

Conocimiento y opinión de los estudiantes de Odontología sobre la infección de COVID-19: un estudio multicéntrico.

Dental Students' opinion and knowledge about COVID-19 infection: A multicentric study.

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Resumen: El propósito de este estudio fue determinar el conocimiento de los estudiantes de odontología sobre la enfermedad COVID-19 durante la primera ola de la pandemia del SARS-CoV-2. Para ello, realizamos una encuesta transversal anónima, mediante cuestionarios autoadministrados, entre estudiantes de odontología de 4 universidades españolas para evaluar su percepción y conocimiento del COVID-19 entre el 6 y el 15 de abril de 2020. Se recibieron un total de 890 respuestas válidas durante 9 días. La mayoría de los estudiantes, 616 (70,3%), utilizaron múltiples fuentes de información. Sin embargo, 542 (60,9%) creían que las fuentes más fiables eran sitios oficiales como el de la OMS. Casi el 60% (523) creyó haber recibido información insuficiente de su institución. La nacionalidad resultó ser un factor relacionado con la aptitud para el conocimiento. Así, el 39,9% de los encuestados en la Europa ibérica suspendieron la prueba de conocimiento, frente al 20% en América del Norte o el 10% en Europa del Este ($X^2 = 24.503$, $p = 0,006$). La nacionalidad ibérica europea implica un riesgo (OR) de no superar la prueba de conocimientos de 1.601 (IC 95% 1,008-2,544, $p = 0,046$). En relación al género, el 69,1% de las mujeres superan la prueba frente al 30,9% de los hombres. ($X^2 = 18.163$, V Cramer = 0.144, $p < 0.001$). Nuestros resultados muestran que los estudiantes de odontología encuestados carecían del conocimiento sobre los síntomas, las vías de infección, la mortalidad y las medidas de protección de la enfermedad COVID-19 durante abril de 2020. Programas educativos específicos sobre la prevención y protección frente al SARS-CoV-2 deberían potencialmente implementarse en el currículo dental a nivel mundial.

Palabras clave: estudiantes de odontología; COVID-19; educación; infección por SARS-CoV-2.

Abstract: The purpose of this study was to determine dental students' knowledge of COVID-19 disease during the first wave of the SARS-CoV-2 pandemic. An anonymous cross-sectional survey,

using self-administered questionnaires, was conducted among dental students from 4 Spanish Universities to assess their perception and knowledge of COVID-19 between April 6 and April 15, 2020. A total of 890 valid responses were received over 9 days. Most students, 616 (70.3%), used multiple sources of information. However, 542 (60.9%) believed that the most reliable sources were official sites such as the WHO's. Almost 60% (523) believed that they have received insufficient information from their institution. Nationality resulted as a factor related to knowledge aptitude. Thus, 39.9% of respondents in Iberian Europe failed, compared to 20% in North America or 10% in Eastern Europe ($\chi^2=24,503$, $p=0,006$). European Iberian nationality implies a risk (OR) of not passing the knowledge test of 1.601 (CI 95% 1.008- 2.544, $p=0.046$). In relation to gender, 69.1% of women pass the test compared to 30.9% of men. ($\chi^2=18.163$, V Cramer=0.144, $p<0.001$). Our results show that surveyed dental students lacked the knowledge regarding symptoms, routes of infection, mortality, and protective measures of COVID-19 disease during April 2020. Specific educational programs on SARS-CoV-2 prevention and protection should potentially be implemented in the dental curriculum worldwide.

Keywords: Dental students; COVID-19; education; SARS-CoV-2 infection.

1. Introduction

The coronavirus pandemic that began in China at the end of 2019, claimed its first confirmed death in Spain at the end of January 2020, where to date more than 4.600.000 deaths have been recorded (1). The manifestations of SARS-CoV-2 (COVID-19) infection described in the literature range from mild symptoms like runny nose, fever, dry cough, diarrhea, oral lesions, to the risk of developing serious and life-threatening conditions, such as severe acute respiratory syndrome (2). Recent data revealed that also symptoms as fatigue, hair loss or dysnea, neurological and cardiovascular problems may be long term consequences after COVID-19 (long- COVID) (3,4).

Spain has been severely affected by the COVID-19 outbreak and the majority of dental clinics and university clinics remained closed during the lockdown period between March and June 2020 and only attended emergencies if the entity had the necessary protective measures in place. There was also a national shortage of serological testing for both patients and medical professionals. During this time, both teachers in all dental schools worldwide and dental students had to adapt abruptly to online teaching and training (5).

SARS-CoV-2 transmission occur by exposure to infectious respiratory fluids. Dentists, as well as dental students, and other health care providers are exposed to aerosols and thus are considered to be at a higher risk than other occupational groups (6). The students' basic understanding of COVID-19 disease will be mandatory not only for achieving safe in person-classes education but also because it is a new entity and it will take part of their profession knowledge.

The aim of our study was to investigate the degree of knowledge (symptoms, routes of infection, mortality, and protective measures of COVID-19 disease) and perceptions of COVID-19 disease held by dental students during the first wave of the pandemic, and where they obtained their information from as a primary source. To this end, We designed a survey in order to obtain quantitative information on students' overall knowledge and perceptions regarding SARS-CoV-2 first outbreak between April the 6th and April the 15th, 2020, during the lockdown period in Spain.

2. Methods

2.1 Study design

This cross-sectional study was carried out at the Faculty of Dentistry of the European University of Madrid (UEM) following the recommendations of the STROBE guide for observational studies (7). Subsequent to approval from the Institutional Review Board (IRB) of the European University of Madrid (UEM), internal code # CIPI/20/108, all dental students from the 4 base dental schools, European University of Madrid (UEM), Santiago de Compostela (USC), Rey Juan Carlos (URJC) and Barcelona (UB) were approached personally and directed to a secure website where the survey could be completed anonymously and students were informed that their responses were entirely confidential.

In parallel and through student associations, professional associations, academic leagues, course delegates and scientific collaborations of the groups led by the authors, the survey was distributed to other Spanish, Brazilian and Portuguese universities. The survey was launched during the 1st wave of the SARS CoV-2 pandemic, between the 6th and the 15th of April 2020. A total number of 890 dental students volunteered to participate and successfully completed the administered survey. The response rate upon the 4 base universities was 40.6%.

2.2 Questionnaire preparation

The survey included questions which combined Likert Scale questionnaire items, rank the choices style questions, with answer choices including and standard multiple-choice questions, followed by answer choices, "Yes, No, Maybe, and Unsure". The questionnaire consisted of closed questions, with several options, single and/or multiple answers without free format questions.

Validation of the instrument

A pilot survey was tested on a sample of 50 randomly selected students to assess reliability, completeness and time to implement. The average time to complete the survey was 8 minutes. After that, these 50 pilot cases were discarded and the final sample was collected. Cronbach's Alpha test was used to determine the final reliability of the sample. Stratification in thematic blocks was used and the average value for this questionnaire was 0.75. The data allowed us to ensure moderate reliability.

2.3 Questionnaire description

We designed a self-applied 18-item survey, through Google Forms application (Google, Madrid, Spain). It was written both in Spanish and in English language. The survey was sent directly to the email of all the students of the 4 base Universities, according to the indications of the UE regarding the fulfillment of the Protection Data Spanish Law Document. In addition, the following were used for national and international dissemination: web pages, social networks (Instagram and Facebook) and digital communication applications (Whatsapp, Telegram and Snapchat). The designed survey was structured in six sections: (1) Sociodemographic data (age, gender, nationality), (2) University profile (University of origin, academic year), (3) Sources of information (use, assessment, perception), (4) General knowledge and perceptions (semiology, infection routes, mortality and treatment), (5) Assessment of knowledge (evaluating the mastery of the fields: symptoms, infection routes, mortality and protective measures).

2.4 Sample size

This survey was promoted and launched from 4 Spanish Universities where the total number of students is 1494. The number of dental students at European University of Madrid is 1000. Universidad of Santiago has 150 students. The number of dental students from Universidad Rey Juan Carlos is 110. The total number of dental students of Barcelona University is 234. A total of 890 dental students volunteered to participate and successfully completed the administered survey. Three hundred and seventy-one (42.2%) of the students were from the European University of Madrid (UEM), 98 (11.2%) students were from University of Barcelona (UB), 127 (14.3%) belonged to Santiago de Compostela University and 13 (1.5%) students were enrolled at Rey Juan Carlos University of Madrid (URJC). If we consider the total number of available students at the 4 bases universities (1494), the response rate was 40.6%. The rest of the sample 234 (30.5%) was composed by dental students from different universities, the majority of them from University of South America 157 (17.9%) (Table 1).

2.5 Statistical analysis

The data was collected in a specifically designed database and entered manually with repeated control to avoid errors. They were statistically analyzed using SPSS v.24.0 (IBM, Statistics, NY, USA). Categorical variables were described by frequencies and percentages and quantitative variables by means and standard deviation. Contingency tables were established to study the relationships between the categorical variables through the chi-square test and the degree of dependence through Cramer's V. The ANOVA test was used to compare knowledge with the demographic and educational variables for comparison of means. Binomial logistic regression analysis was performed to verify the risk of not passing the knowledge test. The significance level was set to $p \leq 0.05$.

Table 1. Socio-demographic data of students.

Variable	N (%)	Variable	N (%)
Gender		Do you think your University has given you enough information about this issue?	
Male	233 (26.2)	Yes	360 (40.4)
Female	657 (73.8)	No	530 (59.6)
Age (Years)		Would you like to learn more about COVID-19?	
18-21	264 (29.7)	Yes	746 (83.8)
22-25	475 (53.4)	No	144 (16.2)
26-30	102 (11.5)		
31-35	25 (2.8)		
36-40	11 (1.2)		
41-45	6 (0.7)		
More than 45	7 (0.8)		
Nationality		Most of the people infected by COVID-19 will develop a...	
South American	189 (21.1)	.Mild disease	617 (69.3)
North American	10 (1.1)	.Moderate disease	223 (25.1)
African	4 (0.4)	.Severe disease	45 (5.1)
Iberian European	22 (2.5)	Unsure	5 (0.6)
Atlantic European	374 (42)		
Central European	148 (16.6)		
Mediterranean European	27 (3)		
Oriental European	77 (8.7)		
Asian	10 (1.1)		

Island American	28 (3.1)		
Oceanian	1 (0.1)		
University		If you suspected you had COVID-19. What would you do first?	
América del Sur	159 (17.9)		
Portugal	25 (2.8)		
CEU	4 (0.4)	Expectant (Wait and see)	268 (30.1)
Complutense	9 (1)	Go to Primary care	24 (2.7)
UPV	30 (3.4)	Go to Hospital	44 (4.9)
Sevilla	17 (1.9)	Call 112 Emergency Dept.	552 (62)
Granada	20 (2.2)	Unsure	2 (0.2)
Comillas	2 (0.2)		
UMU	4 (0.4)		
URJC	13 (1.5)		
USC	127 (14.3)		
UEM	377 (42.4)		
UB	100 (11.2)		
UV	2 (0.2)		
Zaragoza	1 (0.1)		
Grade Year		In patients infected by COVID-19 therapy would be based on....	
1st	75 (8.4)	Antibiotics	17 (1.9)
2nd	127 (14.3)	Antiviral Agents	202 (22.7)
3rd	189 (21.2)	Supportive measures	322 (36.2)
4th	242 (27.2)	A combination of previous measures	340 (38.2)
5th	257 (28.9)	Unsure	9 (1)
Sources of information		Mortality associated to COVID-19 is estimated to be	
Internet/Social Media	159 (17.9)	< 5%	487 (54.7)
Newspapers	51 (5.7)	5-25%	382 (42.9)
WHO official website	54 (6.1)	25-50%	10 (1.1)
Multiple	626 (70.3)	> 50%	11 (1.2)

3. Results

A total of 890 dental students volunteered to participate and successfully completed the administered survey. The sample consisted of 233 men (26.2%) and 657 women (73.8%). In relation to the age group, 469 (53.5%) students were between 22-25 years old, followed by the 18-21 years old group with 258 (29.7%) participants. In terms of nationality, Iberian European accounted for 42% of the sample (368), followed by South American 21.2% (187) and Atlantic European 16.8% (147), with much lower participation from Central Europe, Mediterranean, Eastern Europe, Asia, North America, Africa, Island American and Oceania. Sources information is clearly represented in figure 1. In Table 1 socio-demographic data is summarized.

Regarding thematic blocks (Table 2), almost 70% (617) of the students considered that most people will develop mild manifestations. In the case of a suspicion of contagion, 542 (62%) would call the emergency services (112), although 266 (30.1%) would maintain an expectant attitude. Some of them 340 (38.2%) considered that the therapeutic approach is a combined one (antibiotics, antivirals and support measures) although there is a diversity of opinions. The 54.7% (487) know data about the mortality of the disease is considered to be less than 5%. Although there is a clear lack of knowledge about the disease, 143 (16.2%) students were not willing to learn more about Covid-19 disease.

Sources reliability

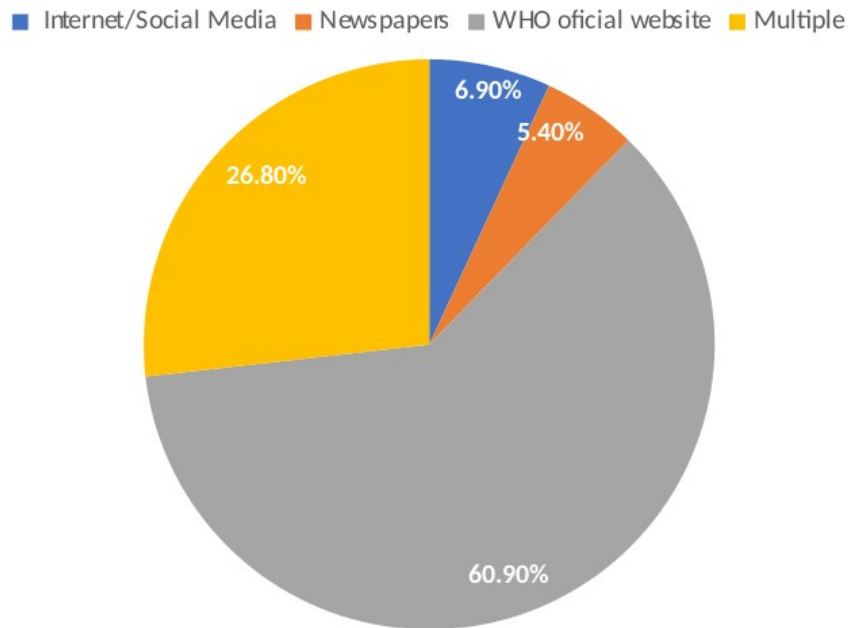


Figure 1. Sources reliability answered by the participants.

Table 2. Summary of survey results and significance

Variable	Total (N=890)	Passed (N=551)	Failed (N=326)	p-value
Sex				
Male	233 (26.2%)	170 (30.9%)	58 (17.8%)	<0.001
Female	657 (73.8%)	381 (69.1%)	268 (82.2%)	<0.001
Nationality				
South American	187 (21.3%)	114 (20.7%)	73 (22.4%)	0.006
North American	10 (1.1%)	2 (0.6%)	8 (1.5%)	0.006
African	22 (2.5%)	9 (1.6%)	13 (4%)	0.006
Iberian European	368 (42%)	221 (40.1%)	147 (45%)	0.006
Atlantic European	147 (16.8%)	105 (19.1%)	42 (12.9%)	0.006
Central European	26 (3%)	17 (3.1%)	9 (2.8%)	0.006
Mediterranean European	75 (8.6%)	54 (9.8)	21 (6.4%)	0.006
Oriental European	10 (1.1%)	9 (1.6%)	1 (0.3%)	0.006
Asian	27 (3.1%)	13 (2.4%)	14 (4.3%)	0.006
Island American	4 (0.5%)	1 (0.2%)	3 (0.9%)	0.006
Oceanian	1 (0.1%)	0	1 (0.3%)	0.006
Age Range				
18-21	258 (29.4%)	147 (26.7%)	111 (34%)	0.257
22-25	469 (53.5%)	299 (54.3%)	170 (52.1%)	0.257
26-30	102 (11.6%)	71 (12.9%)	31 (9.5%)	0.257
31-35	24 (2.7%)	18 (3.3%)	6 (1.8%)	0.257
36-40	11 (1.3%)	7 (1.3%)	4 (1.2%)	0.257
41-45	6 (0.7%)	4 (0.7%)	2 (0.6%)	0.257
More than 45	7 (0.8%)	5 (0.9%)	2 (0.6%)	0.257
University				

América del Sur	157 (17.9%)	95 (17.2%)	62 (19%)	0.161
Portugal	25 (2.9%)	14 (2.5%)	11 (3.4%)	0.161
CEU	4 (0.5%)	1 (0.2%)	3 (0.9%)	0.161
Complutense	9 (1%)	7 (1.3%)	2 (0.6%)	0.161
UPV	30 (3.4%)	15 (2.7)	15 (4.6%)	0.161
Sevilla	16 (1.8%)	10 (1.8%)	6 (1.8%)	0.161
Granada	20 (2.3%)	8 (1.5%)	12 (3.7%)	0.161
Comillas	2 (0.2%)	1 (0.2%)	1 (0.3%)	0.161
UMU	4 (0.5%)	3 (0.5%)	1 (0.3%)	0.161
URJC	13 (1.5%)	11 (2%)	2 (0.6%)	0.161
USC	125 (14.3%)	75 (13.6%)	50 (15.3%)	0.161
UEM	371 (42.4%)	246 (44.6%)	125 (38.3%)	0.161
UB	98 (11.2%)	63 (11.4%)	35 (10.7%)	0.161
UV	2 (0.2%)	2 (0.4%)	0	0.161
Zaragoza	1 (0.1%)	0	1 (0.3%)	0.161
Grade Year				
1st	74 (8.4%)	44 (8%)	30 (9.2%)	0.265
2nd	125 (14.3%)	74 (13.4%)	51 (15.6%)	0.265
3rd	185 (21.2%)	110 (20%)	75 (23%)	0.265
4th	238 (27.1%)	163 (29.6%)	75 (23%)	0.265
5th	255 (29.1%)	160 (29%)	95 (29.1)	0.265
Sources of Information				
Internet/Social Media	156 (17.8%)	91 (16.5%)	65 (19.9%)	0.134
Newspapers	51 (5.7%)	31 (5.6%)	20 (6.1%)	0.134
WHO oficial website	54 (6.1%)	28 (5.1%)	26 (8%)	0.134
Multiple	616 (70.3%)	401 (72.8%)	215 (6%)	0.134
Sources reliability				
Internet/Social Media	61 (6.9%)	36 (6.5%)	24 (7.4%)	0.478
Newspapers	48 (5.4%)	26 (4.7%)	22 (6.7%)	0.478
WHO oficial website	542 (60.9%)	335 (60.8%)	199 (61%)	0.478
Multiple	239 (26.9%)	154 (27.9%)	81 (24.8%)	0.478
Do you think your University has given you enough information about this issue?				
Yes	354 (40.4%)	228 (41.4%)	126 (38.7%)	0.426
No	523 (59.6%)	323 (58.6%)	200 (61.3%)	0.426
Would you like to learn more about COVID-19?				
Yes	734 (83.7%)	453 (82.2%)	281 (86.2%)	0.123
No	143 (16.3%)	98 (17.8%)	45 (13.8%)	0.123
If you suspected you had COVID-19. What would you do first?				
Expectant (Wait and see)				
Go to Primary care	266 (30.3%)	184 (33.4%)	82 (25.2%)	0.123
Go to Hospital	24 (2.7%)	15 (2.7%)	9 (2.8%)	0.123
Call 112 Emergency Department	43 (4.9%)	28 (5.1%)	15 (4.6%)	0.123
Unsure	542 (61.8%)	323 (58.6%)	219 (67.2%)	0.123
	2 (0.2%)	1 (0.2%)	1 (0.3%)	0.123

Considering a weighted score of 0-10 on the items: symptoms, routes of infection, mortality, and protective measures, 37.2% (327) of the students surveyed do not exceed the

minimum knowledge, obtaining an average score of 5.5 ± 1.6 with a range of 1 to 9.7. Students from 4th and 5th year were more likely to pass than students from the previous years of the degree without statistical significance.

We have found that nationality is a factor related to knowledge aptitude. Thus, 39.9% of respondents in Iberian Europe fail, compared to 20% in North America or 10% in Eastern Europe ($X^2=24,503$, V Cramer=0,167, $p=0,006$). European Iberian nationality implies a risk (OR) of not passing the knowledge test of 1.601 (CI 95% 1.008-2.544, $p=0.046$). In relation to gender, 69.1% of women pass the test compared to 30.9% of men. ($X^2=18.163$, V Cramer=0.144, $p<0.001$). The OR for the male gender is double that of women, OR=2.062, 95% CI 1.473-2.887, $p<0.001$.

4. Discussion

Our survey was launched during the first pandemic wave and the lockdown period between the 6th and the 15th of April 2020. We attempted to investigate the level of related knowledge, self-reported preferred information sources and risk perception among dental students. The use of online surveys presents a series of advantages as described by Sánchez-Fernández et al (8) where the target population is more accessible, responses are retrieved faster and participants are usually sincerer due to the self-application of the survey. Conversely, some of the disadvantages described in the literature are the difficulty in obtaining a sample frame or in determining response rate and the technical problems due to a bad internet connection (9). Also, some authors warn of the risk of individuals answering the same survey several times, if the survey has not been designed correctly (10). Sánchez-Fernández et al. (8), also describe that the response rate can be improved if the invitation to participate in the survey was sent weekly and personalized. In our research, we only sent the invitation once, using the universities official emails, and also the dental associations published in the social media channels the survey so that students from other universities could participate. Our survey was only admitting responses for 9 days.

To date, some publications have investigated the practice, knowledge and attitude of students of varying ages, nationality and university of origin in the first pandemic outbreak (11–14). The response rate of our survey considering the base universities (UEM, UB, URJC, USC) was 40.6%. This response rate can be considered low and we believe this fact was caused by the situation of general weariness, fear, frustration and despair that our students and society were living during the month of April 2020 as it has been already reported (15) where COVID-19 data reported during the survey period in Spain showed 130.759 infections and 14.652 deaths on the 6th of April and 180.074 infections and 20.604 deaths on the 16th of April 2020 (16). In our study, women participation was significantly higher (73.8%, $N=657$). This fact could be explained either because classically women tend to participate more in research studies or because in the healthcare degrees nowadays we can find more female students rather than male students.

Our survey was developed in an early stage of the pandemia, revealing the weaknesses of administrations and educational institutions in that moment. The main limitation of our study is the low participation of students in which the lack of motivation was added to the existing overload of work during the academic period in the online modality. The results we present might not be generalized to dental students of other countries, although they are representative of our source population. Given the pandemic situation held responses might present bias.

In addition, even though there is a clear lack of knowledge about the disease, 143 (16.2%) students were not willing to learn more about COVID-19 disease. We believe our students were confined, possibly overwhelmed about the number of dead and infected people by the virus, in a moment of collective despair, anxiety, as stated by other authors (5,18) and uncertainty that could have contributed to that lack of motivation to be given more information about COVID-19.

Interestingly only 51 students (5.7%) referred obtaining information from newspapers exclusively and 156 students (17.8%) used exclusively the internet/apps/social networking sites to learn about the status of the pandemic. Internet has become an important source of information for our students. Moreover, they feel more connected to the world due to social media interactions. Most students, 616 (70.3%) used multiple sources of information. However, 542 (60.9%) believed that the most reliable sources were official sites such as the WHO's.

Nearly 7% (61) believed that social media networks provided the most accurate information. In a recent study on the knowledge, perceptions, and attitude of Egyptians towards the Novel Coronavirus Disease (COVID-19), a cross sectional survey revealed that their participants had a good knowledge about the disease and a positive attitude towards protective measures. This knowledge was gained mainly through media channels (17).

We evaluated the knowledge of the surveyed students considering a weighted score of 0-10 on the items: symptoms, routes of infection, mortality, and protective measures, 37.2% of the students surveyed did not exceed the minimum knowledge, obtaining an average score of 5.5 ± 1.6 with a range of 1 to 9.7. These results doesn't match the ones reported by Wee et al. who they stated that 55.2% of their 174 students had good knowledge of COVID-19 with scores above 8.0, while 44.8% possessed moderate knowledge with scores of 6.0-8.0. None of their dental and medical students had a result below 6.0 and the mean averages of knowledge and attitude with associated preventive behaviors of students was 81.5% (SD=6.3) and 85.7% (SD=13.1) respectively highlighting a good level of both (19). The differences with our results could be explained considering that our survey was launched during the 1st wave of the pandemic (early April), and their survey was launched in May 2020 and concluded in June 2020. As a result, their students probably received more information than ours.

In relation to the information provided by the universities of origin, almost 60% (523) believed that they have received insufficient information from their institution. In general lines, we could consider there was not enough information to provide at that moment. According to Iyer et al., dental school administrations are facing a big challenge. Whereas on the one hand, they need to protect students, patients, and faculty safety, on the other, they need to ensure that there was a continuity in the education of dental students. We agree that during the first wave of the pandemic, there was not enough information to be able to issue consensus guidelines on prevention standards that were safe enough to prevent the perpetuation of the SARS-CoV-2 pandemic among dental schools all over the world (18).

At this point, we would like to emphasize that possibly both government authorities and universities were trying to adapt according to the newly statistics of the pandemic and the measures that governments were implementing almost weekly. The confusion of the students could be extrapolated to all areas of knowledge and a contingency plan to future situations as COVID-19 pandemic should be elaborated.

5. Conclusions

- Our results show that surveyed dental students lack the knowledge regarding symptoms, routes of infection, mortality, and protective measures of COVID-19 disease during April 2020.
- Dental schools would need to design and implement more effective measures to protect the physical and mental health of students in this pandemic era. Specific educational programs on SARS-CoV-2 hazards and protective measures should be considered and potentially implemented in the dental curriculum worldwide.
- In our opinion, psychological assessment and support should be provided to dental students to help them cope with this pandemic and those that may occur in the coming years.

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