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Cross-Sectional Study

Evaluating the Pandemic's Effect on Clinical Skill Development Among Dental Students

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ABSTRACT

Many policies are being put in place to ensure that during the pandemic, human-to-human contact is minimized. The importance of screening and triaging patients before starting any dental procedures is heavily emphasized. Dentists are advised to wear face shields, facemasks (preferably N-95), and personal protective equipment (PPE) kits. Our study intends to fill in the gaps in the previous papers by comparing the clinical skills of undergraduate students at King Saud University in the COVID-19 clinical scenario to those of students who hadn't studied dentistry under the same circumstances. Four groups of undergraduate students representing various undergrad batches and their corresponding clinical performance over their undergraduate years participated in cross-sectional questionnaire-based research. Graduates served as the control group for interns since they graduated without the COVID-19 precautions having an impact on their clinical performance. We enquired about a fifth-year student's clinical performance both with and without the safeguards. Additionally, we found no discernible difference in the simple situations (S, S+). One of the advanced case criteria (M, M+, M++) showed a notable variation, nevertheless, with M denoting the least complex form and M++ denoting the most complex, depending on the severity of the situation and the number of specialties involved. When comparing undergraduate dentistry students at King Saud University who studied COVID-19 precautions to those who did not, the former's clinical performance suffered.

Keywords: COVID-19, Clinical skills, Dental students, Pandemic

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Introduction

Following the sudden emergence of the highly contagious severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), commonly referred to as COVID-19, in early 2020, dentistry was identified as a high-risk occupation [1-3]. When the World Health Organisation (WHO) declared the pandemic on March 11, 2020, lockdowns and curfews were implemented globally right away [4].

The likelihood of infection with COVID-19 is extremely high. Transmission might be either direct or indirect. Aerosols [5], anal (for-oral) secretions, tears, saliva, sperm, and mother-to-child transmission [6] are among the ways that the disease can spread directly. An indirect method of transmission is by fomites. The risk of virus propagation may arise from the underestimation of some of these modes of transmission. Limiting human-to-human contact, disinfecting commonplace items, and practicing excellent self-hygiene—which includes frequent hand washing, using face masks, and coughing and sneezing properly—are all essential to stopping the virus's spread. Reducing transmission requires social

separation. Medical practice has been significantly impacted by SARS-CoV-2. Health professionals must wear PPE to reduce the risk of transmission. Knowledge about SARS-CoV-2 is still growing quickly, and further study is required to look into potential alternate modes of transmission [7].

The virus is thought to have started at Wuhan University in China, where a dentist was reported to have contracted it on January 23, 2020. Other medical personnel were subsequently tested [8, 9].

Dentistry as a profession came to a complete standstill as a consequence of the city authorities' recommendation that, absent an emergency, dentist appointments be rescheduled [10, 11]. Apart from the absence of preventive dental care, the enforced stay-at-home orders will negatively impact oral health because of food modifications, financial worries, general worry, and—above all—fear of infection [12]. Patients must break the one-meter safe distance and have dental procedures that produce aerosols to practice dentistry. The interim suggestion called for the suspension of all non-essential dental procedures [13, 14].

Many policies have been put in place to ensure that during the pandemic, human-to-human contact is minimized. The importance of screening and triaging patients before starting any dental procedures is heavily emphasized. Dentists are advised to wear face shields, facemasks (preferably N-95), and personal protective equipment (PPE) kits. Infection control and bio-waste management are closely adhered to, aerosol production is kept to a minimum, and the operatory is adequately ventilated [15, 16].

The dental profession is facing a new obstacle as a result of COVID-19, which is changing dentistry. The future and sustainability of dental professionals in practice and education depend on their capacity to adjust to post-COVID dentistry and adhere to these new norms and principles. From the delivery of dental education to the execution of dental procedures, dentistry has been forced to adapt.

The Saudi Ministry of Health restricted dental practice to urgent medical attention due to the COVID-19 pandemic on March 15, 2020. As a result, all dental schools were forced to shut down their student clinics and change their emphasis to more hypothetically orientated instruction. During the acute phase of the pandemic, one article examined the impact of COVID-19 on dental education and practice in France [6, 17]. It concluded that basic dental services should be relied upon, and prescriptions for analgesics and other medications should be given. “Dentistry Amidst the COVID-19 Pandemic: Knowledge, Attitude, and Practices Among the Saudi Arabian Dental Students” is another article that was published here in Saudi Arabia. Almulhim *et al*. [18] placed less attention on the impact of clinical skills on undergraduate students and more on the attitude and knowledge around the illness. Lastly, one study evaluated how online learning affected dentistry education in Asia during the pandemic [19], but it made no mention of how it affected dental undergraduates' clinical performance. Our study intends to fill in the gaps in the previously stated papers by comparing the clinical skills of undergraduate students at King Saud University in the COVID-19 clinical scenario to those of students who hadn't studied dentistry under the same circumstances.

Materials and Methods

A cross-sectional questionnaire-based study was conducted among undergraduate students consisting of 4 different groups representing different undergrad batches and their respective undergrad year clinical performance. Graduates will be the control group since this group graduated without the COVID-19 precautions affecting their clinical performance whilst being the control for interns, interns will represent clinical performance in undergrad 5th year whilst being the control for 5th-year students, 5th-year students will represent clinical performance in undergrad 4th year whilst being the control for 4th-year students, and finally, 4th-year students will represent clinical performance in undergrad 3rd year. Each group ranges from 60 to 100 individuals making the total sample size approximately 400.

Data can be easily monitored and collected via digital means, which will be evaluated by a statistician using a Chi-square statistic plan.

After collection, the raw data will be checked and cleaned and will be analyzed using SPSS software [version 25]. Frequencies and percentages were calculated to describe respondents' profiles and questionnaire questions. One-way analysis of variance (ANOVA) was used to measure the impact of these precautions on the clinical performance of dental students. A P-value < 0.05 was considered significant.

Results and Discussion

A total of 203 replies were attained from Undergraduates and new students who finished college where 160 (78.8%) were males while 43 (21.2%) were female.

We questioned the fifth-year students on their clinical activity both with and without the safeguards. Comprehensive dental management course, DEN493. Additionally, we found no discernible difference in the

simple situations (S, S+). Nevertheless, there was a notable variance in one of the advanced case criteria (M, M+, M++), where (M) denotes the least difficult form of the advanced cases and (M++) denotes the most complex, depending on the extent of the situation and the number of specialties included **(Table 1)**.

Additionally, we enquired about how well they performed clinically in POS 493 (Paediatric Dentistry). **Tables 2 and 3** demonstrate the notable distinctions between the methods for pulpotomies and stainless-steel crowns.

With and without the safeguards, we also conducted interviews with fourth-grade students regarding their clinical performance in the clinical prosthodontics course. Additionally, there was no discernible difference between the outcomes of detachable partial dentures and complete dentures. Nonetheless, **Table 4** shows a notable variation in the quantity of crowns performed.

When we asked them how they performed in their clinical endodontics course, we discovered that there was a substantial difference between the two and three to four canal treatments that were completed, but not between the single canal treatments **(Tables 5 and 6)**.

Additionally, we enquired about their clinical performance in the clinical pediatric dentistry course, observing notable variations in the number of pulpotomies and stainless-steel crowns performed. The results are displayed in **Table 5**.

Additionally, we enquired about their clinical performance during their clinical training in operational dentistry. Additionally, there was a substantial difference between courses II and III completed, but not between classes I, IV, or V completed. as shown in **Table 7**.

Last but not least, we polled third-year students regarding their clinical performance with and without the safety measures. Class II, III, and V procedures completed during their operative dentistry course did not differ significantly. Class I and IV performed very differently, nevertheless. as shown in **Table 6**.

Additionally, when we asked them about their clinical performance during their clinical periodontology course, we found no statistically significant difference between the number of cases of gum inflammation and periodontitis they accomplished.

We also asked them about their clinical performance throughout their course on clinical oral surgery. Additionally, there was a notable variation in the quantity of extractions carried out.

Table 1. Response to questions

			In which year are you currently in?			
			Graduate (5th year without precautions)	**Interns (5th year with precautions)**	**Total**	**Statistic**
In 5th year: regarding course DEN493, please answer how many of each of the following you (M++)	0	N	16	66	82	$X^2 = 34.093$ Df = 2 P = 0.000
		%	42.1%	91.7%	74.5%	
	1	N	15	6	21	
		%	39.5%	8.3%	19.1%	
	2	N	6	0	6	
		%	15.8%	0.0%	5.5%	
	3	N	1	0	1	
		%	2.6%	0.0%	0.9%	
Total		N	38	72	110	
		%	100%	100%	100%	

Table 1 shows that out of 110 respondents, among the respondents (Graduate (5th year without precautions)) 16 (42.1%) (M++ = 0), 15 (39.5%) (M++ = 1), 6 (15.8%) (M++ = 2) and 1 (2.6%) (M++ = 3). The association between the precautions in the 5th year and [M++] in DEN493 was statistically significant (χ^2 = 34.093, df = 2, P = 0.000).

Table 2. Response to questions regarding performing stainless steel crown.

			In which year are you currently in?			
			Graduate (5th year without precautions)	**Interns (5th year with precautions)**	**Total**	**Statistic**
	0	N	2	7	19	$X^2 = 27.315$

In 5th year: regarding course POS493 (PEDO), please answer how many of each of the following you (stainless steel crown)		%	5.3%	23.6%	17.3%	Df = 3 P = 0.000
	1-2	N	17	49	66	
		%	44.7%	68.1%	60.0%	
	3-4	N	15	6	21	
		%	39.5%	8.3%	19.1%	
	5+	N	4	0	4	
		%	10.5%	0.0%	3.6%	
Total		N	38	72	110	
		%	100%	100%	100%	

Among the 110 responses (Graduate (5th year without precautions), **Table 2** reveals that 2 (5.3%) had a stainless steel crown of 0, 17 (44.7%) had a stainless steel crown of 1-2, 15 (39.5%) had a stainless steel crown of 3-4, and 4 (10.5%) had a stainless steel crown of = 5+. There was a statistically significant correlation between the precautions taken in the fifth year and [stainless steel crown] in POS493 (PEDO) (χ^2 = 27.315, df = 2, P = 0.000). Additionally, of the 110 responders, 1 (2.6%) had a pulpotomy of 0 (Graduate, 5th year without precautions), 18 (47.2%) had a pulpotomy of 1–2, 15 (39.5%) had a pulpotomy of 3–4, and 4 (10.5%) had a pulpotomy of 5+. A statistically significant correlation was seen between the fifth-year precautions and [pulpotomy] in POS493 (PEDO) (χ^2 = 37.153, df = 3, P = 0.000).

Table 3. Responses to questions

			In which year are you currently in?			
			Interns studied in 4th year without precautions	**5th studied in 4th year with precautions**	**Total**	**Statistic**
In 4th year: regarding course SDS433 (FIXED), please answer how many of each of the following you (Crown)	0	N	6	5	11	X^2 = 21.230 Df = 3 P = 0.000
		%	8.3%	12.5%	9.8%	
	1-2	N	32	33	65	
		%	44.4%	82.5%	58.0%	
	3-4	N	28	2	30	
		%	38.9%	5%	26.8%	
	5+	N	6	0	6	
		%	8.3%	0.0%	5.4%	
Total		N	72	40	112	
		%	100%	100%	100%	

Of 112 respondents, 4 (5.6%) (two canals = 0), 62 (86.1%) (two canals = 1-2), and 6 (8.3%) (two canals = 3-4) were among the respondents (interns studying in their fourth year without precautions), according to **Table 3**. There was a statistically significant correlation between the fourth-year precautions and [two canals] in RDS423 (ENDO) (χ^2 = 16.754, df = 2, P = 0.000). Additionally, of the 112 respondents, 6 (8.3%) (Crown = 0), 32 (44.4%) (Crown = 1-2), 28 (38.9%) (Crown = 3-4) and 6 (8.3%) (Crown = 5+) were interns who studied in their fourth year without taking any measures. A correlation of statistical significance was seen between the precautions taken in the fourth year and [Crown] in SDS433 (FIXED) (χ^2 = 21.230, df = 3, P = 0.000).

Table 4. Response to questions

			In which year are you currently in?			
			Interns studied in 4th year without precautions	**5th studied in 4th year with precautions**	**Total**	**Statistic**
In 4th year: regarding course RDS423 (ENDO), please answer how many of each of the following you (Three or four canals)	0	N	49	32	81	X^2 = 1.833 Df = 1 P = 0.000
		%	68.1%	80.0%	72.3%	
	1-2	N	23	8	31	
		%	31.9%	20.0%	27.7%	

Total	N	72	40	112
	%	100%	100%	100%

Table 4 demonstrates that, of the 112 respondents, 49 (68.1%) (three or four canals = 0) and 23 (31.9%) (three or four canals = 1-2) were interns studying in their fourth year without taking any measures. There was a statistically significant correlation between the fourth-year precautions and [three or four canals] in RDS423 (ENDO) (χ^2 = 1.833, df = 1, P = 0.176). Additionally, 8 (11.1%) of the 112 respondents (interns studying in their fourth year without safeguards) had a stainless steel crown of zero, 51 (70.8%) had a stainless steel crown of one to two, and 13 (18.1%) had a stainless steel crown of three to four. There was a statistically significant correlation between the fourth-year precautions and [stainless steel crown] in POS413 (PEDO) (χ^2 = 6.362, df = 2, P = 0.042).

Table 5. Response to questions

			In which year are you currently in?			
			Interns studied in 4th year without precautions	**5th studied in 4th year with precautions**	**Total**	**Statistic**
In 4th year: regarding course POS413 (PEDO), please answer how many of each of the following you (Pulpotomy)	0	N	14	15	29	X^2 = 6.471 Df = 2 P = 0.039
		%	19.4%	37.5%	25.9%	
	1-2	N	53	25	78	
		%	73.6%	62.5%	69.6%	
	3-4	N	5	0	5	
		%	6.9%	0.0%	4.5%	
Total		N	72	40	112	
		%	100%	100%	100%	

According to **Table 5**, of the 112 respondents, 14 (19.4%) (Pulpotomy = 0), 53 (73.6%) (Pulpotomy = 1-2), and 5 (6.9%) (Pulpotomy = 3–4) were interns studying in their fourth year without taking any measures. A statistically significant correlation was seen between the fourth-year precautions and [pulpotomy] in POS413 (PEDO) (χ^2 = 6.471, df = 2, P = 0.039).

Additionally, of the 112 respondents, 1 (1.4%) (Class II restoration =0), 3 (4.2%) (Class II restoration =1-2), 43 (59.7%) (Class II restoration =3-4) and 25 (34.7%) (Class II restoration =5+) were interns studying in their fourth year without taking any measures. There was a statistically significant correlation between the fourth-year precautions and [Class II restoration] in RDS413 (RESTO) (χ^2 = 13.882, df = 3, P = 0.003).

Table 6. Response to questions

			In which year are you currently in?			
			Interns studied in 4th year without precautions	**5th studied in 4th year with precautions**	**Total**	**Statistic**
In 4th year: regarding course RDS413 (RESTO), please answer how many of each of the following you (Class III restoration)	0	N	2	7	9	X^2 = 13.838 Df = 2 P = 0.001
		%	2.8%	17.5%	8.0%	
	1-2	N	39	27	66	
		%	54.2%	62.5%	58.9%	
	3-4	N	31	6	37	
		%	43.1%	15.0%	33.0%	
Total		N	72	40	112	
		%	100%	100%	100%	

Of 112 respondents, 2 (2.8%) (Class III restoration = 0), 39 (54.2%) (Class III restoration = 1-2), and 31 (43.1%) (Class III restoration = 3-4) were interns studying in their fourth year without taking any measures, according to **Table 6**. There was a statistically significant correlation between the fourth-year precautions and [Class III restoration] in RDS413 (RESTO) (χ^2 = 13.838, df = 2, P = 0.001). In addition, of the 93 respondents, 3 (0.0%) studied in their fourth year without taking any measures, 6 (15.0%) studied in

their first two years (Class I restoration = 1-2), 17 (42.5%) studied in their third year (Class I restoration = 3-4) and 17 (42.5%) studied in their fifth year (Class I restoration = 5+). There was a statistically significant correlation between the third-year precautions and [Class I restoration] in RDS413 (RESTO) ($\chi^2 = 10.302$, df = 3, P = 0.016).

Table 7. Response to questions

			In which year are you currently in?			
			5th studied in 3rd year without precautions	**4th studied in 3rd year with precautions**	**Total**	**Statistic**
In 3rd year: regarding course RDS413 (RESTO), please answer how many of each of the following you (Class IV restoration)	0	N	11	32	43	$X^2 = 10.647$ Df = 2 P = 0.005
		%	27.5%	60.4%	46.2%	
	1-2	N	27	18	45	
		%	67.5%	34.0%	48.4%	
	3-4	N	2	3	5	
		%	5.0%	5.7%	5.4%	
Total		N	40	53	93	
		%	100%	100%	100%	

Of 93 respondents, **Table 7** reveals that 11 (27.5%) had Class IV restoration = 0, 27 (67.5%) had Class IV restoration = 1-2, and 2 (5.0%) had Class IV restoration = 3-4. The third respondent studied in the fourth year without taking any precautions. A correlation with statistical significance was found between the third-year precautions and [Class IV restoration] in RDS413 (RESTO) ($\chi^2 = 10.647$, df = 2, P = 0.005). Additionally, among the 93 respondents, 0 (0.0%) (Extraction = 0), 10 (25.0%) (Extraction = 1-2), 16 (40.0%) (Extraction = 3-4), and 14 (35.0%) (Extraction = 5+) were third-year students who did not take any precautions during their fourth year of study. There was a highly significant correlation between the third-year precautions and [extraction] in MFS311 (SURGERY) ($\chi^2 = 9.625$, df = 3, P = 0.022**).**

The present research examined the impact of COVID-19 precautions on the clinical performance of King Saud University undergraduate dental students, including both recent graduates and undergraduates who trained with and without the safety measures. We looked at the results and discovered that the measures hurt every examined year.

First, the fifth undergraduate year was examined using recent graduates as a control group. These students studied the fifth year in a clinical setting without any precautions, while interns studied the fifth year in a clinical setting with safeguards. Five of the ten variables that were statistically examined showed a significant difference in favor of the pupils who did not take precautions. These include the quantity of [M++] cases in their whole course of therapy. The number of extractions, pulpotomies, space maintainers, and stainless steel crowns performed during their pediatric course.

Second, the number of crowns, posts, and/or cores completed in their prosthodontics course; the number of (RCTs) performed for two canals; and the number of RCTs performed for 3 or 4 canals in their endodontics course were all significantly different for the fourth undergraduate year when interns were used as a control group and studied for the fourth year in a clinical setting without precautions compared to fifth-year students who investigated for the fourth year in a clinical setting with precautions. As well as the number of Stainless steel crowns, pulpotomies, and space maintainers have done in their pediatric course. Several class II and class III composite restorations are conducted in their restoration classes.

Last but not least, the third undergraduate year was examined using fifth-year students as a control group, who studied the third year in a clinical setting without any precautions, and fourth-year students, who studied the third year in a clinical context with precautions. Three out of the nine factors that were analyzed showed a significant difference in favor of pupils who did not take precautions. These include the quantity of class I and class IV composite restorations completed during surgery. How many extractions do they perform during their clinical surgery course?

We believe there were several reasons why students who studied during COVID-19 did not perform well in clinical settings. To accomplish social distancing and lower the chance of illness transmission, students were first split into two groups (Groups A and B). One group was required to attend their clinical session for a week, Conversely, the other group participated in online lectures. Second, students who were suspected of carrying the virus had to be cleared by the infection control department after being suspended for 14 days.

Third, because of a shortage of clinical personnel, the hospital prioritized emergency care over educational patients. To accommodate the growing demand for COVID-19 cases, King Khalid University Hospital (KKUH) had to limit the amount of dental assistants on staff. Last but not least, two primary factors contributed to the decline in patient flow: limited access to dental care and anxiety about contracting an infection at the dental clinic [12].

Conclusion

Following the evaluation and analysis of the results from the surveys given to several groups, each of which represented the affected and unaffected populations for the year. We concluded that the COVID-19 pandemic-related precautions negatively impacted clinical performance in each of the three, fourth, and fifth years that were represented. In the fifth year, we observed a significant difference in five out of the ten variables that were examined. In the fourth year, 10 of the 19 variables that were evaluated showed a significant difference. In the third year, three of the nine factors showed a significant difference. Third-year students were the least impacted by the COVID-19 pandemic precautions, while fifth-year students were the most afflicted. Overall, we found that, in comparison to students who did not study during the COVID-19 restrictions, the clinical performance of King Saud University undergraduate dentistry students who studied during these safety measures was impacted.

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References

1. Alghamdi A, Ibrahim A, Alraey M, Alkazemi A, Alghamdi I, Alwarafi G. Side effects following COVID-19 vaccination: a cross-sectional survey with age-related outcomes in Saudi Arabia. J Adv Pharm Educ Res. 2021;11(3):119-25.
2. Siyal FJ, Shaikh ZA, Ahmed SZ, Shahid MA, Agha F, Khoso M, et al. Anxiety among COVID-19 physicians during the pandemic in the health care center of the rural region. Arch Pharm Pract. 2020;11(4):91-3.
3. Al-Tukmagi H, Allela OQ, Fawzi HA, Fakhri DH. National survey: knowledge, attitude and practice towards COVID-19 among Iraqi pharmacy students. Arch Pharm Pract. 2021;12(2):54-9.
4. WHO. Coronavirus disease (COVID-19) situation report 51. 2020. Available from: www.who.int/emergencies/diseases/novel-coronavirus-2019
5. Amante LFLS, Afonso JTM, Skrupskelyte G. Dentistry and the COVID-19 outbreak. Int Dent J. 2021;71(5):358-68. doi:10.1016/j.identj.2020.12.010
6. Tonkaboni A, Amirzade-Iranaq MH, Ziaei H, Ather A. Impact of COVID-19 on dentistry. Adv Exp Med Biol. 2021;1318:623-36. doi:10.1007/978-3-030-63761-3_34
7. Karia R, Gupta I, Khandait H, Yadav A, Yadav A. COVID-19 and its modes of transmission. SN Compr Clin Med. 2020;2(10):1798-801. doi:10.1007/s42399-020-00498-4
8. Peng X, Xu X, Li Y, Cheng L, Zhou X, Ren B. Transmission routes of 2019-nCoV and controls in dental practice. Int J Oral Sci. 2020;12(1):9. doi:10.1038/s41368-020-0075-9
9. Smales FC SL. Maintaining dental education and specialist dental care during an outbreak of a new coronavirus infection. Part 1: a deadly viral epidemic begins. Br Dent J. 2003;22:557-61. doi:10.1038/sj.bdj.4810723
10. Meng L, Hua FBZ. Coronavirus disease 2019 (COVID-19): emerging and future challenges for dental and oral medicine. J Dent Res. 2020;99(5):481-7. doi:10.1177/0022034520914246
11. Guida A, Carotenuto A, Lanza V, Antonucci F, Salerno P, Marasca D, et al. Dental emergencies and Coronavirus disease-2019: scoping review of the literature and single Centre experience. Dent J (Basel). 2022;10(5):91. doi:10.3390/dj10050091
12. Campagnaro R, Collet GO, Andrade MP, Salles JPDSL, Calvo Fracasso ML, Scheffel DLS, et al. COVID-19 pandemic and pediatric dentistry: fear, eating habits and parent's oral health perceptions. Child Youth Serv Rev. 2020;118:105469. doi:10.1016/j.childyouth.2020.105469
13. Wang C, Horby PW, Hayden FG GG. Concern, a novel coronavirus outbreak of global health. Lancet. 2020;395(10223):470-3. doi:10.1016/S0140-6736(20)30185-9
14. Wu KY, Wu DT, Nguyen TT, Tran SD. COVID-19's impact on private practice and academic

dentistry in north America. Oral Dis. 2021;27:684-7. doi:10.1111/odi.13444

15. Turkistani K, Turkistani K. Dental risks and precautions during COVID-19 pandemic: a systematic review. J Int Soc Prev Community Dent. 2020;10(5):540-8. doi:10.4103/jispcd.JISPCD_295_20
16. Ruskin KJ, Ruskin AC, Musselman BT, Harvey JR, Nesthus TE, O'Connor M. COVID-19, personal protective equipment, and human performance. Anesthesiology. 2021;134(4):518-25. doi:10.1097/ALN.0000000000003684
17. Gaudin A, Arbab-Chirani R, Pérez F. Effect of COVID-19 on dental education and practice in France. Front Dent Med. 2020;1:5. Available from: https://www.frontiersin.org/articles/10.3389/fdmed.2020.00005/full
18. Almulhim B, Alassaf A, Alghamdi S, Alroomy R, Aldhuwayhi S, Aljabr A, et al. Dentistry amidst the COVID-19 pandemic: knowledge, attitude, and practices among the Saudi Arabian dental students. Front Med (Lausanne). 2021;8:654-524. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8058223/
19. Chang TY, Hsu ML, Kwon JS, Kusdhany ML, Hong G. Effect of online learning for dental education in Asia during the pandemic of COVID-19. J Dent Sci. 2021;16(4):1095-101. Available from: https://www.sciencedirect.com/science/article/pii/S1991790221001173