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Original Research

Knowledge and conduct of dental students about mouthwash prior to dental procedures amid the COVID-19 pandemic

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The coronavirus disease 2019 (COVID-19) generated an unusual condition around the world, affecting the essentials of clinical practice in dentistry. **Aim:** The purpose of this survey was to determine dental students' conduct and knowledge regarding using pre-procedural mouthwashes. **Methods:** A cross-sectional study was undertaken for 148 undergraduate dental students at the Dental College/University of Mosul using an online questionnaire. participated in this survey, where 36.5% were female and 63.5% were male, and The survey format had 12 questions delivered to participants, and the replies were statistically analyzed. The data were imported and analyzed using SPSS software (version 22). **Results:** The current study found that 59.5% of participants thought pre-procedural mouthwash was helpful in preventing COVID-19 infections in dental settings, while 40.5% of participants believed that it is not, and for the most effective mouthrinse against COVID-19, 48.6% of participants said chlorhexidine for 30 seconds, while 51.4% said chlorhexidine for 60 seconds. **Conclusions:** Dental students are conscious of the value of pre-procedural mouthwash but need more clarity on the correct concentration, amount, and duration.

Keywords: COVID-19. Dentistry. Mouthwashes.

Introduction

Coronavirus outbreaks for SARS-CoV, MERS-CoV, Additionally, the more modern 2019-n CoV, also known as COVID-19, have been recorded since 2002. According to the World Health Organization, the current COVID-19 pandemic is a worldwide health crisis. Since then, it has been shown that respiratory droplets exorcised by an infected individual are the major mode of disease transmission, putting people at risk of infection[1]. According to research, COVID-19 spread can also happen through fomite transfer or contacting infected surfaces and inanimate items[2].

SARS-CoV-2 is the virus that causes COVID-19, which is described by the World Health Organization as an airborne infection spread by patients who are asymptomatic, pre-symptomatic, and symptomatic by infected droplets and aerosols[3,4]. COVID-19 was a pandemic that affected millions of individuals worldwide, and the basic dynamics of clinical dentistry were being changed. Dental practitioners and support staff are particularly at risk for infection due to the emergence of novel strains and a rise in cases. Asymptomatic patients have been discovered as probable carriers of the illness, further spreading the virus and complicating infection therapy. The importance of the oral cavity in COVID-19 is not well understood[5].

According to the findings, the mouth is a vital location for COVID-19 infection, and saliva is identified as a probable path of transmission. As a result, ultrasonic scalers and high-speed aerators produce and distribute microbe-filled aerosols with a diameter of 0.2 to 2.0 meters into the dental clinic. These particles may travel up to 3 feet (1 meter) in the air and linger suspended for 10 minutes, endangering the health of dental staff members and possibly transmitting infection[6,7].

The possibility for viral transmission was observed in saliva from asymptomatic COVID-19 patients. Effective policies to deactivate these viruses must be prioritized to reduce cross-infections in dental settings[8]. Mouthwashes can reduce the viral load[9].

Studies have revealed that mouthwashes like hydrogen peroxide, chlorhexidine, and cetylpyridinium-chloride have virucidal effects by dissolving the virus's lipid membranes, therefore pre-procedural mouthrinses may offer a solution to the problem[7,10].

Chlorhexidine oral rinses have gained a lot of attention for their ability to reduce COVID-19 in saliva[11]. Povidone-iodine breaks down into free iodine, which can disrupt the virus's cell membrane and change its metabolic route, causing irreparable damage[12]. The oxygen-free radicals in hydrogen peroxide damage a virus's lipid membrane[13].

The objective of this study is to assess dental undergraduate students' knowledge and conduct about the use of pre-procedural mouthwashes during the COVID-19 pandemic at the Dental College, University of Mosul.

Material and Methods

Study design

The scientific committee/department of Dental Basic Science/College of Dentistry/ University of Mosul authorized this study under the U.O.M. license with reference

number (UoM.Dent/ H.7/ 22). This research-based cross-sectional study was started on 15/12/2021 for four months duration, and the questionnaire was 3 weeks in duration starting from 15/1/2022. An online survey was used as part of the study among dental undergraduate students at the Dental College, University of Mosul.

Questionnaire development and pre-testing

The online mode was chosen for the survey as it is time-saving, and a majority of the student population can be covered[14]. After ethical approval, the questionnaire was posted online on the Google Forms platform and submitted to a pre-test carried out with 15 graduate dental students to assess the clarity, writing, organization, and internal consistency of questions. Students were instructed to answer the questionnaire, record the time to complete it, and then fill in a clarity scale for each question from 1 (not clear) to 5 (very clear)[15]. After the evaluation, 3 questions with a rating ≤4 were discussed among the researchers and were edited later. The questions together obtained an average clarity score of 4.70 (0.47). In addition, the mean response time to complete the questionnaire was 10 (2) minutes. The validity of the questionnaire, in this study is not aimed.

Questionnaire content

A 12 point validated questionnaire was posted for the online survey using Google Forms. The participants were given a thorough explanation of the study's goal, and the questionnaire was filled out with their agreement. The questionnaire contained questions about gender, age, studying class (4th or 5th), and other questions demonstrated in Table 4.

Participants and sample size

The sample size is 148 Participants who answer all the 12 points in the questionnaire, divided into 86 from the 4th class & 62 from the 5th class of dental students. The requested sample size was calculated using the Roasoft[16] online sample size calculator (margin error 5%, confidence level 95%, and the total number of dental students in the 4th and 5th classes were 231). The participants received the questionnaire by institutional student e-mail after taking an agreement from the Dental College.

Statistical analysis

SPSS software version 22 was used to perform the statistical test for the analysis; measure the frequency and percentage to comparison between the variables.

The variables included gender (female or male), Age was collected in years and categorized into ranges of (22-23 years, 24-25 years, and 26-27 years), and in which class of studying (4th or 5th).

Results

The survey drew 148 students, 36.5% of whom were female and 63.5% of whom were male as demonstrated in Figure 1(a) and Table 1. In this survey, 58.1% were 4th class & 41.9% were 5th class dental students, as shown in Figure 1(b) and Table 2. Their

age groups were 51.4% between 22-23 years, 29.1% between 24-25 years, and 9.5% between 26-27 years as shown in Figure 1(c) and Table 3.

About 93.2% of participants were conscious of the fact that in a dental environment, as shown in Figure 1(d) and Table 4 (no.1), infection is mostly spread via the aerosols and respiratory droplets created amid dental procedures.

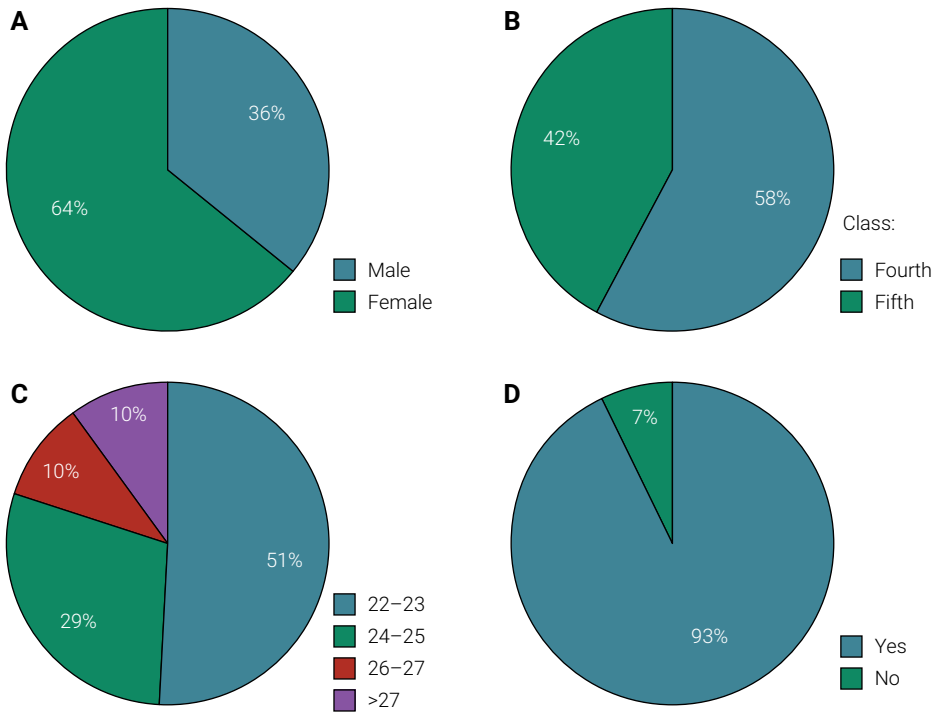

Figure 1. (a) gender percentage, (b): Class percentage, (c): age groups (year) percentage, (d): percentages of awareness of the transmission of COVID-19 among students (mainly via respiratory droplets and aerosols during a dental procedure).

Table 1. Gender percentage

Gender	Frequency	Percentage
Male	54	63.5
Female	94	36.5

Table 2. Class percentage

Class	Frequency	Percentage
Fourth	86	58.1
Fifth	62	41.9

Table 3. Age groups percentage.

Age (Year)	Frequency	Percentage
22 - 23	76	51.4
24 – 25	43	29.1
26 – 27	14	9.5
< 27	15	10.0

As shown in Figure 2 (a) and Table 4 (No. 2), 29.7% of participants in this survey indicated that the SARS-CoV-2 virus can survive in suspended aerosols for up to three hours and up to 72 hours, while 40.6% of participants indicated that the virus can survive in suspended aerosols for up to 24 hours.

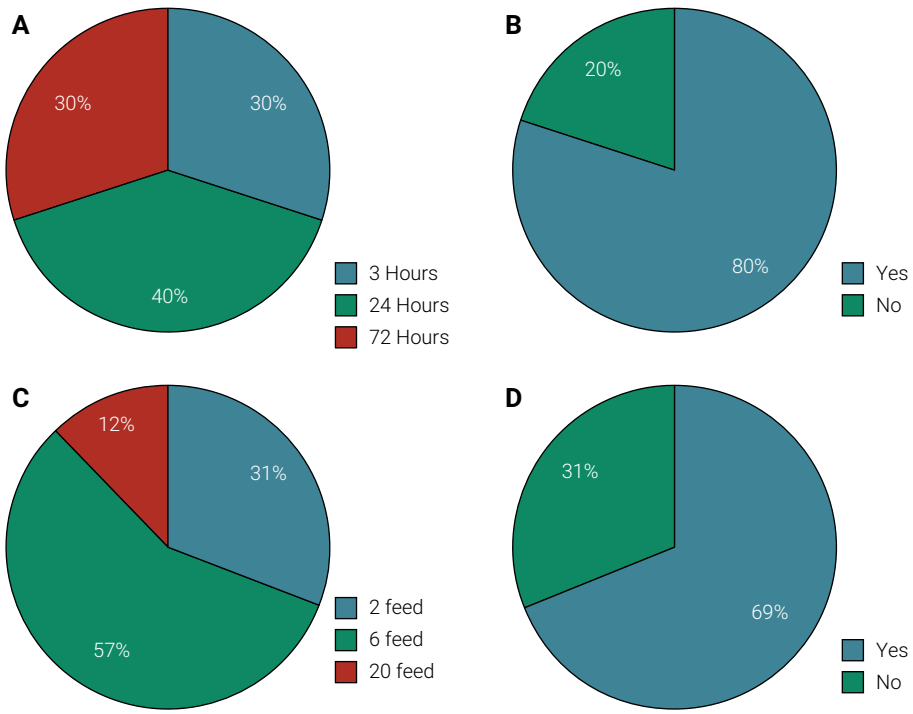

Figure 2. (a) percentages of students who answer about how long COVID-19 remains viable in suspended aerosols, (b) the percentage of awareness that ultrasonic, sonic speed handpiece instrumentation causes the highest incidence of particle transmission, (c) the percentage of awareness that the capacity of aerosols to spread, (d) percentage of awareness on the effectiveness of pre-procedural mouthwash against the bacterial and viral load in dental aerosols.

Table 4. Questioner table.

No.	Questioner	Response	Frequency	Percentage
1	students answer about awareness of the transmission of COVID-19 among students (during a dental procedure, usually by breathing droplets and aerosols)	Yes	138	93.2
		No	10	6.8
2	Students answer about how long COVID-19 in dispersed aerosols, continues to be viable	3 Hours	44	29.7
		24 Hours	60	40.6
		72 Hours	44	29.7
3	Students are asked if they are aware that the handpiece instruments used with ultrasonic and sonic speed procedures have the highest rate of particle transfer.	Yes	118	79.7
		No	30	20.3
4	Students respond to questions concerning their knowledge of the spread ability of aerosols.	2 feet from the dentist's chair	46	31.1
		6 feet from the dentist's chair	85	57.4
		20 feet from the dentist's chair	17	11.5
5	Students respond when asked whether they are aware of pre-procedural mouthwash's usefulness in reducing bacterial and virus loading in dental aerosols.	Yes	102	68.9
		No	46	31.1
6	Students answer about awareness of the most-effective pre-procedural mouthwash against COVID-19	Chlorhexidine for 30 seconds	72	48.6
		Chlorhexidine for 60 seconds	76	51.4
7	Students respond to a question concerning their understanding of other people's behavior about the viability of pre-procedural mouthwash as an infection prevention strategy against COVID-19 in dentistry settings.	Yes	88	59.5
		No	60	40.5
8	Students respond to questions about patient knowledge of Covid-19 transfer by aerosol inhalation in dental procedures.	Yes	110	74.3
		No	38	25.7
9	Students answer about awareness of practices regarding the education of patients about COVID-19	Yes	118	79.7
		No	30	20.3

As shown in Figure 2(b) and Table 4 (no. 3), 79.7% of the participants knew that the procedures that resulted in the highest incidences of particle transmission were those involving ultrasonic, sonic, and high-speed handpiece instrumentation. However, 20.3% of the participants were unaware of this information. Concerning the ability to propagate aerosols, As shown in Figure 2(c) and Table 4 (no. 4), 31.1% of participants said that aerosols could travel to a distance of 2 feet from the dentist's chair, 57.4% said that they could travel to a distance of 6 feet, and 11.5% said that they could disseminate to a distance of 20 feet.

According to Figure 2(d) and Table 4 (number 5), 68.9% of participants were knowledgeable that using mouthwash prior to dental procedures can greatly reduce dental aerosol microbes load and only 31.1% were not. As shown in Figure 3 (a) and Table 4 (no. 6), 48.6% of participants said chlorhexidine for 30 seconds, while 51.4% said chlorhexidine for 60 seconds, when asked which mouthwash was the most effective against COVID-19. These responses imply that the participants were adequately informed about the method of Covid-19 transmission in dental circumstances, but more information about the various mouthrinses, their concentrations, the length of time they should be used, and their efficacy against the virus needs to be provided.

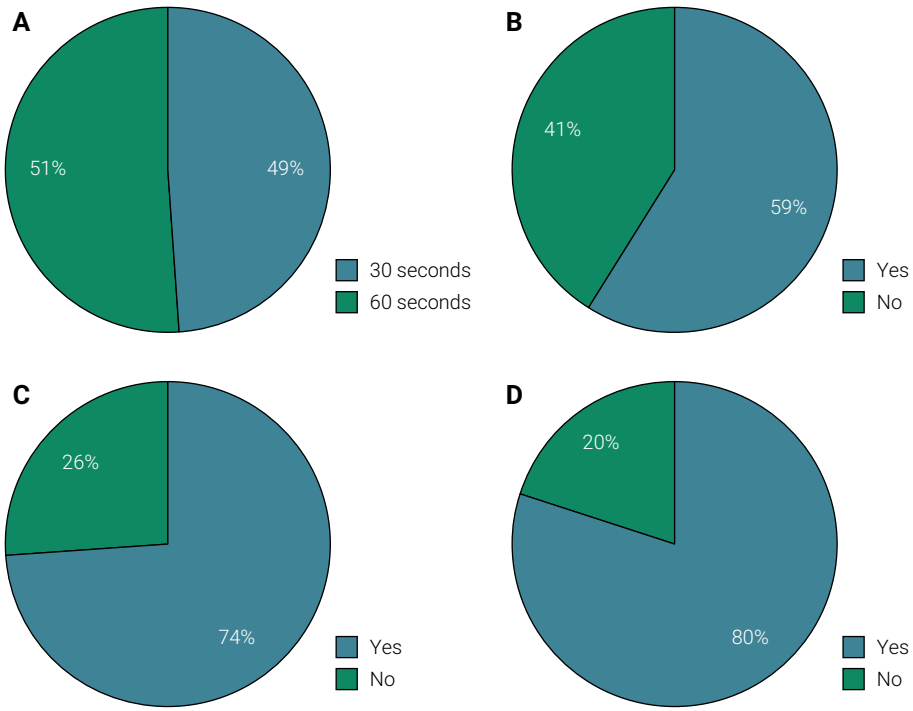

Figure 3. (a) Percentage of awareness on the most-effective pre-procedural mouthwash against COVID-19, (b): Are you aware of the attitude of the participants regarding the effectiveness of pre-procedural mouthwash as an infection control measure against COVID-19 in dental settings 148 responses?, (c) Percentage of awareness of the attitude of the patients regarding the transmission of COVID-19 through aerosol inhalation in the dental setting, (d) the percentage of awareness of practices regarding the education of patients about COVID-19.

According to the results of the current study, 59.5% of participants agreed that pre-procedural mouthwash is an effective infection prevention tool against COVID-19 in the dental context, as indicated in Figure 3(b) and Table 4 (no. 7), while 40.5% disagreed.

The present study showed that 74.3% of the participants believed that transmission of COVID-19 through aerosol inhalation in dental settings is high and 25.7% of participants believed that it is not as shown in Figure 3(c) and Table 4 (no. 8).

According to Figure 3(d) and Table 4(no. 9), 79.7% of the study participants' practices involved educating their patients on Covid-19 disease and its transmission.

The contagiousness of saliva from pre-symptomatic and asymptomatic people with COVID-19 has been proven in research. These findings show that emitted oral droplets carrying infectious viruses and infected cells might be a source of COVID-19 airborne transmission.

Discussion

In this survey, The vast majority of students' answers about awareness of the transmission of COVID-19 among students were These findings were in line with earlier KAP studies by Al-Mawari et al.[17], 2020, which focused mostly on respiratory droplets and aerosols during a dental operation.

For students' answers about how long COVID-19 remains viable in suspended aerosols, about one-third of the answers were for both 3 hours and 72 hours, and the remaining participants replied that the SARS-CoV-2 virus may survive in dispersed aerosols for up to 24 hours. Van Doremalen et al.[18], 2020, has been reported SARS-CoV-2 virus survives for 3 hours in aerosols, but it is more stable in the droplet form, on plastic, copper, and glass, with times reaching 72, 4, 24, and 84 hours, respectively. However, several additional characteristics, such as large upper respiratory viral loads and the ability of COVID-19-infected persons to spread disease in the asymptomatic period, may explain the COVID-19 greater epidemiological sustainability[19].

According to Fitzpatrick et al.[20], 2020, SARS-CoV-2 might survive and retain infectivity for up to 16 hours in repairable-sized aerosols. Sullivan *et al.* 2011, found viable SARS-CoV-2 in air sampled from COVID-19 patients in hospital wards, this is in line with the detection of airborne SARS-CoV-2 RNA in patient areas[21]. These findings imply that, under perfect circumstances, SARS-CoV-2 might persist in aerosols for a long period and spread through them[22,23].

For pathogen-bearing droplets of large size, the answer from more than half of the participants was that aerosols may travel up to 6 feet from the dental chair, according to Zhu et al.[24] (2020) and Centers for Disease Control and Prevention and Prevention[25] (2020), during sneezes, the huge droplets may travel for around 7-8 meters, and during coughs, they can travel for more than 2 minutes (about 6 feet). Another study by Imran *et al* in 2021 explains that aerosols created during dental treatments have a 3 feet (1 m) maximum dispersion and can linger floating in the air for 10 minutes[26].

In conclusion, it is clear from this survey that dental students are mindful of the potential importance of preprocedural mouthrinse for successfully preventive measures against COVID-19 transmission in dental settings, though continuing education programs can provide further information regarding the most effective mouthrinse in the correct concentration, amount, and duration. They did, however, exhibit good conduct and an adequate level of practice, as they followed standards set by numerous international and national health organizations.

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Conflict of Interest

The authors have no conflict of interest to disclose.

Data availability

Datasets related to this article will be available upon request to the corresponding author.

Author Contribution

Faehaa Azher Al-Mashhadane: established the study concept and design, acquisition of data, and interpretation of data

Leqaa H. Qibi: established the study inquiries, planned and implemented the study, handled and evaluated the results, aided in writing conclusions, wrote the first draft of the paper, completed the article, formulation the study inquiries, designed the study, and the results writing, as well as in reading and approval of the article.

Faris Ghanim Ahmed Al-Taee: handled statistical analysis and study supervision.

All authors participated in the manuscript's findings and have revised and approved the final version of the manuscript.

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