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Knowledge About COVID-19 and Perception of Health Safety
Among Mexican Dental Students

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Conocimiento sobre COVID-19 y percepción de seguridad en la
salud de estudiantes mexicanos de odontología

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ABSTRACT: This study aimed: 1) to investigate sources of information used by students to learn about COVID-19, 2) to investigate levels of knowledge about COVID-19 and about conditions for the treatment of patients during the COVID-19 lockdown, and 3) to evaluate students' perceptions of safety regarding their return to in-person activities at the School of Dentistry. Dental students answered a questionnaire (29 items; n=371) that explored the aims of the study, based on a Likert scale (Cronbach's alpha, 0.778). Data were tested with the Mann-Whitney U test and Kendall's Tau-c. Dental students received information about COVID-19 from the Mexican Health Ministry as their first source (45.28%). Students had good knowledge about the main characteristics of

COVID-19, and 59.3% of students had excellent knowledge about the factors relevant to dental treatment of patients. Half of the students said they felt safe regarding a possible return to in-person activities at the dental school, while the other half did not. Statistically significant differences were noted between the students' scholar year and their level of knowledge ($P < 0.001$) and between their perception of safety (very unsafe, unsafe, safe, and very safe) and scholar year ($P = 0.000$). Dental students had good knowledge about COVID-19 and about the dental care for patients during the lockdown. Half of the dental students felt unsafe about a possible return to in-person school activities.

KEYWORDS: COVID-19; Cross-sectional study; Dental students; Knowledge; Perception.

RESUMEN: Los objetivos del estudio fueron 1) investigar que fuentes de información usaron los participantes para conocer sobre la COVID-19, 2) evaluar cuál es el nivel de conocimiento que tienen sobre COVID-19 y la atención a pacientes durante la contingencia, y 3) evaluar la percepción de seguridad sobre el regreso a actividades presenciales en la facultad. Estudio transversal. Se aplicó un cuestionario en línea (29 ítems; $n = 371$) que exploró cada objetivo e incluyó una escala de Likert (Alfa de Cronbach de 0.778). Los datos fueron analizados con las pruebas de U de Mann Whitney y con Tau-c de Kendall. La mayoría de los participantes obtuvieron información sobre la COVID-19 a través de la Secretaría de Salud (45.28%), tuvieron un conocimiento bueno sobre las generalidades de la COVID-19 y el 59.3% tuvo un conocimiento excelente sobre la atención a pacientes. La mitad de los encuestados tuvo una percepción de inseguridad en un posible regreso a actividades en la facultad. Hubo diferencia estadística significativa para la asociación entre año escolar y grado de conocimiento ($p < 0.001$) y entre la percepción en la seguridad en el regreso a actividades (muy inseguro, inseguro, seguro y muy seguro) y el grado escolar ($P = 0.000$). Los participantes tuvieron buen conocimiento sobre las generalidades de la COVID-19 y sobre la atención a pacientes en situación de contingencia. La mitad de los EO sienten inseguridad sobre un posible regreso a actividades.

PALABRAS CLAVE: Conocimiento, COVID-19; Estudiantes de odontología; Estudio transversal; Percepción.

INTRODUCTION

The SARS-COV-2 virus causes COVID-19 disease, which is transmitted by saliva droplets or oral aerosols (1). Aerosols might be micro-droplets of saliva; indeed, saliva is a main transmission factor for COVID-19. Dentists and dental students (DS) are at high risk for COVID-19 because their clinical activities involve contact with saliva (2,3).

Dentists and DS must know about the etiology, signs, and symptoms of COVID-19 as well as its transmission mode (4). Several studies have reported that dentists knew about COVID-19 and its impact on dentistry, but that their knowledge varied from poor to good (4-7).

COVID-19 has also affected the lives of DS, who have had to study dentistry with online

courses during the lockdown, without the customary in-person practical and clinical activities at the dental school (8,9). Dental schools around the world have been attempting to return to in-person clinical activities, first by exploring the levels of DS knowledge of COVID-19 and, second, by exploring the students' perception of safety in returning to in-person clinical activities (10-12). In India, a study found that DS had mid-level knowledge about COVID-19 and a perceived risk of getting it linked to their limited knowledge of the disease (11). In Saudi Arabia, a study found that DS reported stress because of their return to in-person activities at the dental school (12). A study in Brazil found that DS had a high level of knowledge of COVID-19, but that they were unable to identify some clinical signs of the disease (10). Also, the study found that 32.6% of the DS were worried because of their return to in-person activities at the dental school (10). Indeed, DS knowledge about COVID-19 and their perceptions of health safety are critical in the identification of the challenges posed by a return to in-person activities at the dental school.

In Mexico, information about the impact of the COVID-19 lockdown on DS is lacking. An investigation of the problem is necessary for the design of strategies for students' safe return to the dental school. In addition, such an investigation might provide evidence of how DS have faced the COVID-19 lockdown in other Latin American countries. Therefore, we hypothesized that, in the first phase of the COVID-19 outbreak, our DS had a fair knowledge of the virus. Accordingly, the aims of this study were 1) to explore the sources of information used by DS to learn about COVID-19, 2) to evaluate the DS level of knowledge about COVID-19, and 3) to evaluate their perceptions of safety in returning to in-person clinical activities at the dental school.

MATERIALS AND METHODS

The study was accepted by the Ethics Committee of the School of Dentistry (Universidad Veracruzana, Orizaba-Córdoba) CEIFO2020-02. Participants answered a questionnaire under conditions of anonymity, and the data from the study were treated with confidentiality. The study was performed in the School of Dentistry of the Universidad Veracruzana, Orizaba-Córdoba (June 2020). The sample calculation was done based on the total number of DS in the dental school (412 DS, 95% confidence level, 5% margin of error), and the sample size was 200.

A questionnaire was designed by the authors; items and constructs were designed to explore the aims of the study. The questionnaire was reviewed by two experts to check the pertinence of the items, the clarity of the meaning of the items, the pertinence of the knowledge construct about COVID-19, and the students' perceptions of safety on returning to in-person clinical activities in the dental school. Subsequently, the pertinence of the questionnaire was improved by the authors. The questionnaire was then administered to 21 DS in a pilot study for the acquisition of data for Cronbach's alpha (0.778).

The final questionnaire was divided into five sections: Section 1. Demographics (3 items), Section 2. Sources of information about COVID-19 and having a course on COVID-19 (2 items), Section 3. General information about COVID-19 (6 items), Section 4. Level of knowledge on dental practice and COVID-19 (10 items), and Section 5. Perception of health safety regarding a return to in-person clinical activities at the dental school (PESCA) (8 items). Section 4 was designed as a true/false questionnaire, whereby the right answer

scored 1 and the wrong answer scored 0. The true/false questionnaire offers a dichotomous response to scale items; thus, a blank answer was not included as a response choice. The possible scores for knowledge were categorized as follows: 1-2 points=very poor knowledge; 3-4 points=poor knowledge; 5-6 points=fair knowledge; 7-8 points=good knowledge; and 9-10 points=excellent knowledge. Section 5 was a Likert scale-type questionnaire. This section had eight paired items (four pairs), each having a positive item and a negative item (Table 1). For positive items, the choices of answers were: strongly agree (4), agree (3), disagree (2), and strongly disagree (1). For negative items, the choices of answers were: strongly disagree (4), disagree (3), agree (2), and strongly agree (1). The possible scores for PESCA were categorized as: 1) 0-8 points=very unsafe; 2) 9-16 points=unsafe; 3) 17-24 points=safe; and 4) 24-32 points=very safe.

Table 1. Questionnaire exploring dental students' perceptions of health safety regarding a return to in-person clinical activities at the dental school [Items are paired as positive (+) and negative (-).]

Item
I feel calm because my dental school has adapted to requirements for dental practice during COVID-19 (A+).
I feel stressed because I could work with patients after the COVID-19 lockdown (B-).
I think that it is a risk to my health to study dentistry after the COVID-19 lockdown (C-).
I feel calm because I will see patients when I return to the dental school after the COVID-19 lockdown (B+).
I think that I will be at risk of getting COVID-19 when I work at clinical practice in my dental school (D-).
I believe that learning dentistry will be safe for my health after the COVID-19 lockdown (C+).
I think that there will be a low risk of getting COVID-19 when I see patients at the School of Dentistry (D+).
I feel stressed because I think that my dental school does not have the requirements for practicing dentistry during COVID-19 (A-).

The questionnaire was administered to the DS of our dental school, all of whom (412) received an email with the invitation to participate in the study and the invitation to answer the questionnaire. The email included a link to an online questionnaire (SurveyMonkey®), and the link also included informed consent. The DS were free to accept or reject participation in the study. The questionnaire replies were collected from May 1, 2020, to May 20, 2020.

To identify possible statistically significant differences between and among the variables, we applied a Mann-Whitney U test to explore the variable levels of knowledge on dental practices and COVID-19; we applied a Kendall Tau-c to explore possible statistically significant differences between and among categorical variables and levels of knowledge on dental practices and COVID-19; and we applied a Chi-square test to explore for possible statistically significant differences in the data collected from the Likert scale. The significant threshold for all statistical tests was set at $P \leq 0.05$; all tests were performed with statistical software (SPSS Statistical software, version 24, IBM).

RESULTS

Three hundred seventy-one DS, with an average age of 21.7 ± 2.6 years, participated in the study (response rate, 90%). Table 2 shows the demographics. Regarding the sources from which the DS learned about COVID-19, 45.28% (n=168) of participants received information from the Mexican Ministry of Health, 17.25% (n=64) used social networks, 14.02% (n=52) learned from online lectures from the dental school, 12.94% (n=48) received information from a dental association, and 10.51% (n=39) read a scientific journal. Of the total participants, 72.78% (n=371) indicated having had no courses about COVID-19, while 27.22% (n=270)

reported having taken such a course. Table 3 shows the results from the items exploring general information about COVID-19. Regarding the results from items exploring knowledge about COVID-19, 59.3% (n=220) of participants had excellent knowledge, 32.3% (n=120) had good knowledge, 7.5% (n=28) had fair knowledge, and 0.8% (n=3) had poor knowledge (Table 4).

Table 2. Results obtained from the items exploring demographics.

Item		
Gender	Women	70.35% (n=261)
	Men	29.65% (n=110)
Scholar year	First	20.49% (n=76)
	Second	17.25% (n=64)
	Third	16.71% (n=62)
	Fourth	20.22% (n=75)
	Fifth	25.34% (n=94)

Table 3. Results of items exploring general information about COVID-19.

Item	Yes	No
1. Do you know what COVID-19 is?	99.46% (n=369)	0.54% (n=2)
2. Do you know the modes of transmission of COVID-19?	99.46% (n=369)	0.54% (n=2)
3. Do you know the symptoms and signs of COVID-19?	98.92% (n=367)	1.08% (n=4)
4. Do you know the recommendations for performing dental treatment during the COVID-19 lockdown?	73.05% (n=271)	26.95% (n=100)
5. Do you think that the School of Dentistry should include a course on COVID-19 and its implications for dentistry?	97.84% (n=363)	2.16% (n=8)
6. Do you think that the use of personal protective equipment is more important now than in the past before the appearance of COVID-19?	98.65% (n=366)	1.35% (n=5)

Table 4. Results of items exploring the students' level of knowledge about dental practices and COVID-19.

Item	True	False
1. Cough, fever, and fatigue are among the most common symptoms of COVID-19.	92.99% (n=345)	7.01% (n=26)
2. A patient with a body temperature of 37°C can get dental treatment.	12.40% (n=46)	87.60% (n=325)
3. Surgical cap, gloves, goggles, N95 mask, and disposable gown are adequate personal protective equipment for use during the COVID-19 lockdown.	97.30% (n=361)	2.70% (n=10)
4. Each patient must use 0.2% iodopovidone as an oral rinse before a dental treatment.	84.10% (n=312)	15.90% (n=59)
5. Hand-washing must be performed after wearing personal protective equipment.	33.69% (n=125)	66.31% (n=246)
6. I must telephone patients to ask them if they know whether they have symptoms of COVID-19.	97.84% (n=363)	2.16% (n=8)
7. Rubber dam isolation reduces exposure to saliva droplets during a dental treatment.	83.83% (n=311)	16.17% (n=60)
8. Throat pain, headache, diarrhea, and loss of smell or taste are symptoms not linked to COVID-19.	42.05% (n=215)	57.95% (n=156)
9. My high-speed dental handpiece does not require an anti-retraction valve when I do perform a dental treatment.	6.74% (n=25)	93.26% (n=346)
10. Working with a COVID-19-asymptomatic subject does not increase my risk of getting COVID-19.	12.23% (n=46)	86.44% (n=325)

The Mann-Whitney U test did not show statistically significant differences between students having taken courses and those not having taken courses in terms of their level of knowledge about COVID-19 ($P=0.488$). The Kendall Tau-c test showed statistically significant differences ($P<0.001$) regarding scholar year and level of knowledge, i.e., the higher the scholar year, the higher the level of knowledge. Regarding the PESCA, 3.8% ($n=14$) of participants were in the 'very unsafe' category, 46.4% ($n=181$) were in the 'unsafe' category, 48.8% ($n=181$) were in the 'safe' category, and 1.1% ($n=4$) were in the 'very safe' category. Chi-square tests showed statistically significant differences between the PESCA and the scholar year ($P<0.001$).

DISCUSSION

Since the beginning of the COVID-19 outbreak, several scientific media have provided information about the virus. Dental students have access to specific scientific sources of such information. In this study, we found that the DS learned about COVID-19 mainly from a public health institution. That finding showed the positive impact of the Mexican Ministry of Health on the knowledge of DS regarding COVID-19. Social networks were the second source of information used by the DS. While these were valuable sources for spreading information about COVID-19, they likely also reported 'fake news' and untruths (13). Hence, DS must be educated on how to identify reliable information about COVID-19 on social networks and how to recognize 'fake news' to avoid using and spreading that information. The third source of information about COVID-19 was online lectures by instructors at the dental school, indicating that the dental school had a lower impact on DS compared with other sources of information. This evidence showed that dental school faculty must exert more effort to providing information about COVID-19 and its impact on dentistry for the benefit of DS. Dental associations and scientific journals were

sources of information with a minimal impact on DS. Dental associations are scientific groups focused primarily on dentists, thus making it difficult for DS to get information from that source. Scientific journals might be complex reading for DS, who might prefer information sources easier to read and to understand.

Our findings agreed with the evidence reported from other studies. Dental students in Nigeria used social networks (99.0%) and television (81.4%) as their first and second sources of information, respectively, while academic sources were the least popular (8.8%) (14). Similarly, DS in India used social networks as their main source of information about COVID-19 (50.7%), and they assigned little importance to sources linked to academia (11). The DS might have been influenced by social context, economic context, and academic context to select the source of information from which they preferred to learn about COVID-19. Despite the fact that DS do not always have good Internet access (9), the use of social networks has been their most popular avenue for acquiring information about COVID-19.

In our study, most of the DS could identify the general characteristics of COVID-19, which have been described in several media and constitute the main information given to the general population, including dentists. As in our findings, DS in Pakistan (99.0%) could identify the symptoms of COVID-19 and its etiology (15). In Saudi Arabia, DS (69.77%) were also able to recognize the transmission modes and symptoms of the disease (82.73%) (16). Specific knowledge about COVID-19 and dentistry was also investigated in our study. Excellent (59.3%) and good (32.3%) knowledge levels were found among our DS, indicating that most participants knew the recommendations for treating patients during the COVID-19 lockdown. We observed that the DS in upper scholar years had a higher level of knowledge and experience in clinical activities, which might encourage

them to acquire good information about COVID-19, while DS having heard only theoretical lectures might not perceive as important the need to know about COVID-19. Studies have explored DS knowledge about COVID-19 and dental practices. Dental students in Nigeria (15%) showed suitable knowledge, and DS in their last year of school had better knowledge (14). In Brazil, DS showed a good level of knowledge about COVID-19 and dentistry, and the DS in their last year of school registered the highest scores on the questionnaire exploring that topic (10). Other studies have found that the DS in their last year of school were the most informed about COVID-19 and its implications for dentistry (17,18). The evidence showed that while senior undergraduate DS were well-informed about COVID-19, the younger students lacked information on the topic. Thus, dental schools should attempt to educate all of their DS regarding COVID-19.

The evidence about the PESCA at the dental school is important for DS as well as for academic authorities. In our study, only half of the participants had a positive PESCA. That variable was linked to scholar year, because DS in upper scholar years had a higher PESCA. The perception of health safety depends on DS knowledge about COVID-19, on their perception of the ability of the dental school to reduce their risk of contracting COVID-19, on the risk of treating patients with COVID-19, on the lack of personal protective equipment, and on the risk of transmission of COVID-19 between the DS and their families, among other factors (12,19,20). Dental schools have applied strategies to increase health safety for DS, including increasing biosecurity requirements, using simulation models for learning, and online learning (12). However, DS might perceive such strategies as insufficient for maintaining their health safety while at dental school. Stress and anxiety have also been repor-

ted as causes of a low perception of health safety among DS facing a return to in-person activities at a dental school (19-21). While, in our study, most participants had good knowledge of COVID-19, half of them felt unsafe about a possible return to dental school. That perception was likely due to a lack of DS confidence in the control measures for reducing their risk of contracting COVID-19 at the dental school.

This study had limitations. Not all DS answered the questionnaire, although we met the sample size calculation. The design of the questionnaire was based on the needs of our educational context and might be distinct from other contexts. Also, at the time of the administration of the questionnaire, the DS were not vaccinated against COVID-19; thus, their post-vaccination perceptions might be different. The evidence collected in this study might help to design future studies on the topic. For instance, future studies might re-visit the level of knowledge about COVID-19 when the students are already working in clinics at the dental school, or might explore their perceptions of safety after working for a year at the dental school, as well as evaluating the effect of vaccination on their perception of health safety.

CONCLUSION

DS have faced important challenges during the COVID-19 outbreak. They must be well-prepared for conducting clinical practices in special conditions to avoid contracting COVID-19. In this study, the DS demonstrated good knowledge about COVID-19, but they perceived that their health safety might be compromised by a return to in-person activities at the dental school. Academic authorities and DS must work together to create suitable conditions for maintaining safe dental education during the COVID-19 outbreak.

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