

Knowledge of Dental Residents at Shahid Beheshti Dental School about COVID-19

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Objectives After the onset of coronavirus disease-2019 (COVID-19) pandemic in 2019, it turned out to be one of the most important issues in public health, and the healthcare community must have adequate knowledge about it; therefore, this study was conducted to evaluate the knowledge level of dental residents at Shahid Beheshti Dental School about COVID-19.

Methods The knowledge level of 104 dental residents at Shahid Beheshti Dental School about COVID-19 was evaluated with a standardized questionnaire that was developed, and its reliability and validity were confirmed. The questionnaire had 4 parts of (I) virology, basic information, and epidemiology, (II) clinical and oral manifestations, (III) prevention of virus transmission and vaccination, and (IV) diagnosis and treatment. The questionnaires were administered in both printed and online forms.

Results The overall response rate was 72%. The mean number of correctly answered questions was 7.2 ± 2.6 out of 14. Correct answers were 44.5% in virology, basic information, and epidemiology, 49.2% in clinical and oral manifestations, 48.5% in prevention of virus and vaccination, and 69% in diagnosis and treatment. The knowledge level of dental residents was weak in 12%, average in 52%, and good in 36%.

Conclusion The majority of dental residents had average knowledge about COVID-19. Considering the importance of adequate knowledge for proper diagnosis and management of COVID-19, it is suggested to arrange educational programs for dental residents' knowledge enhancement.

Keywords Knowledge; Education, Dental, Graduate; COVID-19

Introduction

In December 2019, patients with pneumonia signs and symptoms of unknown etiology were detected for the first time in Wuhan, China. This continuous spread of viral pneumonia was then identified to be the severe acute respiratory syndrome coronavirus 2.^{1,2}

The COVID-19 symptoms usually appear 2-14 days after exposure, and mainly include fever or chills, cough, shortness of breath, and difficulty breathing. Some other symptoms are tiredness, muscle or body aches, sore throat, loss of taste or smell, nausea, and vomiting. Infected people may present a wide range of symptoms from very mild to severe; some are asymptomatic, 81% of infected patients have mild symptoms, while others may suffer severe illness.³⁻⁵

The risk and severity of infection are influenced by various factors such as age, sex, systemic diseases (e.g., hypertension, diabetes mellitus, cardiac and cerebrovascular diseases), and smoking.⁶⁻⁸ Regarding age distribution, 87% of infected patients were between 30-79 years.⁹ Also, the virus mortality increases with age. The mortality rate is about 2% among patients under the age of 39 years, while it is higher among older age groups.^{10,11} However, it does not mean that younger people will not be affected by the virus. Mild symptoms have been reported in children and infants.¹¹ In addition, it is revealed that the virus infection is riskier in males compared with females.⁹

Dental and oral healthcare providers are at high risk of COVID-19 infection due to close contact with the oropharyngeal region and exposure to dental procedure-induced aerosols.¹² Since airborne droplets and particles are identified as one of the primary virus transmission routes, insufficient protection protocols increase the risk of virus

transmission in the indoor environment of dental offices.^{12,13}

Dentists should take several personal and environmental protections. As the COVID-19 virus is inactivated by water and soap, and other detergents, surface disinfection and frequent hand washing are recommended.¹⁴

Dental residents, as part of dental healthcare providers, can play a vital role in preventing and controlling virus transmission and self-infection, and timely identification and referral of suspected cases. In 2020 and 2021, studies evaluated the dental residents' knowledge level about COVID-19 in India, Nigeria, and Nepal. According to such studies, most residents had sufficient information about the COVID-19 epidemiology, diagnosis, prevention, and treatment.¹⁴⁻¹⁸ It seems that the need for COVID-19 related additional educational programs should be assessed by evaluating the dental residents' knowledge level in Shahid Beheshti Dental School. The present study aimed to assess the dental residents' knowledge about virology, basic information, and epidemiology, clinical and oral manifestations, virus transmission prevention, vaccination, diagnosis, and treatment of COVID-19. The results of this study can reveal if there is a need for additional educational programs. This study was conducted to evaluate the knowledge level of dental residents at Shahid Beheshti Dental School about COVID-19 by using a questionnaire based on the recently published articles^{2,19-28} in 2020-2022 after assessing its reliability and validity.

Methods and Materials

Study design and questionnaire:

The present descriptive cross-sectional study was conducted in the Dental School of Shahid Beheshti University of Medical Sciences, Tehran, Iran. A standardized self-administered

questionnaire was used to assess the knowledge level of dental residents about COVID-19. The initial version of the questionnaire contained 20 questions. The scientific content of the questions was based on the published articles in 2021.^{2, 19-28}

The questionnaire's validity was evaluated quantitatively and qualitatively. For qualitative assessment, 10 scientific experts, including four infectious disease specialists, five oral disease specialists, and one epidemiologist, were asked to review the questions and comment on the scientific content, grammar, compliance, word sufficiency, and appropriate order of questions based on their importance. The suggested changes were applied according to the opinion of the experts. The content validity ratio (CVR) and content validity index (CVI) were used for quantitative validity assessment. Ten experts categorized the questions as "necessary," "beneficial but not necessary," and "not necessary." For questions with inconsistent categorization, CVR was calculated. Questions with a CVR less than 0.62 were excluded. Considering the CVI, 10 experts scored the questions concerning relevance, simplicity and clearance in the next step using a four-point Likert scale (1: irrelevant, 2: somewhat relevant, 3: relevant, 4: completely relevant). For each item (i.e., relevance, simplicity and clearance), the CVI was calculated, and questions with a mean CVI less than 0.79 were excluded. After the calculation of CVR and CVI, six questions were excluded.

The Cohen's kappa coefficient (κ) was used to calculate the questionnaire's reliability. Eighteen residents answered the questions with a one-week interval. All remaining 14 questions had excellent to good reliability.

The final questionnaire consisted of two sections. The first section included questions regarding the participants' sociodemographic information (age, gender, academic year, type of practice). The second section comprised of 14 questions regarding knowledge about COVID-19 (virology, basic information and epidemiology, clinical and oral manifestations, virus prevention, vaccination, diagnosis, and treatment). From February to May 2022, the questionnaire was distributed among dental residents at Shahid Beheshti University Dental School in two formats of printed form and anonymous online link made by Porsline (an online survey software). Each resident's knowledge level was rated as good (9-14 correct answers), average (5-8 correct answers) or weak (0-4 correct answers) based on the number of correctly answered questions.

Participants:

Based on the census method, 104 residents were available and eligible for the study inclusion. Seventy-five residents participated in the survey after signing informed consent forms. Incompletely filled or disturbed questionnaires were excluded. Before the onset of the study, the participants were informed about the study objectives. They were also ensured about the anonymous use of questionnaires and reporting the collected data as groups. Ethical approval for this study was obtained from the ethical committee of Shahid Beheshti University of Medical Sciences, Tehran, Iran with the approval number IR.SBMU.DRC.REC.1400.143.

Statistical analysis:

Statistical analysis of the final results was conducted by SPSS® (Statistical Package for Social Sciences Version 20, SPSS Inc., Chicago, IL, USA). The mean and standard deviation values were used for quantitative data presentation, and qualitative data were reported as frequency and percentage. Data were analyzed by independent t-test, one-way ANOVA, and Fisher's exact test. $P < 0.05$ was considered statistically significant.

Results

A total of 75 participants completed the questionnaire. Forty-seven percent of the participants were males, and 53% were females; 89% were under 30 years of age. The age range was between 25 to 40 years. Most respondents were in their second and third year of education (64%). Oral and maxillofacial surgery (26%) and endodontics (11%) residents comprised a larger part of the study population.

Younger residents (25-30 years old) had a mean correct answer of 7.2 while it was 8.7 in elders; however, based on the results of independent t-test, the difference was not statistically significant ($P = 0.252$). The mean number of correct answers was 7.6 in males and 7 in females. Independent t-test did not reveal a statistically significant difference in the knowledge level of males and females ($P = 0.385$). Regarding the academic year, 4th and 5th year residents had higher mean number of correct answers (8 and 10.6, respectively); the difference between the groups was not statistically significant ($P = 0.260$). In addition, while radiology, restorative dentistry, and pediatric dentistry residents had higher mean number of correct answers, the Fisher's exact test did not show a statistically significant correlation between COVID-19 knowledge and specialty ($P = 0.290$, Table 1).

Most participants correctly knew that the Delta variant has a higher mortality rate than the Alpha and Beta variants ($n = 53$, 71%); however, few residents recognized the Lambda variant as the most infectious ($n = 13$, 18%). Regarding the COVID-19 symptoms, 50 (67%) residents correctly reported that most infected patients are asymptomatic. Only 27 (36%) residents knew that loss of taste and smell are early symptoms of COVID-19 infection and last for a long time after infection. About half of the residents correctly identified xerostomia as one of the primary manifestations of COVID-19 ($n = 44$, 59%) and 36 (48%) reported that inflammation of oral tissue and periodontitis could be among the COVID-19 oral symptoms. Most residents did not know that gastrointestinal complications are the most prevalent after respiratory symptoms ($n = 48$, 64%). Considering the effective personal protective equipment, 43 (57%) residents correctly realized that face shields are practical prevention tools. In contrast, a higher percentage of the participants were unaware of the efficacy of surgical masks ($n = 54$, 70%) and hydrogen peroxide mouthwash ($n = 46$, 61%). Also, 51 (68%) residents correctly pointed out the optimal efficacy of vaccination against all variants, including the Delta variant. Almost half of the residents knew that PCR rather than chest X-ray might be

able to identify COVID-positive cases at early stages of disease (n=42, 56%). A higher number of residents were correctly aware of mucormycosis as one of the COVID treatment-related complications, and they knew that remdesivir is not a definite COVID treatment (n=47, 63%) (Table 2). The most and the least frequent correct answers were related to diagnosis and treatment (section 4) and

virology, basic information, and epidemiology topics (section 1), respectively (Table 3). It was also found that 52% (n=39) of residents had a moderate knowledge level regarding COVID-19 (5-8 correct answers), 36% (n=27) had good (9-14 correct answers) and 12% (N=9) had poor knowledge (0-4 correct answers) in this regard.

Table 1 Frequency of correct and incorrect answers according to the sociodemographic characteristics of the participants

Variable	Mean correct answers	Mean incorrect answers	Mean "don't know" answers
Age groups			
< 30 years	7.2 ± 2.4	3.4 ± 1.9	3.4 ± 2.1
≥ 30 years	8.7 ± 3.7	2.1 ± 1.4	3.2 ± 4.7
P = 0.252			
Gender			
Male	7.6 ± 2.4	2.9 ± 1.8	3.5 ± 2.2
Female	7 ± 2.8	3.5 ± 1.9	3.5 ± 2.8
P = 0.385			
Specialty			
Oral medicine	6.2 ± 1.5	6.2 ± 1.4	1.6 ± 0.5
Periodontics	6 ± 1.2	4 ± 1.4	4 ± 1.5
Oral and maxillofacial surgery	7.8 ± 2.5	2.8 ± 1.4	3.4 ± 2.0
Endodontics	6 ± 2.8	2.4 ± 1.6	5.6 ± 3.7
Prosthodontics	6.6 ± 1.9	2.8 ± 2.4	4.6 ± 2.6
Orthodontics	6 ± 3.1	2.7 ± 0.5	5.3 ± 2.9
Restorative dentistry	8.7 ± 2.1	2.4 ± 1.5	2.9 ± 2.3
Dental materials	5.6 ± 4.7	4.6 ± 3.2	3.7 ± 1.5
Community dentistry	5.2 ± 1.2	4.8 ± 1.5	4 ± 2.0
Radiology	11.2 ± 1.0	2.5 ± 1.2	0.3 ± 0.5
Pediatric dentistry	9.4 ± 2.1	2.8 ± 1.8	1.8 ± 2.0
P = 0.290			
Academic year			
1 st year	7 ± 2.1	2.8 ± 1.9	4.2 ± 1.6
2 nd year	7.2 ± 3.1	3.6 ± 2.0	3.2 ± 2.4
3 rd year	7.2 ± 2.6	3.2 ± 1.9	3.6 ± 3.1
4 th year	8 ± 1.8	3.3 ± 0.5	2.7 ± 2.2
5 th year	10.6 ± 1.1	3 ± 1.0	0.4 ± 0.5
P = 0.260			
Total	7.2 ± 2.6	3.4 ± 1.9	3.4 ± 2.5

Table 2- Frequency of correct and incorrect answers to each question

Question topic	Correct answers	Incorrect answers	Not answered
	N (%)	N (%)	N (%)
1.Variants' mortality (Alpha, Beta, Delta)	53 (71)	10 (13)	12 (16)
2.Variants' infectivity	13 (18)	31 (41)	31 (41)
3.Symptoms of COVID-19	50 (67)	12 (16)	13 (17)
4.Complications of COVID-19 (renal V.S. gastrointestinal)	27 (36)	22 (29)	26 (35)
5.Symptoms' prevalence	27 (36)	24 (32)	24 (32)
6.Primary manifestations of COVID-19 (Xerostomia)	44 (59)	16 (21)	15 (20)
7.Oral symptoms of COVID-19	36 (48)	11 (15)	28 (37)
8.Personal protective equipment for COVID-19 (face shield)	43 (57)	20 (27)	12 (16)
9.COVID-19 prevention in dental office	29 (39)	16 (21)	30 (40)
10.Vaccine efficacy	51 (68)	13 (17)	11 (15)
11. Personal protective equipment for COVID-19 (N95 vs. surgical mask)	22 (30)	31 (41)	22 (29)
12.Early diagnosis (PCR vs. chest X-ray)	42 (56)	22 (29)	11 (15)
13.Complications of COVID-19 (mucormycosis)	66 (88)	3 (4)	6 (8)
14.Treatments of COVID-19 (remdesivir)	47 (63)	11 (15)	17 (22)

Table 3- Percentage of answers to each section 1: Virology, basic information and epidemiology, 2: Clinical and oral manifestations, 3: Prevention of virus transmission and vaccination, 4: Diagnosis and treatment

Question topic (question number)	Correct answers (%)	Incorrect answers (%)	Not answered (%)
Virology, basic information and epidemiology ^{1,2}	44.5	27	28.5
Clinical and oral manifestations ³⁻⁷	49.2	22.6	28.2
Prevention of the virus transmission and vaccine ⁸⁻¹¹	48.5	26.5	25
Diagnosis and treatment ¹²⁻¹⁴	69	16	15

Discussion

Considering the vital role of healthcare professionals in controlling coronavirus transmission, diagnosis of suspected cases, appropriate patient referral, prevention of self-infection and education of others, various studies have been conducted evaluating the COVID-19 knowledge level of healthcare staff. However, the knowledge level of dental residents in this regard in Iran has not been well investigated. The present study aimed to assess the dental residents' knowledge about COVID-19 at Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Seventy-five dental residents, including 35 males (47%) and 40 females (53%) between 25 and 40 years participated in this study. The study population consisted of five oral medicine, four radiology, three dental materials, four community dentistry, seven periodontology, 19 oral and maxillofacial surgery, seven restorative dentistry, eight endodontics, five pediatric dentistry, and four orthodontics residents. The mean frequency of participants' correct answers was 7.2 ± 2.6 . Of all, 12% of the participants had poor knowledge, and 52% and 36% had average and good knowledge scores, respectively. The highest number of correct answers was related to diagnosis and treatment, while the residents' knowledge was the lowest about the virology, basic information, and epidemiologic contents. Behfarnia et al. conducted a similar study among dentists in Isfahan, Iran. They reported moderate to high COVID-19 knowledge levels in 87.4% of participants, which was consistent with the present study's findings.²⁹ These findings indicate the need for extra educational programs concerning the weak points. Conversely, Singh et al. reported that 221 (69%) participants acquired low and moderate knowledge scores, and only 99 (31%) had high knowledge level about COVID-19.¹⁷ Also, more than 80% of the participants in previous studies had good knowledge levels.^{15,30-32} Different types of questions might explain variations in the results. For instance, the questionnaire used by Jha et al. comprised of questions regarding prevention and virus pathogenesis.³⁰ In addition, 92.7% of dentists participating in the study by Kamate et al. had adequate knowledge. Participants' multinationalism and vast scope of the study can be the reason for different results compared with our assessment.¹⁶ Acceptable knowledge levels were also reported in studies by Zhao et al.,³³ Quadri et al.,¹⁸ Aragão et al.,³⁴ Basheer et al.,³⁵ and Sotomayor et al.³⁶

Our study found no statistically significant correlation between the knowledge level and participants' sociodemographic characteristics (i.e., sex, age, specialty and

academic year). These findings were in agreement with those of Behfarnia and Jha et al.^{29,30}

In a study by Aldhuwayhi et al, oral and maxillofacial surgery residents gained the highest knowledge score, followed by prosthodontics and periodontics residents.³² In the present study, the highest scores belonged to radiology, pediatric dentistry, and restorative dentistry residents. Yet the difference was not statistically significant. Smaller sample size might be the reason for this inconsistency. In the present study, there was no significant correlation between sex and knowledge score.

Previous studies indicated that educational year significantly affected the COVID knowledge. Quadri et al. reported that participants with higher level of education had significantly higher COVID-19 knowledge.¹⁸ The same results were reported by Singh et al, and Jha et al. in India and the UAE^{17,30}; however, the knowledge level difference between the first to fifth year residents was not statistically significant in the present study. This might be due to smaller number of participants in the first year of dental residency.

Based on the study by Zhao et al, where most respondents had an acceptable COVID knowledge level, dental school education can substantially update the residents' COVID-19 information.³³ The social media and health authorities also positively affect the public awareness regarding the COVID-19.^{32,36} Nevertheless, it seems that academic education and the media can be used as practical sources of information.

One limitation of the present study was the small sample size and inaccessibility of the participants because of the COVID-19 protection protocols. To bypass this limitation, the questionnaire was provided in two forms of printed and online. Further studies in other medical and dental schools with a larger number of participants are suggested.

Conclusion

Our findings indicated that most residents had moderate COVID-19 knowledge level. Diagnosis and treatment-related knowledge level was good. However, the knowledge level of residents regarding basic information, clinical and oral manifestations, virus transmission prevention and vaccines was poor. Concerning the importance of residents' knowledge about COVID, educational programs are suggested to improve their knowledge level.

Conflict of Interest

No Conflict of Interest Declared ■

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