

DENTAL PRACTITIONER'S AWARENESS AND PRACTICES OF PRE PROCEDURAL MOUTH RINSE DURING COVID-19 PANDEMIC

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ABSTRACT

Objectives: To assess participants' knowledge, attitude, and practices in regards to use of pre procedural mouth rinse during COVID-19 pandemic.

Materials and Methods: This survey was conducted on 254 participants (consultant, general practitioner, and post graduate trainees). The questionnaire contained demographic information followed by 21 questions related to basic knowledge about cross infection in dental offices, the practices and attitudes of dental practitioners about pre procedural mouth rinse and any change in selection of mouth washes due to COVID-19. The survey was distributed among consultants, post graduate trainees and general practitioners of various dental institutes and hospitals as well as private practitioners across Pakistan. Descriptive statistics were calculated and chi-square test was applied for comparison.

Results: Among the participants who responded females (n=196, 77.17%) were more common than males (n= 58, 22.83%). The majority of participants were post graduate trainees (n=150, 59.06%) followed by general practitioners and consultants (n=52, 20.47%). The common place of practice was government set up (n=150, 59.06%). Above 50% participants reported that mouth washes have promising results in prevention of cross infection in transmission of COVID-19. Most of respondents reported that for around 10 minutes the aerosols remain suspended in the air (35.43%) followed by 5 minutes (29.53%). About 31.89% responded that 0.2% povidone iodine is recommended by ADA and CDC for prevention of COVID-19 transmission. The common source of highest levels of bioaerosols was ultrasonic scaling (75.59%) and cavity preparation (21.26%).

Conclusion: Dental practitioners are not up to date in knowledge regarding COVID-19 transmission and prevention in dental practices. Proper training and education is needed to be provided to update their knowledge and practices for professional development.

Key words: Awareness, Dental practitioners, mouth rinses, COVID-19

INTRODUCTION

SARS CoV-2 is the seventh virus in the family of coronaviruses, which causes severe acute respiratory syndrome after severe acute respiratory syndrome SARS-CoV and Middle East respiratory syndrome

MERS-CoV that caused local outbreaks in 2003 and 2015. Rapid spread of the disease has occurred around the globe after first case has emerged in late December 2019.^{1,2}

Clinical signs of the illness differ among individuals ranging from milder respiratory symptoms to severe organ failure.³ Respiratory droplets generated during speaking, sneezing and coughing are considered as the main source of its spread.⁴ Due to their frequent interaction with infected patients, healthcare

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workers, especially dentists, are at an increased risk of contracting an infection.⁵ Nasal cavity, oropharynx, nasopharynx, and saliva have higher loads of the virus so there is high rate of transmission in dental offices.^{6,7} Hand pieces and ultrasonic devices are used on daily basis in dental offices leading to generation and emission of secretions known as aerosols and splatters. These consist of saliva and blood along with bacteria and viruses (0.2–2.0µm in diameter), which aerosolize into environment. These aerosols can travel up to 3 feet (1 m) and stay suspended in the air for 10 minutes, contaminating dental equipment and posing health risks to the staff and other patients.⁸⁻¹⁰

The British orthodontic society has recommended use of high-speed suction devices, rubber dams, mouthwashes, and personal protective equipment for all aerosol generating procedures (AGPs).¹¹

The risk of cross-contamination with infectious agents in the dental operator can be reduced to a greater extent by following pre procedural rinse. Among all available agents chlorhexidine was found to be most commonly used for pre procedural mouth rinse. The use of chlorhexidine mouth rinses to minimize aerosol formation was also mentioned in the Centers for Disease Control and Prevention (CDC) guidelines.¹²

But when it comes to the enveloped COVID-19 virus, 0.12% CHX gluconate has been shown to have little to no effect against coronaviruses.^{12,13}

As a pre-surgical skin antiseptic and as a mouthwash, povidone-iodine (PVP-I), a water-soluble iodine compound, has been used extensively.¹³ In a recently completed in vitro experiment, Bidra et al.¹⁴ concluded that at least 0.5% concentration of PVP-I was required to kill SARS-CoV-2 with a contact time of 15 seconds. Sarfaraz et al.¹⁵ In a recently conducted cross sectional study during the pandemic found that majority of dental practitioners utilized chlorhexidine oral rinses in contrast to other mouthwashes showing lack of knowledge regarding the antiviral properties of PVP-I oral rinses.

Presently, there are no clinical studies reported on any oral antiseptic rinses specifically against SARS-CoV-2. Based on the in vitro literature available on effectiveness of antiseptic agents on COVID-19, the study will probe how much dental professionals are

aware of most effective pre procedural mouth rinse available to reduce COVID-19 load. The findings of this survey will alert the dental professional to update their knowledge regarding the use of antiseptic mouth rinse during COVID-19 pandemic.

This survey was conducted to evaluate the knowledge, attitude and practices of dental professionals regarding the use of mouthwashes before pandemic and any changes if made in choice of pre procedural mouth rinse during pandemic as well to emphasize on pre-procedural utilization of mouthwashes. Our null hypothesis was there is no difference in awareness level for various practitioners of different qualification and experience level.

MATERIALS AND METHODS

This survey was conducted on 254 participants (Consultant, general practitioner, post graduate trainees) in dentistry. By using WHO sample size calculator, the minimum total calculated sample is 254 using 38.9%¹⁵ frequency of knowledge of Povidone-iodine (PVP-I) mouthwash efficiency in reducing corona viruses, taking 6% margin of error and 95% confidence interval. Ethical committee approval for the study was taken from research and development cell of Khyber College of dentistry no. 37/ADR/KCD.

A questionnaire composed of demographic details and questions to assess knowledge and change in attitude and practices of dental practitioner was distributed to the dental practitioners through whatsapp and social media links. It was distributed to dental practitioners including consultants, post graduate trainees and general practitioners of various dental institutes and hospitals as well as private practitioners across Pakistan. 15 dental professionals were requested to complete the questionnaire as a control in order to assess the questionnaire's validity and reliability. The questionnaire was to be filled out by the respondents within a week. Non-responders received reminders after three weeks. The purpose of the study was briefly stated in the covering and reminder letters, and it was made clear that all information gathered would be kept private.

The questionnaire consisted of demographic data and 21 questions related to basic knowledge of dental practitioners about cross infection in dental offices and their practice and attitudes of pre procedural

mouth rinse use and any change in choice of mouth rinse due to COVID-19.

The data was analysed using R package version 4.1.2. Frequency and percentages were computed for categorical data and mean and SD for continuous data. The awareness was compared among level of qualification using Chi-Square test. Fisher test was applied in case of violation of Chi-square test assumption. The level of significance was $P \leq 0.05$.

RESULT

The most common age group was 25-30 years having 163 (64.17%) participants followed by 31-35 years having 42 (16.54%) participants and least common age group was 46-50 years having 4 (1.57%). The females (n=196, 77.17%) was more common than males (n=58, 22.83%). The majority of the participants were post graduate trainee (n=150, 59.06%) followed by general practitioner and consultants (n=52, 20.47%). The common place of practice was government set up (n=150, 59.06%). (Table 1)

Most of the participants 'strongly agreed' that respiratory droplets are a key source of cross infection in a dental workplace (n=122, 48.03%) and 91 (35.83%) were 'agreed'. Most of respondents agreed (n=129, 50.79%) that aerosol generated during cough, sneeze and talk fall to the ground quickly and 57 (22.44%) strongly agreed. When the participants were asked if small diameter of the aerosol particles (<1 micron) represents a potentially high risk of inhalation of aerosolized bacteria; most common response was 'agree' in 127 (50%) and 'strongly agree' in 87 (34.25%). The common response for promising results of mouthwashes was 'agree' in 98 (38.5%) and 'neutral' in 70 (27.56%). Most of respondents 'agree' that pre-procedural use of mouthwashes can effectively reduce the bacterial and viral load in dental aerosols (n=135, 53.15%). For superiority of providence-iodine (PVP-I) over Chlorohexidine in reducing Coronaviruses, most of the participants were 'neutral' (n=113, 44.49%). (Table 2)

Most of respondents reported that aerosols will float around in the air for ten minutes (n=90, 35.43%) followed by 5 minutes (n=75, 29.53%). Most of respondents reported that virus can survive for up to 7 days (n=110, 43.31%) followed by 5 days (n=77, 30.31%). Most of the participants responded that bioaerosols generated after the dental treatment

return to baseline after 2 hours (n=103, 40.55%) followed by 4 hours (n=54, 21.26%). Of total 81 (31.89%) responded that 0.2% povidone iodine is recommended by ADA and CDC. 119 (46.85%) reported that ADA and CDC recommended time to use PVP-1 (povidone iodine) for pre procedural rinse against COVID -19 is 30 seconds. About 61 (24.02%) reported that major drawback of use of pre procedural mouth rinse with povidone-iodine is allergic reaction. (Table 3)

The common source of Highest levels bioaerosols was ultrasonic scaling (n=192, 75.59%) and cavity preparation (n=54, 21.26%). Most of the participants reported that the virus remains longer on plastic (n=106, 41.73%) and steel surface (n=75, 29.53%). Chlorhexidine (n=196, 77.17%) was the common mouthwash recommended by respondents pre procedural rinse in routine practice. Rest of detail are given in table 4.

Awareness about sources of infection, role of mouth washes and duration of rinses by qualification of participants shows significant difference. Small diameter of the aerosols may be quite dangerous when inhaled as aerosolized bacteria ($p=0.0003$) and mouthwashes offer promising results against coronavirus transmission ($p=0.064$). Consultants were more aware than general practitioners and post graduate trainees. Rest of questions was not different statistically. (Table 5)

Awareness about aerosols, virus survival, concentration of PVP, and ADA recommendation by qualification shows that significant difference were found for question about if aerosols can travel up to a distance of 3 feet and remain suspended in the air for 10 minutes ($p=0.04$) and regarding question about bioaerosols generated after dental treatment return to baseline after how many hours ($p=0.051$). Rest of details is given in table 6.

Awareness about the bioaerosols level and viral survival on surface were statistically significant among various practitioners ($p<0.001$). The details are given in table 7.

DISCUSSION

An evaluation of dental professionals' knowledge, attitudes, and practices about the usage of mouthwashes was done by this survey. Questions regarding use of mouth washes during routine practice

and any change in choice of pre procedural mouth wash due to COVID-19 were included. Results were used to reinforce pre-procedural utilization of mouthwashes.

COVID-19 is mostly spread through respiratory droplets generated during speaking; sneezing and coughing and these are acknowledged as the primary conduit for its spread.⁴ Our findings showed that most of participants had awareness that common cause of cross infection in COVID-19 pandemic is respiratory droplets. Similar reports have been found by Kanaparthy and Meng¹ about awareness of dental professionals regarding COVID 19 transmission.^{16,17} Above 50% participants of our study reported that mouth washes have promising results in prevention of cross infection in transmission of COVID-19 and also above 50% participants reported that using mouthwashes before procedures can successfully lower the amount of bacteria and viruses in dental aerosols. These findings were supported by a study conducted in Islamabad by Imran et al.¹⁸ which also reported that 53.3% participants were aware that using mouthwashes before procedures can successfully

Table 1: Frequency of age group, gender, qualification and place of practice

Variable	Characteristic	n(%)
Age group (years)	25-30	163 (64.17)
	31-35	42 (16.54)
	35-40	36 (14.17)
	41-45	9 (3.54)
	46-50	4 (1.57)
Gender	Female	196 (77.17)
	Male	58 (22.83)
Position	Consultant	51 (20.08)
	Demonstrator	1 (0.39)
	General practitioner	52 (20.47)
	Post graduate trainee	150 (59.06)
Place of practice	Dental college	1 (0.39)
	Government practice	150 (59.06)
	House job	3 (1.18)
	Medical college	1 (0.39)
	Private hospital	5 (1.97)
	Private practice	85 (33.46)
	Pvt dental college	2 (0.79)
	Semi government	3 (1.18)
Teaching hospital	4 (1.57)	

Table 2: Awareness about sources of infection, role of mouth washes and duration of rinses

	Characteristic	n(%)
Major source of cross infection in a dental environment is respiratory droplets	Agree	91 (35.83)
	Disagree	4 (1.57)
	Neutral	21 (8.27)
	Strongly agree	122 (48.03)
	Strongly disagree	16 (6.30)
When a person coughs, sneezes laughs, or talks, large and small droplets or aerosols are generated. Due to gravity, larger droplets fall to the ground quickly	Agree	129 (50.79)
	Disagree	20 (7.87)
	Neutral	41 (16.14)
	Strongly agree	57 (22.44)
	Strongly disagree	7 (2.76)
The small diameter of the aerosol particles (<1 micron) represents a potentially high risk of inhalation of aerosolized bacteria	Agree	127 (50.00)
	Disagree	2 (0.79)
	Neutral	32 (12.60)
	Strongly agree	87 (34.25)
	Strongly disagree	6 (2.36)
Mouthwashes offer promising results against coronavirus transmission, as they have the potential to destroy the lipid membrane of the virus, thus effective against all mutated COVID-19 strains	Agree	98 (38.58)
	Disagree	32 (12.60)
	Neutral	70 (27.56)
	Strongly agree	49 (19.29)
	Strongly disagree	5 (1.97)
Pre-procedural use of mouthwashes can effectively reduce the bacterial and viral load in dental aerosols	Agree	135 (53.15)
	Disagree	6 (2.36)
	Neutral	22 (8.66)
	Strongly agree	81 (31.89)
	Strongly disagree	10 (3.94)
When used as pre procedural mouth rinse, mouthwashes constituting Povidone-iodine (PVP-I) are more efficient in reducing Coronaviruses than Chlorohexidine (CHX) mouthwashes	Agree	89 (35.04)
	Disagree	12 (4.72)
	Neutral	113 (44.49)
	Strongly agree	37 (14.57)
	Strongly disagree	3 (1.18)
Increasing pre procedural rinse time results in increased reduction of viral cells.	Agree	82(32.28)
	Disagree	15(5.91)
	Neutral	105(41.34)
	Strongly agree	47(18.50)
	Strongly disagree	5(1.97)

Table 3: Awareness about aerosols, viral survival, concentration of PVP, and ADA recommendation

Question	Characteristic	n(%)
Aerosols can travel up- to a distance of 3 feet and remain suspended in the air for (minutes)	4	32 (12.60)
	5	75 (29.53)
	7	41 (16.14)
	9	16 (6.30)
	10	90 (35.43)
Virus can survive on hands, objects and surfaces that have been exposed to infected saliva for up to (days)	5	110 (43.31)
	6	19 (7.48)
	7	77 (30.31)
	8	15 (5.91)
	9	33 (12.99)
Bioaerosols generated after the dental treatment return to baseline after (hours)	2	103 (40.55)
	3	37 (14.57)
	4	54 (21.26)
	5	20 (7.87)
	6	40 (15.75)
	What percentage of PVP-19 (povidone iodine) is recommended by ADA and CDC as pre procedural oral rinse against COVID 19?	0.20%
0.50%		72 (28.35)
0.70%		37 (14.57)
0.90%		16 (6.30)
1%		46 (18.11)
0.2%		2 (0.79)
ADA and CDC recommended time to use PVP-1 (povidone iodine) for pre procedural rinse against COVID -19 is	15 seconds	52 (20.47)
	15 seconds	2 (0.79)
	30 seconds	119 (46.85)
	45 seconds	18 (7.09)
	60 seconds	49 (19.29)
	90 seconds	14 (5.51)
PVP-I oral solutions can be safely used as mouthwashes up to a concentration of	1.50%	76(29.92)
	2%	42(16.54)
	2.50%	10(3.94)
	0.2%	54(21.26)
	0.5%	72(28.35)
A major drawback of use of pre procedural mouth rinse with Povidone-iodine is		
Allergic reaction		61 (24.02)
Does not display substantivity, as it fails to bind to the hydroxyapatite		53 (20.87)
Iodine is absorbed from the mucosa		57 (22.44)
It has to be freshly prepared		40 (15.75)
it is not commonly available		2 (0.79)
It is not commonly available commercially		41 (16.14)

Table 4: Awareness about the bioaerosols level, viral survival on surface, type and mechanism of mouth wash

Question	Characteristic	n(%)
Highest levels bioaerosols were observed for	Cavity preparation	54(21.26)
	Extraction	2(0.79)
	Oral examination	6(2.36)
	Ultrasonic scaling	192(75.59)
The virus remains longer on	Copper	16(6.30)
	Paper	22(8.66)
	Plastic	106(41.73)
	Steel	75(29.53)
Which mouthwash do you recommend as pre procedural rinse in routine practice?	Wood	35(13.78)
	Cetylypyridinium-chloride	4(1.57)
	Chlorhexidine	196(77.17)
	Hydrogen peroxide	14(5.51)
Which mouthwash do you recommend as pre procedural mouth rinse amidst COVID pandemic?	None	14(5.51)
	Povidone-Iodine	26(10.24)
	Cetylypyridinium-chloride	4 (2.60)
	Chlorhexidine gluconate	64 (41.56)
	Hydrogen peroxide	21 (13.64)
	None	10 (6.49)
How PVP-1 destroys viral cells?	Povidone-Iodine	55 (35.71)
	Strongly disagree	2 (1.30)
	cause oxidation of the MIC	7(2.76)
	Cause oxidation of the microbial cells	107(42.13)
	Increasing the permeability of the cell wall, causing its lysis	36(14.17)
	Interfere with the phospholipid bilayer	16(6.30)
	Penetrates microbes to disrupt proteins and oxidizes nucleic acid	88(34.65)
Penetrating the cell membrane, causing cell components to leak	7(2.76)	
PVP-I mouth rinse is recommended for healthcare workers exposed to infected patients	2 times a day	154(60.63)
	3 times a day	64(25.20)
	4 times a day	18(7.09)
	5 times a day	10(3.94)
	6 times a day	8(3.15)

Table 5: Awareness about sources of infection, role of mouth washes and duration of rinses by qualification

Characteristic	consultant, N = 51 ¹	demonstrator, N = 1 ¹	general practitioner, N = 52 ¹	post graduate trainee, N = 150 ¹	P-Value
Major source of cross infection in a dental environment is respiratory droplets					
Agree	17 (33.33)	0 (0.00)	20 (38.46)	54 (36.00)	0.064
Disagree	0 (0.00)	0 (0.00)	2 (3.85)	2 (1.33)	
Neutral	4 (7.84)	0 (0.00)	2 (3.85)	15 (10.00)	
Strongly agree	27 (52.94)	0 (0.00)	24 (46.15)	71 (47.33)	
strongly disagree	3 (5.88)	1 (100.00)	4 (7.69)	8 (5.33)	
When a person coughs, sneezes laughs, or talks, large and small droplets or aerosols are generated. Due to gravity, larger droplets fall to the ground quickly					
Agree	35 (68.63)	0 (0.00)	16 (30.77)	78 (52.00)	0.0003
Disagree	3 (5.88)	1 (100.00)	2 (3.85)	14 (9.33)	
Neutral	4 (7.84)	0 (0.00)	17 (32.69)	20 (13.33)	
Strongly agree	9 (17.65)	0 (0.00)	15 (28.85)	33 (22.00)	
Strongly disagree	0 (0.00)	0 (0.00)	2 (3.85)	5 (3.33)	
The small diameter of the aerosol particles (<1 micron) represents a potentially high risk of inhalation of aerosolized bacteria					
Agree	26 (50.98)	0 (0.00)	28 (53.85)	73 (48.67)	0.69
Disagree	1 (1.96)	0 (0.00)	0 (0.00)	1 (0.67)	
Neutral	7 (13.73)	1 (100.00)	6 (11.54)	18 (12.00)	
Strongly agree	16 (31.37)	0 (0.00)	17 (32.69)	54 (36.00)	
Strongly disagree	1 (1.96)	0 (0.00)	1 (1.92)	4 (2.67)	
Mouthwashes offer promising results against coronavirus transmission, as they have the potential to destroy the lipid membrane of the virus, thus effective against all mutated COVID-19 strains					
Agree	23 (45.10)	0 (0.00)	22 (42.31)	53 (35.33)	0.716
Disagree	3 (5.88)	0 (0.00)	7 (13.46)	22 (14.67)	
Neutral	15 (29.41)	1 (100.00)	13 (25.00)	41 (27.33)	
Strongly agree	8 (15.69)	0 (0.00)	10 (19.23)	31 (20.67)	
Strongly disagree	2 (3.92)	0 (0.00)	0 (0.00)	3 (2.00)	
Pre-procedural use of mouthwashes can effectively reduce the bacterial and viral load in dental aerosols					
Agree	29 (56.86)	1 (100.00)	27 (51.92)	78 (52.00)	0.89
Disagree	2 (3.92)	0 (0.00)	1 (1.92)	3 (2.00)	
Neutral	3 (5.88)	0 (0.00)	8 (15.38)	11 (7.33)	
Strongly agree	15 (29.41)	0 (0.00)	15 (28.85)	51 (34.00)	
Strongly disagree	2 (3.92)	0 (0.00)	1 (1.92)	7 (4.67)	
When used as pre procedural mouth rinse, mouthwashes constituting Povidone-iodine (PVP-I) are more efficient in reducing Coronaviruses than Chlorohexidine (CHX) mouthwashes					
Agree	19 (37.25)	0 (0.00)	21 (40.38)	49 (32.67)	0.48
Disagree	1 (1.96)	0 (0.00)	4 (7.69)	7 (4.67)	
Neutral	22 (43.14)	1 (100.00)	22 (42.31)	68 (45.33)	
Strongly agree	9 (17.65)	0 (0.00)	3 (5.77)	25 (16.67)	
Strongly disagree	0 (0.00)	0 (0.00)	2 (3.85)	1 (0.67)	
Increasing pre procedural rinse time results in increased reduction of viral cells.					
Agree	15 (29.41)	1 (100.00)	16 (30.77)	50 (33.33)	0.99
Disagree	3 (5.88)	0 (0.00)	3 (5.77)	9 (6.00)	
Neutral	20 (39.22)	0 (0.00)	23 (44.23)	62 (41.33)	
Strongly agree	12 (23.53)	0 (0.00)	9 (17.31)	26 (17.33)	
Strongly disagree	1 (1.96)	0 (0.00)	1 (1.92)	3 (2.00)	

lower the amount of bacteria and viruses in dental aerosols. A previous randomized clinical trial showed that use of mouth washes considerably decreased the viral load in saliva of COVID-19 affected patients.¹⁹

In the current study most of respondents agreed that aerosols remain suspended in the air for 10 minutes followed by 5 minutes answer. Most of the participants in this study responded that bioaerosols generated after the dental treatment return to baseline

after 2 hours followed by 4 hours. Almost similar results were shown in previous studies.^{18,20} But the recent literature showed that aerosols remain suspended in the air up to nine hours.²¹ Our findings and previous studies showed that dentists are not aware of this alarming situation.

31.89% participants of our study responded that 0.2% povidone iodine is recommended by ADA and CDC for prevention of COVID-19 transmission. But

Table 6: Awareness about aerosols, viral survival, concentration of PVP, and ADA recommendation by qualification

Characteristic	consultant, N = 51 ¹	demonstrator, N = 1 ¹	general practitioner, N = 52 ¹	post graduate trainee, N = 150 ¹	P-Value
Aerosols can travel up- to a distance of 3 feet and remain suspended in the air fo(minutes)					
4	6 (11.76)	0 (0.00)	6 (11.54)	20 (13.33)	0.04
5	17 (33.33)	1 (100.00)	19 (36.54)	38 (25.33)	
7	9 (17.65)	0 (0.00)	4 (7.69)	28 (18.67)	
9	2 (3.92)	0 (0.00)	9 (17.31)	5 (3.33)	
10	17 (33.33)	0 (0.00)	14 (26.92)	59 (39.33)	
Virus can survive on hands, objects and surfaces that have been exposed to infected saliva for up to minutes					
5	22 (43.14)	0 (0.00)	21 (40.38)	67 (44.67)	0.843
6	3 (5.88)	0 (0.00)	3 (5.77)	13 (8.67)	
7	17 (33.33)	1 (100.00)	17 (32.69)	42 (28.00)	
8	5 (9.80)	0 (0.00)	2 (3.85)	8 (5.33)	
9	4 (7.84)	0 (0.00)	9 (17.31)	20 (13.33)	
Bioaerosols generated after the dental treatment return to baseline after (hours)					
2	21 (41.18)	1 (100.00)	18 (34.62)	63 (42.00)	0.051
3	7 (13.73)	0 (0.00)	9 (17.31)	21 (14.00)	
4	17 (33.33)	0 (0.00)	7 (13.46)	30 (20.00)	
5	4 (7.84)	0 (0.00)	2 (3.85)	14 (9.33)	
6	2 (3.92)	0 (0.00)	16 (30.77)	22 (14.67)	
What percentage of PVP-19 (povidone iodine) is recommended by American Dental Association (ADA) and Centre of disease control (CDC) as pre procedural oral rinse against COVID 19?					
0.20%	18 (35.29)	0 (0.00)	18 (34.62)	45 (30.00)	0.896
0.50%	13 (25.49)	1 (100.00)	18 (34.62)	40 (26.67)	
0.70%	8 (15.69)	0 (0.00)	7 (13.46)	22 (14.67)	
0.90%	2 (3.92)	0 (0.00)	2 (3.85)	12 (8.00)	
1%	10 (19.61)	0 (0.00)	6 (11.54)	30 (20.00)	
1.5%	0 (0.00)	0 (0.00)	1 (1.92)	1 (0.67)	
ADA and CDC recommended time to use PVP-1 (povidone iodine) for pre procedural rinse against COVID -19 is					
15 seconds	14 (27.45)	0 (0.00)	9 (17.31)	29 (19.33)	0.741
15 seconds	0 (0.00)	0 (0.00)	1 (1.92)	1 (0.67)	
30 seconds	20 (39.22)	0 (0.00)	29 (55.77)	70 (46.67)	
45 seconds	4 (7.84)	0 (0.00)	2 (3.85)	12 (8.00)	
60 seconds	10 (19.61)	1 (100.00)	10 (19.23)	28 (18.67)	
90 seconds	3 (5.88)	0 (0.00)	1 (1.92)	10 (6.67)	

*Fisher exact test

the recent updated evidence showed that 0.5 % povidone iodine (PVP-I) mouthwash can lower SARS-CoV-2 viral infectivity to below detectable levels in under 30 seconds.²² In our study only 28.35% participants award that 0.5% PVP-I mouthrinse is effective. And 46.85% reported that ADA and CDC recommended time to use PVP-1 (povidone iodine) for pre procedural rinse against COVID -19 is 30 seconds. This shows that most of dental professionals are not aware and updated their knowledge about

ADA and CDC recommendation for mouthwashes.

Our findings showed that the common source of highest levels of bioaerosols was ultrasonic scaling and cavity preparation. These are two common procedures in dentistry which create bioaerosols. Similar results were found in a previous study.¹⁸

Most of the participants of our study were neutral about that Chlorohexidine (CHX) being less effective at reducing coronaviruses than Povidone-iodine

Table 7: Awareness about the bioaerosols level, viral survival on surface, type and mechanism of mouth wash by qualifications

Characteristic	consultant, N = 51 ¹	demonstrator, N = 1 ¹	general practitioner, N = 52 ¹	post graduate trainee, N = 150 ¹	P-Value
The virus remains longer on					
Copper	6 (11.76)	0 (0.00)	0 (0.00)	10 (6.67)	<0.001
Paper	10 (19.61)	0 (0.00)	0 (0.00)	12 (8.00)	
Plastic	22 (43.14)	1 (100.00)	15 (28.85)	68 (45.33)	
Steel	7 (13.73)	0 (0.00)	36 (69.23)	32 (21.33)	
Wood	6 (11.76)	0 (0.00)	1 (1.92)	28 (18.67)	
Mean level of bioaerosols depends on the procedures; highest levels were observed for					
cavity preparation	21 (41.18)	0 (0.00)	0 (0.00)	33 (22.00)	<0.001
Extraction	1 (1.96)	0 (0.00)	0 (0.00)	1 (0.67)	
oral examination	3 (5.88)	0 (0.00)	0 (0.00)	3 (2.00)	
ultrasonic scaling	26 (50.98)	1 (100.00)	52 (100.00)	113 (75.33)	
Which mouthwash do you recommend as pre procedural rinse in routine practice?					
Cetylypyridinium-chloride	2 (3.92)	0 (0.00)	0 (0.00)	2 (1.33)	0.938
Chlorhexidine	39 (76.47)	1 (100.00)	41 (78.85)	115 (76.67)	
Hydrogen peroxide	2 (3.92)	0 (0.00)	3 (5.77)	9 (6.00)	
None	3 (5.88)	0 (0.00)	1 (1.92)	10 (6.67)	
Povidone-Iodine	5 (9.80)	0 (0.00)	7 (13.46)	14 (9.33)	
How PVP-1 destroys viral cells?					
cause oxidation of the mic	0 (0.00)	0 (0.00)	1 (1.92)	1 (0.67)	0.802
Cause oxidation of the microbial cells	7 (13.73)	0 (0.00)	7 (13.46)	26 (17.33)	
Increasing the permeability of the cell wall, causing its lysis	12 (23.53)	0 (0.00)	15 (28.85)	25 (16.67)	
Interfere with the phospholipid bilayer	12 (23.53)	1 (100.00)	8 (15.38)	32 (21.33)	
Penetrates microbes to disrupt proteins and oxidises nucleic acid structures	15 (29.41)	0 (0.00)	14 (26.92)	45 (30.00)	
Penetrating the cell membrane, causing cell components to leak	5 (9.80)	0 (0.00)	7 (13.46)	21 (14.00)	
PVP-I mouth rinse is recommended for healthcare workers exposed to infected patients					
2 times a day	28 (54.90)	1 (100.00)	39 (75.00)	86 (57.33)	0.553
3 times a day	13 (25.49)	0 (0.00)	9 (17.31)	42 (28.00)	
4 times a day	3 (5.88)	0 (0.00)	3 (5.77)	12 (8.00)	
5 times a day	4 (7.84)	0 (0.00)	0 (0.00)	6 (4.00)	
6 times a day	3 (5.88)	0 (0.00)	1 (1.92)	4 (2.67)	

(PVP-I) mouthwash. Previous authors also found similar results.^{18,23} Evidence from systematic review showed that PVP-I is more effective than CHX.²⁴

The null hypothesis proposed was not accepted. Some of the limitations of the study were that we had a smaller sample size so it did not represent the whole dental community of Pakistan. Conducting a survey with more sample size will give a better insight into the need for updating knowledge and practices of dental practitioners. Also there was unequal number of participants from various levels of experience and qualification which can affect the statistical significance, and the use of close ended questionnaire which limits the responses of the participants. So it is recommended that further research of mixed methodology containing both qualitative and quantitative questions on large sample size should be conducted.

CONCLUSION

Our study showed that dental practitioners are less aware regarding recent developments in dental practices' understanding of COVID-19 transmission and prevention. Proper training and education needs to be provided to update their knowledge for professional development and patient care. We had no commercial interest or research grants provided for the study.

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