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Awareness of Dental Practitioners in Jeddah about the Use of Antimicrobial Mouthwash as A Pre-Procedural Measure

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ABSTRACT
This study aimed to assess the knowledge and awareness of dental practitioners in Saudi Arabia Jeddah, about using mouthwash pre procedural to prevent covid 19 transmission in dental clinic. A questionnaire was developed to assess the awareness and knowledge of dental practitioners toward mouthwashes and their relation to prevent (SARS-CoV-2) through online and social media outlets. A total of 500 questionnaires were sent to dental practitioners in Jeddah and 294 were respondent to the questionnaire. Male respondent represent 54.4 % and female were 45.7 %. Overall knowledge and awareness of Covid 19 transmission was consistent across the majority of the dental practitioners. However, correlating the age groups with the following questions demonstrated statistical significance. In conclusion, this study showed significant knowledge regarding awareness of Covid-19 transmission in the dental clinic in Jeddah, Saudi Arabia. However, it also shows the lack knowledge of dental practitioners in using mouthwash and reducing covid 19 using mouthwash.
Key Word: *Mouthwash, Awareness, Knowledge, Dental practitioners*

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I. INTRODUCTION

By the end of December 2019, three patients from the seafood and wet animal wholesale market in Wuhan, China, were admitted to the hospital with unknown pneumonia of unknown cause (1). They identified a new novel beta-corona virus, “CoV 2019," as pneumonia's causative organisms. This novelty was first named the "novel corona virus-infected pneumonia" (NCIP);however, it was subsequently renamed as the SARS-COV-2 (1). The SARS-COV-2 from Wuhan, China, has spread widely and rapidly, resulting in global morbidity and mortality. The World Health Organization (WHO) considered this as a global epidemic, after which most countries took extraordinary precautionary measures and imposed a strict quarantine on their people to reduce the number of cases that have caused pressure on the hospital systems and medical staff. This virus is defined as a severe acute respiratory syndrome corona virus (SARS-CoV-2) infection and it is transmission routes by direct contact to the affected site then to oral, nasal and eye mucous membranes or through sneezing, coughing and droplet inhalation (2, 3, 4).

Corona viruses are a group of enveloped RNA viruses that exhibit a typical structure with a binding protein, the "spike protein – S protein" on the viral envelope facilitates the entry process (5, 6, 7). The fusion between S protein and angiotensin-converting enzyme 2 (ACE2) receptors on numerous host tissue cells (mucosal membranes, gingiva, non-keratinised epithelium, tongue epithelium and salivary glands acini) is responsible for the entry of the virus.8 that may point to possible routes of infection (9,10)

The SARS-CoV-2 virus has been identified in saliva (2),and its presence has even been suggested in periodontal pockets(3) and has been associated with periodontal disease (4,5). These findings imply that transmission of the SARS-CoV-2 virus can be closely connected with saliva interactions and periodontal disease, so suggesting oral tissues area potential reservoir for the spread of the SARS-CoV-2 virus may occur during dental care.

Antiseptic mouthwashes are extensively used as a traditional procedure during routine dental treatment as prophylaxis as numerous studies have asserted that the use of antiseptic mouthwash may control and reduce microorganisms that may cause cross-infection in the dental office due to their presence in oral aerosol resulting in the reduction of the spread of SARS-CoV-2 (6, 7, 8). .However, specific evidence for the awareness amongst dental practitioners and students regarding antiseptic mouth washes reduces the viral load. This paper aims to provide an insight into the awareness of mouthwashes against the SARS-CoV-2 virus before starting treatment to reduce its impact and limit its spread in dental clinics.

II. MATERIALS AND METHODS

STUDY DESIGN

A cross-sectional analytical study was conducted to measure the awareness among dental students and dental practitioners in Jeddah, Saudi Arabia, on the pre-operative use of different prophylactic mouthwashes to reduce coronavirus transmission (SARS CoV-2) September 2020 and February 2021. The anamnesis of the participants consisted of personal information, such as age, gender, and nationality. The student participants were obtained from the four dental colleges in Jeddah: Ibn Sina National College, Al Farabi Dental College, Al Battergi Dental College, and the College of Dentistry at King Abdelaziz University. The practitioner participants were obtained from the various private and public dental clinics in Jeddah.

The participants from these sources who fulfilled the inclusion criteria were invited to answer a self-administered anonymous questionnaire consisting of 15 compulsory close-ended questions in Arabic or English. The questionnaire was divided into two sections: section one demographic profile (n=3); general knowledge about the COVID-19, and mouth washes (n=12)

The app Google form was used to generate the survey form. The prepared forms were sent to students via the team leaders in the various colleges who distributed them to their respective students via WhatsApp. Whereas the participants in the various dental clinics, the questionnaire was given in a paper form to the practitioners willing to participate. In the introduction section of the form, the purpose of the data collection was clearly outlined, and the data collected was for scientific research.

SAMPLE SIZE

An approximate number of total dental students' 4th year and above was obtained from the respective colleges' admission and registration officer and those practising dentistry in Jeddah. Their number was obtained from the Directorate of Medical services Ministry of Health in Jeddah. The sample size calculator Roasoft was used to estimate the sample size, and the total number of participants was calculated to be 300.

STATISTICAL ANALYSIS

The data obtained via google form was first checked, cleaned and coded before being converted to MS excel format and subsequently converted to statistical package for the Social Sciences (SPSS)[1] version 23 for analysis. Descriptive statistics such as mean and standard deviation (SD) for continuous variables and frequency and percentage for categorical variables were determined. The level of significance is set at $p < 0.05$.

ETHICAL CONSIDERATION

Before starting the Ibn Sina National College Research Ethics Committee (ISNCREC) study, ethical clearance was obtained. The ISNCREC did not request a written informed consent form due to a cross-sectional study where no personal identifiers were used. Data collected was coded and locked in a password-protected computer on the candidates' laptop to ensure patient data confidentiality and privacy.

III. RESULTS

A cross-sectional study was conducted at the Faculty of Dentistry of King Abdulaziz University and in the Dentistry Programmes at Ibn Sina National College, Al-Farabi Dental College and Al-Batarji Dental College during the period between October and April 2020-2021 to measure the awareness of dental practitioners in the Kingdom of Saudi Arabia (KSA) about use of mouthwash as a pre-procedural rinse before dental treatment for reduction of COVID-19 transmission.

Two hundred ninety-four participants were recruited through an anonymous self-administered Google form survey and asked 15 questions via WhatsApp. The study (Table 1) demonstrates the age group ofthe respondents.The first age group represents the 20-30 years old and comprises 87.2%, the 31-40 years old comprised of 10.7%, the 41-50 and the 61-70years old comprised of 1%.

According to the nationality, the Saudi's represented the majority (90.5%) of the participants. the Yemeni and Egyptian nationalities comprised.7%, the Syrians comprised 6%, the Jordanians comprised 1.4%, and the American and Palestinian comprised 0.3% (Table 1). The males were the majority (54.3%) of the participants in the study. The females comprised 45.7% (Table 1).

In the study, in response to the question "Are you aware of the high-risk transmission of covid 19 in dental clinics"94.2% of the answers were yes, (Table 2)

However, in response to the question "do you think using mouthwash pre-procedural can reduce the transmission of covid 19, interestingly 44.4% responded with yes. The majority think that mouthwash pre-procedural doesn't reduce the transmission of COVID-19 (Table 3). On the other hand, in response to the ques-

tion "which mouthwash do you recommend," the majority (15.3%) of the respondents stated hydrogen peroxide, then Listerine 7.1%, none scored 1.9%, fluoride with 1.5%. Alcohol, betadine and Povidone all scored 0.7% (Table 4).

Respondents' recommendations of mouthwash as follows Chlorhexidine scored the highest percentage with 39.6% after that non-antiseptic mouthwash with 28%. In response to the question in the study, "*do you use mouthwash pre-procedure in the clinic*"the majority (61.2%) of the respondents said yes to use mouthwash pre-procedural (Table 5), and for the question "*have ever been exposed to a covid 19 patient in your clinic?*"the majority (79%) of the respondents said they didn't interact with a covid-19 patient before (Table 6). In the study, according to the question, do you think using mouthwash pre-procedural is necessary at all? the majority of participants see that is using mouthwash is necessarily by voting 59.5 % Yes and 40.5 % No related to (Table 7).

The answer of the question, do you use mouthwash rinse pre-procedural with all patients or with suspected patients of covid 19 was 53.1% voted to "I don't use mouthwash pre any procedure, 29.9 votes for "With all patients", 16.7% "With suspected patients only", And 3% pre-surgical procedures only (Table 8). In the study, according to question if you use mouthwash pre-procedure, how long do you keep it inside patients' Highest vote 15-30 sec 44.5%, 32.5% voted 30-60 sec, 21.9% 1-2 min, 1.1% voted I don't use mouthwash (Table 9).

In the study, according to the question, when do you prescribe mouthwash? Participants prescribe mouthwash in the following scenarios 46.2% votes on Periodontal inflammation, 24.5% after treatment, 15.3% votes on oral hygiene, 4.8% voted consistently, and 4.4% before treatment and as a prophylactic .4% never prescribed mouthwash (Table 10). According to the question, do you use full concentrated or diluted with water mouthwash in the study? 74.2% use mouthwash diluted, and 25.8% use mouthwash with full concentration (Table 11). Do you think there is any difference between gargle, rinse, and swish mouthwash in the study? 56.8% think there is a difference between gargle, rinse, and swish mouth wash 43.2% think there is no difference (Table 12), and question: What do you advise, rinse or swish mouthwash? Respondent advice 52.1% Rinse and 36.9% Gargle, 11% Swish (Table 13).

The Chi-Square Test was used in these correlations. The correlating age group with gender demonstrated no statistical significance. Similarly, correlating the age groups with nationality also demonstrated no statistical significance. Correlating the age groups with the following questions demonstrated no statistical significance.

Table 1: Demographic data of the study population

Demographic data	N	Frequency	Percent
Age Groups	289		
• 20-30		252	87.2
• 31-40		10.7	31
• 41-50		1.0	3
• 61-70		1.0	3
Gender	293		
• Female		134	45.7
• Male		159	54.3
Nationality	294		
• American		1	.3
• Egyptian		2	.7
• Jordanian		4	1.4
• Palestinian		1	.3
• Saudi Arabian		266	90.5
• Syrian		18	6.1
• Yemen		2	.7

Table 2: Are you aware of the high risk of transmission of covid 19 in dental clinics?

	N=293	Frequency	Percent
No		17	5.8

Yes	276	94.2

Table 3: Do you think using mouthwash pre-procedural can reduce the transmission of covid 19

		Frequency	Percent
No	**N=294**	163	55.6
Yes		139	44.4

Table 4: Which mouthwash do you recommend using?

		Frequency	Percent
Alcohol	**N=294**	2	0.7
Antiseptic Mouthwash		1	0.4
Betadine		2	0.7
Chlorhexidine		106	39.6
Different marks		7	2.6
Fluoride		4	1.5
Hydrogen Peroxide		41	15.3
Listerine		19	7.1
Non-Antiseptic mouth-wash		75	28
None		5	1.9
Povidone		2	0.7

Table 5: Do you use mouthwash pre-procedure in the clinic?

	N=294	Frequency	Percent
No		180	61.2
Yes		114	38.8

Table 6: Have you ever been exposed to a covid 19 patient in your clinic?

	N=294	Frequency	Percent
No		234	79.6
Yes		60	20.4

Table 7: Do you think using mouthwash pre-procedural is necessary at all?

	N=294	Frequency	Percent
No		119	40.5
Yes		175	59.5

Table 8: The use of mouthwash rinse pre-procedural with all patients or with suspected patients of covid 19

	N	Frequency	Percent
I don't use mouthwash pre any procedure	294	156	53.1
Especially pre-surgical procedures		1	.3
With all patients		88	29.9
With suspected patients, only		49	16.7

Table 9: If you use mouthwash pre-procedure, for how long do you keep it inside your mouth.

	N=274	Frequency	Percent
15-30 sec		122	44.5
30-60 sec		89	32.5
1-2 min		60	21.9
I don't use		3	1.1

Table 10: When do you prescribe mouthwash?

	N=249	**Frequency**	**Percent**
After treatment		61	24.5
Always		12	4.8
Before treatment		11	4.4
Never		1	.4
Oral hygiene		38	15.3
Periodontal inflammation		115	46.2
Prophylactic		11	4.4

Table 11: Do you use full concentrated or diluted with water mouthwash'.

	N=291	**Frequency**	**Percent**
Diluted		126	43.2
Full concentration		166	56.8

Table 12: Do you think there is any difference between gargle, rinse and swish mouthwash?

	N=292	**Frequency**	**Percent**
No		126	43.2
Yes		166	56.8

Table 13: The used gargle, rinse or swish mouthwash

	N=290	Frequency	Percent
Gargle		107	36.9
Rinse		151	52.1
Swish		32	11.0

Table 14: Correlation of age groups according to gender

	Female		**Male**		**P-value**
	N	%	N	%	
20-30	120	41.5	132	45.7	
31-40	11	3.8	20	6.9	0.81
41-50	0	0	3	1	
51-60	0	0	0	0	
61-70	0	0	3	1	

Table 15: Correlation of age groups according to nationality

	American		**Egyptian**		**Jordanian**		**Palestinian**		**Saudi Arabian**		**Syrian**		**Yemen**	
	N	%	N	%	N	%	n	%	N	%	N	%	N	%
20-30	1	0.3	2	0.7	4	1.4	1	0.3	226	78.2	16	5.5	2	0.7
31-40	0	0	0	0	0	0	0	0	29	10	2	0.7	0	0
41-50	0	0	0	0	0	0	0	0	3	1	0	0	0	0
51-60	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61-70	0	0	0	0	0	0	0	0	3	1	0	0	0	0

Table 16: Correlation of age groups according to question Do you think using mouthwash pre prcedural can reduce the transmission of covid 19

	Yes		**No**	
	N	%	N	%
20-30	236	81.9	15	5.2
31-40	31	10.8	0	0
41-50	3	1	0	0
51-60	0	0	0	0
61-70	2	0.7	1	0.3

Table 17: Age Groups * Are you aware of the high risk of transmission of covid 19 in dental clinics?

	Yes		**No**		**P-value**
	N	%	N	%	
20-30	236	81.9	15	5.2	0.090
31-40	31	10.8	0	0	
41-50	3	1	0	0	
51-60	0	0	0	0	
61-70	2	0.7	1	0.3	

Table 18" Age Groups * Do you think using mouthwash pre-procedural can reduce the transmission of covid 19

	Yes		No		P-value
	N	%	N	%	
20-30	108	37.5	144	50	0.173
31-40	15	5.2	15	5.2	
41-50	3	1	0	0	
51-60	0	0	0	0	
61-70	2	0.7	1	0.3	

Table 19 A: Age Groups * Which mouthwash do you recommend using?

	Alcohol		Antiseptic mouthwash		Betadine		Chlorhexidine		Different marks		Fluoride	
	N	%	N	%	N	%	N	%	N	%	N	%
20-30	2	0.8	1	0.4	2	0.8	87	32.7	4	1.5	3	1.1
31-40	0	0	0	0	0	0	16	15.1	1	16.7	1	25
41-50	0	0	0	0	0	0	0	0	3	1	0	0
51-60	0	0	0	0	0	0	0	0	0	0	0	0
61-70	0	0	0	0	0	0	0	0	3	1	0	0

Table 20 A: Age Groups * Which mouthwash do you recommend using?

	Hydrogen peroxide		Listerine		Non-antiseptic mouthwash		None	Povidone		Sodium hydroxide	
20-30	N	%	N	%	N	%	N	N	%	N	%
31-40	33	12.4	17	6.4	71	26.7	5	2	0.8	3	1.1
41-50	8	19.5	0	0	4	1.5	0	0	0	1	0.4
51-60	0	0	0	0	0	0	0	0	0	0	0
61-70	0	0	0	0	0	0	0	0	0	0	0
20-30	0	0	0	0	0	0	0	0	0	0	0

Table 21: Age Groups * Do you use mouthwash pre-procedure in the clinic

	Yes		No		P-value
	N	%	N	%	
20-30	94	32.5	158	54.7	0.103
31-40	15	5.2	16	5.5	
41-50	0	0	3	1	
51-60	0	0	0	0	
61-70	1	0.3	2	0.7	

Table 22: Age Groups * Have you ever been exposed to a covid 19 patient in your clinic?

	Yes		No		P-value
	N	%	N	%	
20-30	48	16.6	204	70.6	0.003
31-40	9	3.1	22	7.6	
41-50	3	1	0	0	
51-60	0	0	0	0	
61-70	0	0	3	1	

Table 23" Age Groups * Do you think using mouthwash pre-procedural is necessary at all?

	Yes		No		P-value
	N	%	N	%	0.497
20-30	148	51.2	104	36	
31-40	17	5.9	14	4.8	
41-50	3	1.8	0	0	
51-60	0	0	0	0	
61-70	2	1.2	1	0.8	

Table 24: Age Groups * Do you use mouthwash rinse pre-procedural with all patient or with suspected patients of covid 19

	I don't use mouthwash pre any procedure		No,especiallypre surgical procedures		With all patients		With suspected patients, only	
	N	%	N	%	N	%	N	%
20-30	183	74.8	1	0.3	77	26.6	36	12.5
31-40	14	4.8	0	0	7	2.4	10	3.5
41-50	0	0	0	0	0	0	3	1
51-60	0	0	0	0	0	0	0	0
61-70	1	0.3	0	0	2	0.7	0	0

Table 25: Age Groups * When do you prescribe mouthwash?

	After treat-ment		Always		Before treatment		Never		Oral hygiene		Periodontal inflammation		Prophylactic	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
20-30	47	19.1	11	4.5	9	3.7	1	0.4	30	12.2	109	44.3	6	2.4
31-40	11	4.5	0	0	1	0.4	0	0	7	2.8	4	1.6	5	2
41-50	2	0.8	0	0	0	0	0	0	1	0.4	0	0	0	0
51-60	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61-70	0	0	1	0.4	1	0.4	0	0	0	0	0	0	0	0

Table 26: Age Groups * Do you use full concentrated or diluted with water mouthwash

	Diluted		Full concentration		P-value
	N	%	N	%	0.557
20-30	189	66.1	60	21	
31-40	20	7	11	3.8	
41-50	2	0.7	1	0.3	
51-60	0	0	0	0	
61-70	2	0.7	1	0.3	

Table 27: Age Groups * Do you think there is any difference between gargle, rinse and swish mouthwash?

	Gargle		Rinse		Swish		P value
	N	%	N	%	N	%	0.235
20-30	93	32.6	124	43.5	31	10.9	
31-40	11	3.9	20	7	0	0	
41-50	1	0.4	2	0.7	0	0	
51-60	0	0	0	0	0	0	
61-70	2	0.7	1	0.4	0	0	

IV. DISCUSSION

During 2020, the transmission of COVID-19 exceeded expectations and imposed a considerable amount of pressure on the health sectors worldwide. Indeed, this pressure has not declined until today in some countries, which are still battling this horrific disease, and where strict infection control measures have to firmly be followed and considered for the sake of stopping the transmission and controlling this virus.

However, the COVID-19 virus is still spreading rapidly throughout the globe, and when it comes to dentistry, the situation is more challenging. Airborne droplets and aerosols have been identified as the main route for transmission of the disease (9), and many changes to pre-procedural protocols have been introduced to the dental field to reduce the transmission.

Mouthwashes are one of the pre-procedural protocols though more protection protocols should be considered to control the transmission. Dentists are still in the highly susceptible group category, and all precautionary measures need to be followed to prevent the dissemination of COVID-19 to the dental office personnel or patients. Accordingly, and to the best of our knowledge, this study is the first cross-sectional survey that has been conducted to evaluate the knowledge of the dental practitioners of Jeddah, Saudi Arabia, about using mouthwash as a pre-procedural. Based on an electronic questionnaire, the study's findings reflect the current infection control standard and level of awareness among dental practitioners in Jeddah regarding covid-19 transmission. Five hundred electronic survey forms (ESF) were sent to the dental practitioners (general dentists, interns, specialists and consultants) in Jeddah, and 294 responses have been received, a 58.8% response rate. This figure was attained because following the easing and the final lifting of the lockdown. The study team visited the practitioners in their dental clinics to persuade them to respond if they have not responded. In addition, it's because the survey was done exclusively in Jeddah, and a more significant number of the dental society have joined this speciality in recent years.

The response rate compared to other studies is comparatively high. The study done by Tarkaji *et al.* reported a response rate of 28.2% (10). The authors attributed these results to the extensive dissemination throughout Saudi Arabia of their ESF. Another study by Shahin *et al. [3]* also reported a response rate of 21.7% among dental practitioners in all Saudi Arabia because some of the questionnaires were incomplete. Those with more than one missing answer were excluded from the analysis (11).

Al Baker *et al.* mentioned [4] that almost 70% of the licensed dentists in Saudi Arabia are concentrated in three main regions; Riyadh, Makkah, and Eastern (12). The total number of licensed dentists working in the Kingdom as of December 2016 was estimated to approximately 16887 dentists, and the vast majority (70.27%) are registered as general dentists. Furthermore, over 80% of the registered dentists are Saudi. This figure is reflected by a greater number of Saudi dentists participating in the study (12).

This study shows higher participation from male dentists than females because dentists in Saudi Arabia are (61.06%) males (12). Also, males seemed to be more willing to participate in online surveys, and the number of male dentists working in dental clinics was more than females. Another possible reason is that the females were more involved on the Homefront during the lockdown period as coaching and supervision of their children's education were online. However, Tarakji *et al.* mentioned that female dentist participated in his survey questionnaire were more than males because of general dentists among professionally registered female dentists was significantly higher than their male counterparts (79.71% versus 64.80%) (10).

The study demonstrated that the age from 20-30 scored the highest participation, and the younger age group are more involved in social media platforms and more willing to answer online surveys. Indeed, many of those who have joined dentistry in recent years may also explain the high number of younger dentists that responded to this survey (10). Regarding the awareness of COVID-19 transmission, results showed a significant knowledge of the high-risk transmission of COVID-19 among dental practitioners, and this can be attributed to the Ministry of Health (MoH) and the Saudi Commission of Health Specialists (SCHS) efforts of publishing strict infection control measures in hospitals and health centres in addition to spreading awareness among dental and health practitioners.

In response to the participants' preference, the majority recommended chlorohexidine and Chlorohexidine as the gold standard mouthwash worldwide (9). Chlorohexidine affects the enveloped viruses' lipid coat, such as influenza A, herpes virus, and hepatitis B, and COVID-19 is an enveloped virus. However, Vergara *et al.* mentioned evidence of an in vitro effect against enveloped viruses chlorohexidine has little to no effect on COVID-19 compared to other mouthwashes (9). In another study, Yoon *et al.* found SARS-COVID-19's suppression for two hours after using 15ml 0.12% chlorohexidine, suggesting that its use would be beneficial for controlling COVID-19 transmission (13).

Another study conducted by Moosavi *et al.* (14) mentions that chlorohexidine is a broad-spectrum antiseptic that acts against Gram-positive and Gram-negative bacteria, aerobes, facultative anaerobes(14), and fungus by increasing the permeability of the bacterial cell wall, causing its lysis. Previous studies have also shown that chlorohexidine is the most significant effect against covid patients (14). The second highest response from

the participants is antiseptic mouthwash which clearly shows a lack of knowledge of differentiation among mouthwashes, and they were loose to specify a reasonable answer.

Although many of the participants recommended rinsing followed by gargling, however, there is no actual evidence that supports rinsing to gargling. However, Vergara has recommended gargling pre-procedural for 30 sec (1); Ahmad *et al.* mentioned a critical point that most dentists did not ask patients to rinse the mouth with mouthwash before dental treatment despite their knowledge of reducing the transmission (15). Most of the respondents prescribed mouthwash in periodontal disease cases. Periodontal disease is a general term of chronic inflammation of the gingiva triggered by bacterial microorganisms and plaque biofilm. Hence the mouthwash has two effects bactericidal and bacteriostatic but needs a sufficient contact time with microorganisms to act. A study conducted by Sonam *et al.* mufti confirms that most of the uses of mouthwash are related to periodontal inflammations and gingival inflammations (16).

V. CONCLUSIONS

In general, this study shows significant knowledge regarding awareness of COVID-19 transmission in the dental clinics in Jeddah, Saudi Arabia. However, it also shows the lack of knowledge of dental practitioners on using mouthwash pre-procedurally and reducing COVID-19 using mouthwashes. The study also noticed that the practitioners have difficulty differentiating between the various types of mouthwash.

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