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Original Article

Dentist's perception and usage of Personal Protective Equipment –A Cross sectional survey

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Abstract

Introduction: Personal protective equipment (PPE) refers to protective clothing, helmets, gloves, face shields, goggles, facemasks and/or respirators or other equipment designed to protect the wearer from injury or the spread of infection or illness. The usage of PPE among health care professionals is increased after Covid 19. Dentists poses high risks to infection due to largernumber of droplets generated during dental procedures. The perception and the usage of Personal Protective Equipment among the dentists may not be same. Hence an online cross-sectional questionnaire survey was conducted among the dentists on perception and usage of Personal Protective Equipment.

Materials and methods: A cross sectional only survey using 20closed-ended questionnaire was conducted to assess the perception and usage of Personal Protective Equipment among dentists. A total of 388 dentists were included in the survey. The study subjects were classified into 3 groups. Group A-Practitioner alone (in Clinic/Hospital), Group B-Academician (Working in academic institution alone without practice) and Group C- Both (clinician and academician).

Results: Most of the dental practitioners who are affiliated to dental colleges as well as having or working in clinician (Group C) had received formal training or demonstration regarding donning and doffing of PPE compared to individual practitioners or academician (Group A and B) and it is statistically significant ($P<0.05$) and many private practitioner's faced shortage of PPE compared to academician and both (Private practitioners and academician) which is statistically significant ($P<0.05$)

Conclusion: Compared to Group A and B academician and clinician individually dental professionals who are working as both academician and clinician (Group C) have better perception and know the proper usage of PPE which might be because of the exposure in both college and clinical setup.

KEYWORDS: Dentists, Perception, Donning, Doffing, Personal Protective Equipment

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INTRODUCTION

Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus and the infection can be spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, sing or breathe. These particles range from larger respiratory droplets to even smaller aerosols (1). Healthcare workers havehigh and constant risk of exposure while managing patients with COVID-19 (2). One of the ways to prevent covid 19 infection is the usage of PPE (Personal Protective Equipment). PPE protects healthcare workers from virulent pathogens by preventing exposure to bodily fluids and respiratory droplets. The appropriate use of PPE is one of the most effective strategies for protecting both patients and healthcare providers from transmissible pathogens (3).

Occupational Safety and Health Administration (OSHA) defined PPE as an equipment worn to minimize exposure to hazards that cause serious workplace injuries and illnesses (3).

The use of PPE, which involves the process of donning (putting on) and doffing (taking off), consists of procedures that not only need to be performed correctly but also in the correct sequence to protect dental professionals from infectious exposures in the workplace. In addition, decision regarding how, when and what type of PPE to wear is also crucial which should be guided by CDC recommendations for Standard Precautions and Expanded Isolation Precautions (4).

Personal Protective Equipment (PPE) and protocols for safe and efficient donning and doffing are important for protecting HCWs and preventing disease transmission, but risky behaviour during doffing do occur and may result in self-contamination. Moreover, local adaptations of national guidelines result in variability in the PPE used and the procedures for donning and doffing PPE.4Even the best designed and manufactured PPE kits may not be able to save HCWs from the potential infectious agents if they lack proper knowledge and practice of PPE.

Hence an online cross-sectional questionnaire survey was conducted among the dentists on perception and usage of Personal Protective Equipment.

MATERIAL AND METHODS

Study settings and participants: This questionnaire-based cross-sectional study was conducted over a period of 2 months between February and March 2022. The participants consisted of dental professionals from various parts of Tamil Nadu with varying age, Gender, Qualification and type of practice. Principal investigator approached the study participants.

Sample size Estimated: The sample size was estimated using G power software. The estimated sample size was 388 with alpha error at 0.05 and power of the study being 0.80 and effect size as 0.062.

Ethical approval: Ethical approval was obtained before the commencement of study from the college ethical committee and corrections were made as per the committee.

Data collection: A structured, self-explanatory questionnaire was designed in English on the Google Forms platform. The questionnaire was validated by the experts with value of 0.86 and also peer-reviewed. It consisted of a brief introduction to the study, followed by 3 sections. Section I collected the demographic data, section II consisted of 12 closed-ended questions regarding the participants perception of PPE and section III consists of 8-closed ended questions regarding the usage of PPE. Snow ball sampling was used to recruit the study participants. The participants were approached through personal connection and the Internet/e-based technologies (e.g., online platforms and e-mail). The survey was pilot tested with a sample of

10 dentists to check the clarity and validity of all items and level of understanding the questionnaire. The average time taken to complete the questionnaire was also calculated. The data of the pilot study was removed from the final analysis. The questionnaire was then sent to the study participants and their responses were kept confidential. Timely reminders were sent as well. Patient information sheet and informed consent form was attached with the questionnaire. Dentists who were willing to participate and enrolled in the survey. Dentists who did not respond to the questionnaire form two weeks from the time of receiving the form were excluded.

All the 388 study participants were divided into 3 groups

Group A-Practitioner alone (In Clinic/Hospital),

Group B-Academician (Working in academic institution alone without practice) and

Group C- Both (clinician and academician)

Statistical Analysis.

Data were entered into a password-encrypted computer and subsequently analysed using IBM Statistical Package for Social Sciences (SPSS) version 23.0 for Windows (IBM, Armonk, New York, USA). values of <0.05 were considered significant. Categorical variables were summarized using frequencies, ratios and proportions, while the chi-square test was used to determine the association between the variables.

RESULTS

Among 388 dental professionals, 106 were male and 282 were female which is depicted in figure 1. Majority of dental professional who had participated in the study had MDS degree which is shown in table 1. With regard to the type of practice most of them are both academician and practitioner which is shown in table 2. Perception of dental practitioners regarding PPE was shown in table 3 and usage of PPE is depicted in table 3.

Most of the dental practitioners who are affiliated to dental colleges as well as having or working in clinics had received formal training or demonstration regarding donning and doffing of PPE compared to individual practitioners or academician and it is statistically significant(P<0.05) which is shown in table 3. Most of the private practitioner's faced shortage of PPE compared to academician and both (Private practitioners and academician) which is statistically significant(P<0.05) and it is depicted in table 3. Responses to the questionnaire on usage of PPE among dentists is depicted in table 4.

Figure 1: Distribution of study subjects based on gender

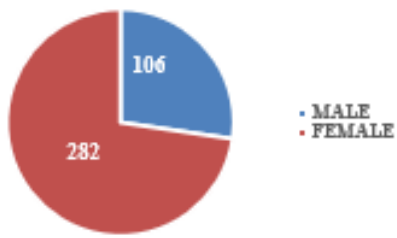

Table 1: Distribution of study subjects based on qualification

S. No	Qualification	Total
1.	BDS	93
2.	MDS	246
3.	MDS with any degree	49

Table 2: Distribution of study subjects based on type of practice

S. No	Type of practice	Total
1.	Practitioner in clinic/Hospital	58
2.	Academician alone	151
3.	Both (Practitioner and Academician)	179

Table 3: Questionnaire on perception of dental practitioners regarding PPE

S. No	Questions	Response	Private Practitioners Group A	Academician Group B	Both Group C	X^2	P Value
1	Are you aware of the standard guidelines for donning and doffing of PPE?	Yes	34	71	82	11.804	0.019
		No	20	44	70		
		Not sure	4	36	27		
2	Are you aware of the sequence of wearing PPE?	Yes	34	80	106	3.259	0.515
		No	12	33	27		
		Not sure	12	38	46		
3	Are you aware of the different types/materials of PPE available in the market?	Yes	31	77	85	0.778	0.67
		No	27	74	94		
		Not sure	0	0	0		
4	Are you aware that virus dispersion occurs more commonly during doffing?	Yes	44	106	134	0.013	0.7
		No	33	38	33		
		Not sure	134	33	12		
5	Do you know all the components of PPE??	Yes	47	106	131	5.562	0.234
		No	6	37	38		
		Not sure	5	8	10		
6	Is the sequence of wearing and removing the personal protective equipment the same?	Yes	24	84	108	6.902	0.141
		No	8	19	48		
		Not sure	108	21	50		
7	Have you received any formal training or demonstration regarding donning and doffing of PPE?	Yes	49	76	107	12.404	0.051
		No	84	51	21		
		Not sure	0	0	0		
8	Do you feel the cost of PPE is very high?	Yes	31	75	89	0.278	0.870
		No	27	76	90		
		Not sure	0	0	0		
9	Have you ever faced shortage of PPE	Yes	123	85	102	13.234	0.050
		No	31	21	26		
		Not sure	0	0	0		
10	Do you feel that your patients are frightened seeing you with PPE during dental procedures	Yes	43	105	125	0.470	0.791
		No	15	46	54		
		Not sure	0	0	0		
11	Do you agree that strict donning and doffing practices would wear off if the pandemic continues for longer period?	Yes	40	106	122	0.160	0.923
		No	18	45	57		
		Not sure	0	0	0		

$\chi 2$: Chi-square test; P value<0.05-Statistically significant

Table 4: Questionnaire on usage of PPE among dental practitioners

S. No	Questions	Response	Private Practitioners Group A	Academician Group B	Both Group C	X^2	P Value
1	Do you feel uncomfortable on wearing PPE while during dental procedures	Yes	41	96	129	2.883	0.237
		No	17	55	50		
		Not sure	0	0	0		
2	Do you think it is mandatory to wear PPE even for screening?	Yes	37	91	113	5.762	0.218
		No	19	58	66		
		Not sure	2	22	0		
3	Have you ever had difficulties in communicating with your patients while wearing PPE	Yes	39	104	126	0.229	0.89
		No	19	47	53		
		Not sure	0	0	0		
4	Have you ever had Sensitivity to the materials used in producing the personal protective equipment	Yes	35	97	114	0.285	0.867
		No	23	54	65		
		Not sure	0	0	0		
5	Do you prefer disposable PPEs compared to reusable PPEs?	Yes	44	125	140	1.655	0.437
		No	14	26	39		
		Not sure	0	0	0		
6	Do you think PPE is giving complete protection while doing dental procedures?	Yes	21	56	77	1.549	0.461
		No	37	95	102		
		Not sure	0	0	0		
7	Will you do donning and doffing of PPE without other help?	Yes	33	84	106	0.441	0.802
		No	25	67	73		
		Not sure	0	0	0		
8	After doing dental procedures, do you dispose of your personal protective equipment kits according to standard guidelines?	Yes	43	113	124	1.393	0.498
		No	15	35	38		
		Not sure	0	0	0		

$\chi 2$: Chi-square test; P value<0.05-Statistically significant

DISCUSSION

In the present study 48.1 % of dental practitioners were aware of the standard guidelines for donning and doffing of PPE where most of the private practitioners were unaware compared to the academicians which might be because of the formal training received by them in their affiliated colleges.

70.3% of the dental practitioners were aware of the sequence of wearing PPE whereas in a study conducted by M. A. Alao et al on April 2020 among Nigerian health workers only 39.7% know how to correctly wear and remove PPE (5) and the differences in the results might be because of the time period of the study conducted where the present was conducted after one year of the study compared.

49.7% of the dental practitioners were aware of the different types/materials of PPE available in the market in a study conducted by M. A. Alao et al about half (134 (49.3%)) of the respondents correctly admitted that there were 4 levels of PPE utilization.

Most of the dental practitioners i.e., 73.1% were aware that virus dispersion occurs more commonly during doffing. Even the best designed and manufactured PPE kits may not be able to save HCWs from the potential infectious agents if they lack proper PPE practice of donning and doffing.

Most of the dental practitioners i.e., 73.1% know all the components of PPE which includes Glove, Gown/Apron, Mask, Respirators, Goggles, Face shields and Shoes. 55.6% of the dental practitioners felt that sequence of wearing and removing the personal protective equipment is same. Many studies reported that the procedure for donning and doffing differs (6).

59.7% of dental practitioners received any formal training or demonstration regarding donning and doffing of PPE and 40% have not received any training which might be due to the lack of expertise to conduct this training, and a false assumption that epidemics of contagious diseases are rare and acquiring related knowledge may be a futile effort. Almost half of the dental practitioners feel the cost of PPE is very high. The Cost of Personal Protective Equipment During the First Wave of COVID-19 is very high compared to second and third wave which might be due to the increase in PPE manufacturing. In a study conducted by Alfredo Mena Lora et al on Cost of Personal Protective Equipment During the First Wave of COVID-19 it was found that market prices for PPE were significantly elevated during the first weeks of the pandemic and remained high throughout the first wave of COVID-19. Multiple factors likely contributed to high prices, including demand shock, disrupted supply chains, and a rush to acquisition by healthcare systems and the general population alike (7, 8).

70.3% of dental practitioners reported that their patients are frightened seeing them with PPE during dental procedures which might be because of the full coverage of doctors with PPE from head to toe and in a study conducted by Vallari Malandkar et al 28% agreed that the patient seemed more anxious upon seeing the dentist in PPE whereas in a study conducted among paediatric dentists most of them responded that PPE increases the anxiety levels of children during dental procedures (9).

Most of dental practitioners also felt that they were uncomfortable on wearing PPE while during dental procedures. 69.3% have difficulty while communicating with their patients and in a survey of self-perceived physical discomforts and health behaviours related to personal protective equipment of indian dental professionals during COVID-19 Pandemic, it was reported that sweating, difficulty in vision, difficulty in breathing, and headache were the common discomforts reported by majority of the dental professionals and burning, stinging, itching, dryness, etc. on their skin due to frequent hand cleaning and the long-term use of PPE were also reported in a study conducted by Yelda Koç among pediatric dentists. Although wearing PPE is associated with difficulties to dentists but it is extremely essential to wear PPEs for self-protection during the ongoing pandemic and in a study conducted by Vallari Malandkar et al It was found that 89% of the respondents had difficulty in communication due to the use of PPE (9,10).

62.1% of dental practitioners thought it is mandatory to wear PPE even for screening and in a study conducted by Yelda Koc et al 87% of them preferred Scrubs 90% preferred surgical masks, 83 preferred surgical gown 70.5 preferred Disposable surgical gown 92.5% preferred Disposable gloves for Both Aerosol Generating and Non-Aerosol Generating Procedures. Majority of dental practitioners prefer disposable PPE'S compared to reusable PPE's and in a study conducted by Meredith McQuerry wt al it was concluded that due to the superior durability and sustainability of reusable gowns as well as increased protection and significant cost savings many prefer reusable gowns compared to disposable gowns. In March of 2020, the Centre for Disease Control recommended disposable gown use be shifted toward "cloth gowns," stating that reusable (ie, washable) gowns are typically made of polyester or polyester-cotton fabrics whereas most disposable gowns are constructed from nonwoven materials. Gowns made of these non-woven materials can be safely laundered according to routine procedures and are, therefore, reusable (11).

If aerosol-generating procedures are necessary for dental care, high evacuation suction and dental dams can be used with PPE to minimize droplet spatter and aerosols (12). 57.4% had replied that they will do donning and doffing of PPE without others helpand technique regarding donning and doffing of PPE is crucial to the

protection of those who don it where virus contamination will mostly occur during donning and doffing of PPE and it is better to do donning and doffing without others help to prevent cross infection (5).

Majority of dental professionals (72.1%) replied that they will dispose their personal protective equipment kits according to standard guidelines.

The present survey is not without its limitations. Though respondents were encouraged to be honest and assured their responses were anonymous it is also reasonable to suspect that the responses from the self-administered questionnaire may not always represent the true/honest position of the respondents and these limits the generalisability of the result and calls for careful interpretation. The distribution of study participants in three groups is not similar.

CONCLUSION

Compared to Group A and Group B (academician and clinician individually) dental professionals who are working as both academician and clinician (Group C) have better perception and know the proper usage of PPE which might be because of the exposure in both college and clinical setup. Though many dental professionals felt uncomfortable while wearing PPE it is advised to wear while doing the dental procedures to prevent the infection through aerosols and it is mandatory to emphasize the importance of training, practice, competence and observation of healthcare workers, especially in correct donning and doffing, maintaining, detection of breach in PPE and disposal of PPE.All PPE must be used in the context of a comprehensive infection control program that follows CDC recommendations and applicable Occupational Safety and Health Act of (OSHA) requirements to protect health care workers and their patients.

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Conflicts of interest
There are no conflicts of interest

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