0.000.

When queried whether, during the Covid-19 Pandemic, level 2 and level 3 masks can be used while treating low-risk patients, 360 participants (71.0%) had answered as yes, and among them, 66.1% were practitioners and 33.9% were

post graduates. The remaining 147 participants (29%) had answered it, as No which included 40.8% of practitioners and 59.2% of post graduates. A statistically significant difference was observed with a p value of 0.000. (Table 1)

When questioned regarding the use of level 1 masks, 51 participants (10.1%) opted during Restorative/Endodontic procedures/Tooth preparation procedures, and among them, 47.1% were practitioners and 52.9% were post graduates. A total of 252 participants (49.7%) opted for all of the above, and among them, 66.3% were practitioners and 33.7% were post graduates. A statistically significant difference was observed with a p value of 0.000. Along with it when the participants were questioned about which layer acts as a filter/barrier, only 327 participants (64.5%) answered it as the middle layer, of which 55.7% were practitioners and 44.3% were post graduates.

When the study population was inquired about changing the mouth masks for every patient, 71.4% (362) said yes.

Similarly, when questioned whether the cloth masks and surgical masks are as effective as N95 respirators, 81.1% (411) disagreed to the question. (Table 1). Regarding the type of mask with the best filter capacity of the particles (i.e., 0.3 microns or larger), 55.1% of practitioners and 44.9% of post graduates with a total of 53.6% (272) answered it as FFP3. A total of 175 participants (34.5%) answered FFP2, and 60 participants answered FFP1.

When the participants were queried about the filter capacity of the FFP3 masks, only 46.7% of the participants (237) answered 99-99.95% with a frequency of 57.4% of practitioners and 42.6% of post graduates. 89.0% (451) of the participants dispose their mask immediately after removing it with a frequency of 58.5% of practitioners and 41.5% of post graduates. (Table 1)

When we questioned regarding the color code of the bag used for disposal of mask, 64.9% of the participants opted yellow with a p-value of 0.660, which indicates

Table 1: Knowledge and awareness of the usage of masks among practitioners and post graduates

Question	Options	Occupation in percent		P-Value
		General Practitioner	Post Graduate	
1. During aerosol generation procedures which type of masks are preferred?	N 95 masks	50.9%	49.1%	0.001
	3ply cloth masks	57.1%	42.9%	
	Surgical mask	82.6%	17.4%	
	Combination of any two of the above	53.3%	46.7%	
	Surgical mask over N95	70.4%	29.6%	
2. During non-aerosol generation procedures which type of masks are preferred?	N 95 masks	57.1%	42.9%	0.000
	3ply cloth masks	50.0%	50.0%	
	Surgical mask	57.8%	42.2%	
	Combination of any two of the above	31.7%	68.3%	
	Surgical mask over N95	93.8%	6.3%	
3. Do you think that, during Covid-19 pandemic, level 2 and level 3 masks can be used while treating low risk patients?	N95 mask over surgical mask	95.2%	4.8%	0.000
	Yes	66.1%	33.9%	
	No	40.8%	59.2%	
4. When will you prefer to use level -1 masks?	Restorative/endodontic procedures / tooth preparation procedures	47.1%	52.9%	0.000
	Post insertion reviews for removal prostheses	42.7%	57.3%	
	During surgical procedures	78.0%	22.0%	
	All the above	66.3%	33.7%	
5. In a three layered mask, which layer acts as a filter/barrier?	First Layer	61.5%	38.5%	0.035
	Middle Layer	55.7%	44.3%	
	Inner Layer	78.1%	21.9%	
6. Do you prefer changing your mask for every patient?	Yes	56.4%	43.6%	0.080
	No	64.8%	35.2%	
7. Do you think surgical masks and 3ply cloth masks are equally effective to N95 respirators?	Yes	62.5%	37.5%	0.410
	No	57.9%	42.1%	
8. Which type of mask among the three will have the best filter capacity of the particles (i.e 0.3 microns or larger)?	FFP1	65.0%	35.0%	0.189
	FFP2	62.3%	37.7%	
	FFP3	55.1%	44.9%	
9. How much is the filter capacity (removes x% of all the particles that are 0.3 microns in diameter or larger) of the FFP3 masks?	99-99.95%	57.4%	42.6%	0.000
	99.97%	52.2%	47.8%	
	99%	87.5%	12.5%	
	Less than 99 percent	54.5%	45.5%	
10. Do you dispose your mask immediately after removing it?	Yes	58.5%	41.5%	0.755
	No	60.7%	39.3%	

no statistically significant difference (Table 2). When surveyed regarding fogging of the eye wear, 43.4% (220) of participants said that they experienced more fogging with 3 ply masks with frequencies of 42.3% and 57.7% of practitioners and post graduates, respectively.

When the side effects of usage of masks were inquired, 76.1% (386) of participants answered as yes, and 79.1% (401) of the study population accepted that there will be a reduction in O₂ and CO₂ levels with prolonged use of masks. A total of 67.1% (340) of participants agreed that there will be a reduction in transmission of various infections such as SARS CoV with use of masks. Regarding the use of N95 respirators among the general public, 57.0% (289) of the participants did not support their use, while 43.0% (218) of the participants supported its use.

When a question was asked as to which mask is suitable for COVID-19 patients, 50.7% (257) of the participants answered as valved N95, and the remaining 49.3% (250) of the participants advised the usage of non-valved N95 masks, among which 56.8% were practitioners and 43.2% were post graduates. When a question was asked about the first person who suggested wearing a mouth mask in 1897, only 57.2% (290) of the participants answered correctly as Johann Mikulicz with frequencies of 53.4% and 46.6% for practitioners and post graduates, respectively, with a p-value of 0.000, which shows a significant difference. (Table 2)

DISCUSSION

Face masks are used in the public in Asian countries not only to guard people from acquiring respiratory infection but also to decrease the spread of disease from the wearer. Such use often increases during outbreaks and pandemics. Usually, masks are made of different materials and with specific designs depending on the filtering capacity. Various standards are used during evaluating the masks in the health care setting because the main aim of preparing the masks is to protect the wearer from infectious particles. Masks not only protect the wearers but also protect the others by blocking the droplets ejected by the wearer while speaking and coughing. Therefore, keeping in mind, the purpose of our paper is to evaluate the knowledge on the masks among dental fraternity, especially general practitioners and post graduates. The two segments of dentists are more prone to become infected while treating patients in pandemics or outbreaks such as COVID 19.⁶

According to the US CDC, close contact is defined as “being within approximately 6 feet (2 meters) of a COVID-19 case for a prolonged period of time or having direct contact with infectious secretions of a COVID-19 case. Likewise, several additional significant explanations have been stipulated and issued by the CDC.⁷

This group (Dentists) has the highest risk of potential contact with the virus because they will be having near patient interaction at some point in the healthcare setting and consequently at risk of contracting and smattering the

Table 2: Knowledge and awareness on the disposal and side effects of masks among practitioners and post graduates

11. In Which colour bag or bin you will dispose the mask?	Yellow	58.1%	41.9%	0.660
	Red	59.3%	40.7%	
	Blue	66.7%	33.3%	
	Green	50.0%	50.0%	
12. While using which type of the mask, do you experience more fogging of the eye wear?	3ply cloth mask	42.3%	57.7%	0.000
	Surgical mask	68.1%	31.9%	
	N95 mask	90.7%	9.3%	
	All the above	66.2%	33.8%	
13. Did you experience any side effects with use of mouth masks like breathing difficulty, pressure on face?	Yes	66.2%	33.8%	0.021
	No	67.8%	32.2%	
14. Does wearing a mask for prolonged duration, can reduce oxygen and increase CO2 levels in the body?	Yes	60.6%	39.4%	0.105
	No	51.9%	48.1%	
15. Do you think wearing of mouth masks can prevent transmission of various infections like SARS COV?	Yes	57.6%	42.4%	0.461
	No	61.1%	38.9%	
16. Do you recommend the use of N95 Respirators to the general public	Yes	58.3%	41.7%	0.836
	No	59.2%	40.8%	
17. For COVID -19 Patient which mask is suitable?	Valved N95	60.7%	39.3%	0.372
	Non Valved N95	56.8%	43.2%	
18. Do you know who was the first person suggested wearing a mouth mask in 1897?	Johann Mikulicz	53.4%	46.6%	0.000
	Carl Flugge	43.2%	56.8%	
	Joseph lister	81.2%	18.8%	
	Louis Pasteur	81.8%	18.2%	

contagion. A mixed response was noted about the usage of masks during the aerosol and non-aerosol generating procedures, but the maximum percentage was general dentists, and post graduates mentioned that surgical masks were used over the N95 while performing these types of procedures. This is in accordance with the stand-in exposure studies; N95 respirators were associated with less filter penetration, less face-seal leakage and less total inward leakage under laboratory investigational conditions compared with surgical masks. Although N95 respirators appeared to have a shielding advantage over surgical masks in the laboratory setting, the meta-analysis showed that there were inadequate data to definitively determine whether N95 respirators are superior to surgical masks in protecting health care workers against transmissible acute respiratory infections in clinical settings.^{8,9}

In a recent systematic review and meta-analysis regarding surgical masks versus N95 respirator masks by the Chinese Cochrane Center, which includes six randomized controlled trials with a total of approximately 9171 health care workers, there was no difference in the efficacy between surgical and N95 masks in preventing laboratory-confirmed influenza or respiratory viral infections.⁹ These studies provide some confidence that the surgical masks may help as well as N95 masks in a health care setting, but we have to follow proper protocols during wearing and removing these masks along with following adequate hand hygiene measures.¹⁰

Regarding the usage of level 1, 2 and level 3 masks, according to ADA-specified guide lines, level 1 masks are not widely used in dental practice, and they are appropriate only when there is no risk of blood or body splash. These can be used when conducting post-insertion reviews for removable prostheses, mouth guards and removable appliances and other performing orthodontic adjustments. Regarding the usage of level 2 masks, these are most commonly used in dental practice due to their ability to block the particle sizes commonly encountered in the dental setting or practice. These masks will block aerosols of three microns or less in size, which arises from procedures such as restorative and endodontic procedures, periodontal procedures such as the use of ultrasonic scalars and air-turbine hand pieces. Coming to the level 3 masks, these have a high level of splash protection and are used for procedures where there is a greater risk for exposure to blood and body fluids such as surgical and trauma procedures.¹¹

Surgical masks used for dental purposes are fluid-repellent paper filter masks, and they are suitable for both surgical and nonsurgical procedures to generate aerosols. The filtration ability of the masks starts declining with moisture on the inner and outer surfaces of the mask after approximately 20 minutes. It is difficult to change masks during long surgical procedures and is not necessary unless the mask becomes completely wet from within or without.¹²

N95 masks and the other respirators are available with valve and without a valve. The valve N95 masks are not suitable for patients suffering from COVID-19 because exhalation allows the virus to pass easily and can potentially infect adjacent or neighboring persons.^{12,13}

When coming to the three-layered mask whose layer acts as a filter, there is a mixed response, 50 percent of general dentists and 49 percent of post graduates answered correctly that the middle layer acts as a filter. This is in accordance with Jagadeesh kumar et al., who found that the outer layer is hydrophobic and is a fluid-repelling layer, and the main function of this layer is to prevent germs from attaching to it. When coming to the inner layer, it is a hydrophilic layer that absorbs any kind of moisture from the air that we exhale. There is a middle layer that is very important and actually filters microorganisms.¹³

When the participants were questioned about the disposal of the masks in which color bags, 58 percent of general practitioners and 41.9 percent of postgraduates answered correctly that they would dispose in yellow color bags, and the rest of all participants answered differently. When coming to the disposal of the mask immediately after every patient, 58.5 percent of general practitioners and 41.5 percent of postgraduates answered yes, and instant discarding of the mouth mask decreased the spread of infection from the patient to the patient as well as to the dentist; these practices are supposed to be practiced by every dentist in the clinical care setting to prevent cross contamination.⁵ General dentists are more aware when compared to postgraduates, it may be due to more years of experience in the clinical practice than the post graduates.

When we enquired about whether they felt difficulty breathing while wearing a mouth mask, 76.1% had problems breathing while wearing the mouth mask, which might be due to thick barriers provided by the manufacturing companies.⁵

A total of 57.6% and 42.4% of the practitioners and post graduates, respectively, agreed that there will be a reduction in the transmission of various infections, such as SARS CoV, as wearing mouth masks can prevent community spread.¹⁴ According to Kumar J et al., there is insufficient evidence supporting this hypothesis because along with the usage of masks, hand hygiene and infection control protocols should be followed, which may help to prevent disease transmission.¹³

For the type of mask with the best filter capacity of the particles (i.e., 0.3 microns or larger), 55.1% of practitioners and 44.9% of post graduates answered correctly as FFP3. Only 46.7% of the participants (237) answered its filter capacity correctly as 99-99.95%.¹⁵

CONCLUSION

The inputs from the survey show that there is a strong need to implement periodic educational interventions and training programs on infection control practices or about the usage of protective equipment during this pandemic crisis among dentists in particular. Conducting regular educational webinars with customary guidelines and contents to create more awareness amongst dental fraternity is important for them to stay safe and protect our society from transmissible diseases such as COVID-19.

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Author's contributions:

RR-Concept and design of the study; interpreted the results, prepared first draft of manuscript and critical revision of the manuscript; **SA**- Statistically analyzed and interpreted; reviewed the literature and manuscript preparation; **CCP**- Design of the study, statistically analyzed and interpreted, preparation of manuscript and revision of the manuscript; **RB**- Concept reviewed the literature and manuscript preparation. **SP**-Prepared first draft of manuscript and critical revision of the manuscript; **AA**- Statistically analyzed and interpreted.

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