ORIGINAL ARTICLE

Knowledge of Dentists and Dental Undergraduates Related to COVID-19

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ABSTRACT

Objective: To assess the knowledge of Brazilian dentists and final-year dental undergraduates concerning COVID-19. **Material and Methods:** We conducted a self-administered online questionnaire about the symptoms, incubation period, and transmission routes of COVID-19. In total, there were three questions addressing these topics and 15 correct answers, so each participant could score from 0 to 15 points. Besides that, data such as sex, age, education level, years of work experience and place of work were collected. All data were submitted to statistical analysis with a 5% significance level. **Results:** 476 participants were recruited. Regarding the respondents' perception of the most common symptoms of COVID-19, 99.4% responded fever, 95.2% cough, and 99.2% dyspnea. About the incubation period, 56.3% answered from 1 to 14 days. About the transmission routes, 98.3% recognized transmission through droplets, 80.3% through direct contact with infected persons, and 70.4% through indirect routes. The median knowledge score was 10 (4 − 14). Regarding the socio-demographic variables, participants aged 30 years or more had a higher score than those aged up to 29 years old (p=0.004). For education level, specialist dentists presented a higher score than undergraduates (p=0.006), general dentists (p=0.048) and Ph.D. (p=0.016). Participants with 15 years or more of work experience had a higher score than undergraduates (p=0.003). Concerning the workplace, participants working in the public sector had a higher score than those working in the private sector or universities (p=0.015). **Conclusion:** Participants recognized the main symptoms, incubation period, and transmission routes of the COVID-19 virus; however, the knowledge level of specialist dentists, older dentists, more experienced dentists, and dentists working in the public sector was higher than the other participants.

Keywords: COVID-19; SARS-CoV-2; Dentistry; Knowledge; Surveys and Questionnaires.

Introduction

Coronavirus is one of the main pathogens targeting the human respiratory system. In December 2019, a group of patients was admitted to a Chinese hospital with an initial diagnosis of severe acute respiratory syndrome (SARS) similar to pneumonia with unknown etiology [1]. After studies, this condition was observed to be caused by a novel coronavirus, and the disease was named severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) or Coronavirus Disease 2019 (COVID-19). COVID-19 was first detected in Wuhan, Hubei, China and the disease rapidly spread worldwide [2].

The COVID-19 pandemic is a public health emergency of global concern [3]. At the beginning of January 2022, according to the publicly available database by Johns Hopkins University, approximately 298.000.000 cases were confirmed worldwide and 5.470.000 confirmed deaths [4]. The speed of virus dissemination and the response to this disease have varied around the world according to virus variant, different health systems, economies, political ideologies [5], and climatic factors. In Brazil, there are records of approximately 22.300.000 contaminated individuals, totaling over 620.000 deaths. It is the third country with the highest number of confirmed cases in the world to August 2021 [4].

The transmission of COVID-19 also occurs through saliva droplets that contain the virus. For this reason, dental treatment presents a high risk for COVID-19 dissemination due to the high viral load present in the upper airways and high exposure to biological materials provided by aerosol-generating procedures [6], beyond the close contact between patient and professional, and the fact that the patient needs to be without a mask and with his mouth open to receive treatment.

Due to the risk of coronavirus transmission during dental treatment, COVID-19 has had a major impact on this sector. The National Surveillance Agency of Brazil (ANVISA) recommended the suspension of elective treatments in the country at the peak of the first wave outbreak of the pandemic [6]. Initially, most dental offices started to perform only emergency treatments, and many public-service dentists were relocated from their usual duties and began screening and testing patients with suspected COVID-19 [7]. Later, elective dental care returned, but a series of recommendations about EPIs and biosafety were followed to protect both patients and professionals [8]. Based on this, the dentist's knowledge of the issues involving SARS-CoV-2, as characteristics of COVID-19, the signs and symptoms of the disease, and transmission routes are pivotal in dental practices [9,10].

The present study aimed to evaluate the level of knowledge among Brazilian dentists and final-year dental undergraduates concerning the symptoms, incubation period and transmission routes of the novel Coronavirus. Besides, the study aimed to investigate the relationship of the knowledge score with socio-demographic characteristics, such as sex, age, level of education, years of work experience, and place of work.

Material and Methods

Ethical Aspects and Study Design

This observational cross-sectional study was approved by Positivo University Research Ethics Committee, under registration number 33828820.1.0000.0093, and followed the ethical principles for medical research involving human subjects, the Declaration of Helsinki. This study was performed with a web-based questionnaire and submitted to Brazilian dentists and final-year dental undergraduates from July 8 to August 8, 2020. The participants' names were kept anonymous to maintain the privacy and confidentiality of all information collected in the trial. Informed consent was obtained from all the participants.

Sample Size Calculation and Data Collection

The sample size was calculated considering the following parameters: an estimated population of 361.845 (336.352 corresponds to the number of dental surgeons currently registered in Brazil and 25.493 is the number corresponding to the number of new registrations in the Federal Council of Dentistry in the year 2021), an anticipated frequency of 50%, a confidence limit of 5%, and a design effect of 1. Through these parameters, the calculations resulted in a sample size of 384 individuals. (www.openepi.com/samplesize).

The researchers shared the link to the survey with a brief explanation about the need for the study through WhatsApp© (WhatsApp Messenger, WhatsApp Inc., Mountain View, California, USA) and Instagram© (Facebook, Inc, Menlo Park, California, USA). For recruitment, convenience and snowball sampling was utilized. The convenience sample was obtained through the researchers when they invited Dentists and final-year dental undergraduates to participate of the study. Regarding the snowball sampling, the researchers encouraged the participants of the study to forward the questionnaire to their friends. WhatsApp Messenger© is a favorable application when used as a communication tool for healthcare professionals [11]. In Brazil, it is a widely used instant messaging and discussing tool [12]. Because it allows quick communication, we choose to use this tool to spread the research information in groups for dentists. In Instagram©, a profile (@covid19pesquisa) was created to recruit dentists or dental undergraduates and was also used to disseminate the research.

The inclusion criteria were Brazilian dentists or final-year dental undergraduates of both sexes, aged 18 years or more, that were selected regardless of their place of work. The exclusion criterion was the inadequate filling of the questionnaire.

Testing of the Instrument

Before commencing the study, an online questionnaire was developed and pretested. During this test, the questionnaire was applied to 25 colleagues to check the dynamics, sequence, clarity, relevance, objectivity, consistency, and adequacy of the questions designed by the researchers. After the pilot test, some modifications were performed to improve data collection, such as adding socio-demographic data, adding more answer options, changing the order of questions and answers, and simplifying some terminologies.

Questionnaire

The data collection was performed through a structured self-administered questionnaire created with Google Forms® (Alphabet, Mountain View, CA, USA), written in Portuguese. On opening the questionnaire, the first page contained a short text explaining the nature and importance of the study, and also contained a header for participant confidentiality and stated that participants were willing to participate in the study voluntarily. After this, if the person answered the questionnaire, their consent was automatically implied.

The questionnaire was divided into two main sections. The first section covered socio-demographic characteristics, such as sex (female or male), age, education level (undergraduates - UG, graduate - DDs, specialist - DSp, master − MSc or doctor − Ph.D.), years of work experience and place of work (University, Private Sector, Public − the participant could mark more than one answer option). The second section concerned the dentist's knowledge of COVID-19 symptoms, incubation period, and transmission routes.

Participants were requested to select the correct alternatives about the possible signs/symptoms of COVID-19. The response options were: (fever, cough, dyspnea, muscle pain, headache, sore throat, rhinorrhea, diarrhea, skin rash, anosmia, infected patient with no symptoms − participants could choose more than one

option for this question). The second question asked the participants to select the correct option regarding the incubation period of COVID-19 (the response options were: 1 to 14 days, 2 to 7 days, 7 to 14 days, and 7 to 21 days - the participant could select only one alternative for this question). Finally, the third question requested the participants to choose possible transmission routes for COVID-19 (the response options were: via droplets; direct contact with infected persons; indirectly, through contaminated hands, objects or surfaces – participants could choose more than one option for this question). After completing the questionnaire, the participant received feedback on the corrected answers with information about the subject and links from official websites.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Science (IBM SPSS® for Apple OS, version 21.0, Armonk, NY: IBM Corp). The sample size was calculated by the Open Epi web-based calculator (Open-Source Epidemiologic Statistics for Public Health, Version. www.OpenEpi.com). For the statistical analysis, the participants' answers were considered such as scores, there were 15 correct answer options in the questionnaire; therefore, scores were assigned for each participant ranging from 0- to 15-points, with one score for each correct alternative question. With respect to the symptoms question, eleven alternatives were considered correct; for the incubation period question, one alternative was correct; and for the transmission routes question, three alternatives were correct. The questions were created based on guidelines provided by the Brazilian health regulatory agency to dentists, ANVISA, and the Federal Council of Dentistry (CFO) [6]. All inferential analyses were attributed to a significance level of $p < 0.05$. The variable age (≥ 29 or ≤ 30 years) was dichotomized by the median since it was non-parametric. To evaluate the differences between knowledge scores and the socio-demographic sample characteristics, U Mann Whitney and Kruskal-Wallis test was performed.

Results

There were 524 complete questionnaires; however, 48 were excluded because the same individual answered the questionnaire twice. Thus, the sample was composed of 476 participants, of whom 26.7% (127) were male and 73.3% (349) female with a median age of 29 years (18 − 86), being 52.7% (251) with up to 29 years old and 47.3% (225) with 30 years old or more. More data about sex, age, education level, years of work experience and places of work of the participants of this study can be seen in Table 1.

Table 1. Socio-demographic characteristics of the sample.

Socio-demographic Characteristics	Categories	N	%
Sex	Female	349	73.3
	Male	127	26.7
Age	≤ 29	251	52.7
	≥ 30	225	47.3
Education level	UG	83	17.4
	DDs	115	24.2
	DSp	146	30.6
	MSc	90	18.9
	PhD	42	8.9
Years of work experience	UG	80	16.9
	≤ 15	273	57.3
	> 15	123	25.8
Place of work	University	121	25.4
	Private Sector	209	43.9
	Public Sector	31	6.5

University + Private Sector	67	14.1
University + Public Sector	7	1.5
Private + Public Sector	38	8
University + Private + Public Sector	3	0.63

Figure 2 describes the percentage of the dentist's knowledge about symptoms, incubation period, and transmission routes of COVID-19.
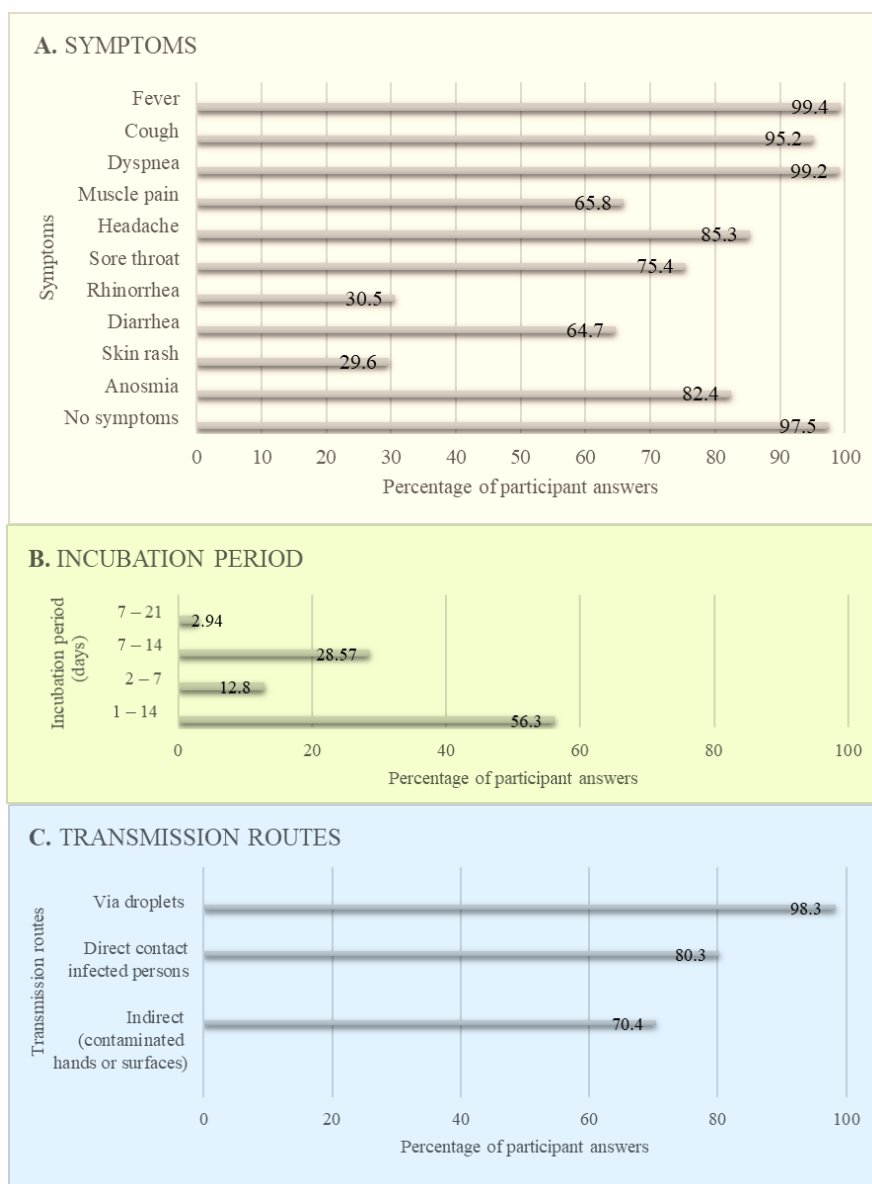
Figure 2. Bar chart A represents the distribution of knowledge about COVID-19 symptoms assessed in dental students and dental surgeons. Bar chart B represents the distribution of knowledge about the Incubation period of COVID-19 (days) assessed in dental students and dental surgeons. Bar chart C represents the distribution of knowledge about the Incubation period of COVID-19 (days) assessed in dental students and dental surgeons.

The median knowledge score of the sample was 10 (4–14). No statistical differences were found between sex (p=0.239). However, median knowledge score significantly differed between participants aged 30 years or more [11 (4–14)] and participants with 29 years or less [10 (5–14)] (p=0.004). Individuals aged 30 years or more presented the highest number of correct answers.

For education level, specialists had more correct answers when compared to any other educational level, except those with a master's degree. We found a difference between UG and DSp, with DSp having significantly higher scores (p<0.0001), between DDs and DSp, with DSp also having significantly higher scores (p=0.005) and between DSp e Ph.D., with DSp having higher scores (p=0.016).

Regarding to years of work experience, the median knowledge score significantly differed between UG [10 (6–14), dentists with 15 years or less of work experience [11 (5–14)] and dentists with more than 15 years [11 (4–14)] (p=0.004). Higher scores were found for dentists with more than 15 years of work experience compared to UG (p=0.001) and for dentists with less than 15 years of work experience compared to UG (p=0.029).

Regarding the place of work, the knowledge score was significantly different between dentists who worked in University [10 (4–14)] and the public sector [11 (7–14)] (p=0.02), dentists who worked in University and the one who worked jointly in public and private sector [13 (10–14)] (p=0.037), between the group who worked in the private sector [11 (6–14)] and those who were in the University and private sector [10 (5–14)] (p=0.040), between the group who worked in the public sector and those who were in the University and private sector (p=0.012), and between those who were in the University and private sector together with the public sector [13 (10–14)] (p=0.016) (Table 2).

Table 2. Comparison of awareness scores in different categories of participants.

Variables	N (%)	Awareness Score Median (Min.–Max.)	p-value
Sex			
Male	127 (26.7)	10 (6–14)	0.239*
Female	349 (73.3)	11 (4–14)	
Age			
≤ 29	251 (52.7)	10 (5–14)	0.004*
> 30	225 (47.3)	11 (4 −14)	
Education level			
UG	83 (17.4)	10 (6–14)[a]	0.003**
DDs	115 (24.2)	10 (6–14)[a]	
DSp	146 (30.6)	11 (6–14)[b]	
MSc	90 (18.9)	11 (5–14)[ab]	
PhD	42 (8.9)	10 (4–14)[a]	
Years of work experience			
UG	80 (16.9)	10 (6–14)[a]	0.004**
≤ 15	273 (57.3)	11 (5–14)[b]	
> 15	123 (25.8)	11 (4–14)[b]	
Place of work			
University	52 (13.2)	10 (4–14)[ac]	0.015**
Private sector	206 (52.4)	11 (6–14)[ab]	
Public sector	31 (7.9)	11 (7 −14)[b]	
University + Private sector	59 (15)	10 (5–14)[c]	
University + Public sector	5 (1.3)	10 (9–12)[abc]	
Private + Public sector	37 (9.4)	13 (10 −14)[b]	
University + Private + Public	3 (0.8)	13 (10–14)[abc]	

*U Mann Whitney; **Kruskal Wallis and U Mann Whitney, with a significance level of 0.05; Bold values indicate statistical significance.

Discussion

This survey study provides an insight into the level of knowledge of Brazilian dentists and final-year dental UG in times of pandemic. The participants of the study had access to the questionnaire between July 8 to August 8, 2020, about five months after the first confirmed case of COVID-19 in Brazil. This period

corresponds to epidemiological weeks 28, 29, 30, 31, and 32, corresponding to the highest number of cases and deaths from COVID-19 in the southern region of Brazil in the first wave [13].

It is common knowledge that the primary transmission route of COVID-19 is through air droplets and aerosols. Therefore, the transmission of COVID-19 is of high risk for people in close contact with an infected individual [14]. Furthermore, the average distance between the working field and the dentist is around 35–40 cm, and certain procedures can be time-consuming, thus, increasing the risk of dentists getting infected and further spreading the virus [15]. For this reason, it is extremely necessary for dentists to be aware of the main symptoms, incubation period, and transmission routes of COVID-19. Based on this premise, this study addresses important data about the COVID-19 knowledge of Brazilian dentists and UG.

In the present study, most participants had a fair knowledge of COVID-19. Most of the participants successfully recognized the disease's symptoms (fever, cough, and dyspnea); in addition, more than half correctly answered the virus's incubation period. These results were similar to Sezgin and Şirinoğlu [16], Khader et al. [17], and Kamate et al. [18]. The ability to identify the main symptoms and incubation period of COVID-19 is important because it assists professionals in determining threats, as well as in deciding necessary actions, which is considered pivotal in the management [19] and in controlling the dissemination of the disease [9]. Besides that, when dentists were asked about the transmission routes of COVID-19, the results showed that most participants were aware of the correct answers, which is in agreement with the results found by Sezgin and Şirinoğlu [16].

The study sample was predominately female, which can be explained by the higher number of female dentists than male dentists in Brazil, based on the CFO records [20]. The results exhibited no significant difference in knowledge scores between sex. A previous study of healthcare professionals [21] and dental professionals [22] in Pakistan found no sex difference in their knowledge about COVID-19.

Most participants were young adults, with a mean age of 29 years. This may be attributed to the fact that younger individuals are more active and participatory in research through social media and participate in online research studies, as observed in other studies [16,17]. In this study, older professionals were associated with higher knowledge scores. This was supported by our findings regarding work experience, where it was noted that dentists with more than 15 years of work experience had higher knowledge scores than UG and less experienced dentists. Our data contrast with those found by Sezgin and Şirinoğlu [16], who evaluated the level of knowledge of Turkish dentists about COVID-19, finding no difference related to professional experience and level of knowledge [16].

Regarding educational level, the knowledge of specialist dentists about symptoms, incubation period, and transmission routes of COVID-19 was higher than UG, DDs and Ph.D. Our results, which show that DSp have a higher level of knowledge than UG and DDs, are consistent with several previous studies on COVID-19 knowledge conducted with dentists in different parts of the world [18,22-25]. However, we were surprised that Ph.D. obtained lower knowledge scores in this study. We hypothesize that due to the great immersion in very specific knowledge inherent to the researcher's life, other subjects end up receiving less attention.

In addition, in general, dentists working in the public sector had more knowledge than the other categories. The main hypothesis for this result is that, considering the COVID-19 situation in Brazil, many public-sector dentists have been reassigned to work directly related to COVID-19 and are therefore more exposed to information regarding the disease.

The literature points out that questionnaire-based studies are highly effective for gathering information regarding the knowledge of healthcare professionals about COVID-19 [18,26-28]; however, the

collection and interpretation of data must be carefully revised. One limitation of this study is related to the increase in research related to COVID-19 SARS-Cov-2. New information is generated daily, so when we compared the data present in the CFO guideline with the current literature, we observed some aspects remained correct and others diverged. Another limitation is that it is a cross-sectional study, and there is no follow-up of the increase in the level of knowledge. Thus, the data from this study may become parameters for future studies to evaluate the increase in knowledge of dentists about COVID-19.

Conclusion

The sample recognized the main symptoms, incubation period and transmission routes of the novel coronavirus; however, specialist dentists, more aged group of dentists, experienced dentists, and dentists working in the public sector had better knowledge towards COVID-19.

Authors' Contributions

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RS	https://orcid.org/0000-0002-4911-6413	Conceptualization, Methodology, Formal Analysis, Data Curation, Writing - Original Draft and Writing - Review and Editing.

All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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Conflict of Interest

The authors declare no conflicts of interest.

Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

References

[1] Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. J Autoimmun 2020; 109:102433. https://doi.org/ 10.1016/j.jaut.2020.102433

[2] Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med 2020; 382(8):727-33. https://doi.org/10.1056/NEJMoa2001017

[3] Lancet T. Emerging understandings of 2019-nCoV. Lancet (London, England) 2020; 395(10221):311. https://doi.org/10.1016/S0140-6736(20)30186-0

[4] Johns Hopkins University. Coronavirus COVID-19 Global Cases by Johns Hopkins CSSE [Internet]. Johns Hopkins University; 2020. Available from: https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6. [Accessed on May 30, 2021].

[5] Coulthard P. Dentistry and coronavirus (COVID-19) - moral decision-making. Br Dent J 2020; 228(7):503-5. https://doi.org/10.1038/s41415-020-1482-1

[6] Brazil. National Health Surveillance Agency. Technical Note GVIMS/GGTES/ANVISA No. 04/2020-Orientations for health services: prevention and control measures to be adopted during the assistance to suspected or confirmed cases of infection by the new coronavirus (SARS-CoV-2). ANVISA Brasília (DF), 2020. Available from: https://www20.anvisa.gov.br/segurancadopaciente/index.php/alertas/item/nota-tecnica-n-04-2020-gvims-ggtes-anvisa-atualizada?category_id=244/. [Accessed on Oct 04, 2020]. [In Portuguese].

[7] Shi AH, Guo W, Chng CK, Chan BH. Precautions when providing dental care during Coronavirus disease 2019 (COVID-19) Pandemic. Ann Acad Med 2020; 49(5):312-9.

[8] Al-Omiri MK, Lynch E, Patil S, Al-Shayya MH, Al Nazeh AA, Alraheam AI, et al. COVID-19 and dentistry: an updated overview of dental perspectives and a recommended protocol for dental care and emergency dental treatment. J Contemp Dent Pract 2021; 22(5):572-86.

[9] Meng L, Hua F, Bian Z. Coronavirus disease 2019 (COVID-19): emerging and future challenges for dental and oral medicine. J Dent Res 2020; 99(5):481-7. https://doi.org/10.1177/0022034520932149

[10] World Health Organization. Clinical management of severe acute respiratory infection (SARI) when COVID-19 disease is suspected: interim guidance, 13 March 2020 (No. WHO/2019-nCoV/clinical/2020.4). World Health Organization; 2020.

[11] Giordano V, Koch H, Godoy-Santos A, Belangero WD, Pires RES, Labronici P. WhatsApp messenger as an adjunctive tool for telemedicine: an overview. Interact J Med Res 2017; 6(2):e6214. https://doi.org/10.2196/ijmr.6214

[12] Machado RA, Bonan PRF, Perez DE da C, Martelli Júnior H. COVID-19 pandemic and the impact on dental education: discussing current and future perspectives. Braz Oral Res 2020; 34:e083. https://doi.org/10.1590/1807-3107bor-2020.vol34.0083

[13] COVID-19 in Brazil: update of confirmed cases and deaths. 2020. Available from: https://covid.saude.gov.br/. [Accessed on April 11, 2020].

[14] Singhal T. A review of coronavirus disease-2019 (COVID-19). Indian J Pediatr 2020; 87(4):281-6. https://doi.org/10.1007/s12098-020-03263-6

[15] Nejatidanesh F, Khosravi Z, Goroohi H, Badrian H, Savabi O. Risk of contamination of different areas of dentist's face during dental practices. Int J Prev Med 2013; 4(5):611-15.

[16] Sezgin GP, Şirinoğlu Çapan B. Assessment of dentists' awareness and knowledge levels on the Novel Coronavirus (COVID-19). Braz Oral Res 2020; 34:e112. https://doi.org/10.1590/1807-3107bor-2020.vol34.0112

[17] Khader Y, Al Nsour M, Al-Batayneh OB, Saadeh R, Bashier H, Alfaqih M, et al. Dentists' awareness, perception, and attitude regarding COVID-19 and infection control: cross-sectional study among Jordanian dentists. JMIR Public Heal Surveill 2020; 6(2):e18798. https://doi.org/10.2196/18798

[18] Kamate SK, Sharma S, Thakar S, Srivastava D, Sengupta K, Hadi AJ, et al. Assessing Knowledge, Attitudes and Practices of dental practitioners regarding the COVID-19 pandemic: A multinational study. Dent Med Probl 2020; 57(1):11-7. https://doi.org/10.17219/dmp/119743

[19] Gaffar BO, El Tantawi M, Al-Ansari AA, AlAgl AS, Farooqi FA, Almas KM. Knowledge and practices of dentists regarding MERS-CoV. Saudi Med J 2019; 40 (7):14-20. https://doi.org/10.15537/smj.2019.7.24304

[20] Federal Council of Dentistry. General number of specialist dental surgeons. Available from: http://website.cfo.org.br/estatisticas/quantidade-geral-de-cirurgioes-dentistas-especialistas/. [Acessed on Oct 20, 2020].

[21] Ahmed N, Shakoor M, Vohra F, Abduljabbar T, Mariam Q, Rehman MA. Knowledge, awareness and practice of health care professionals amid SARS-CoV-2, corona virus disease outbreak. Pakistan J Med Sci 2020; 36(COVID19-S4):S49-56. https://doi.org/10.12669/pjms.36.COVID19-S4.2704

[22] Almas K, Khan AS, Tabassum A, Nazir MA, Afaq A, Majeed A. Knowledge, Attitudes, and Clinical Practices of Dental Professionals during COVID-19 Pandemic in Pakistan. Eur J Dent 2020; 14(S01):S63-9. https://doi.org/10.1055/s-0040-1718785

[23] Singh Gambhir R, Singh Dhaliwal J, Aggarwal A, Anand S, Anand V, Kaur Bhangu A. Covid-19: a survey on knowledge, awareness and hygiene practices among dental health professionals in an Indian scenario. Rocz Panstw Zakl Hig 2020; 71(2):223-9. https://doi.org/10.32394/rpzh.2020.0115

[24] Kinariwala N, Samaranayake L, Perera I, Patel Z. Knowledge, awareness and perceptions of coronavirus disease 2019 (COVID-19) in a cohort of Indian dental professionals: a questionnaire-based study. Preprints 2020; 2020050442. https://doi.org/10.20944/preprints202005.0442.v1

[25] Quadri FA, Jafer MA, Alqahtani AS, Mutahar SAB, Odabi NI, Daghriri AA, et al. Novel corona virus disease (COVID-19) awareness among the dental interns, dental auxiliaries and dental specialists in Saudi Arabia: a nationwide study. J Infect Public Health 2020; 13(6):856-64. https://doi.org/10.1016/j.jiph.2020.05.010

[26] Backer JA, Klinkenberg D, Wallinga J. Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20-28 January 2020. Eurosurveillance 2020; 25(5):2000062. https://doi.org/10.2807/1560-7917.ES.2020.25.5.2000062

[27] Marui VC, Souto MLS, Rovai ES, Romito GA, Chambrone L, Pannuti CM. Efficacy of preprocedural mouthrinses in the reduction of microorganisms in aerosol: a systematic review. J Am Dent Assoc 2019; 150(12):1015-26. https://doi.org/10.1016/j.adaj.2019.06.024

[28] Sharaf RF, Kabel N. Awareness and knowledge of undergraduate dental students about the signs and symptoms of Corona viral infection (COVID-19), and the required infection control measures to prevent its spread. Bull Natl Res Cent 2021; 45(1):1-9. https://doi.org/10.1186/s42269-021-00494-1