

## Original Article

# Effect of Covid-19 Pandemic on Dental Education: A Questionnaire Based Institutional Study

Krishna Sireesha Sundaragiri<sup>1</sup>, Sandeep Tandon<sup>2</sup>, Bharat Sankhla<sup>3</sup>, Shikha Saxena<sup>4</sup>, Anupama Gaur<sup>5</sup>, Akshay Bhargava<sup>6</sup>, Syed Yawar Husain<sup>7</sup>

<sup>1,3,4,6</sup>Associate Professor, Department of Oral Pathology and Microbiology; <sup>2</sup>Senior Professor, Department of Pedodontics; <sup>5</sup>Associate Professor, Department of Public Health Dentistry; <sup>7</sup>Associate Professor, Department of Dental Materials, RUHS College of Dental Sciences, Jaipur, Rajasthan, India

DOI:10.37821/ruhsjhs.6.4.2021.393

### ABSTRACT

### INTRODUCTION

**Introduction:** COVID-19 infection has impacted all walks of dentistry and dental educators, students are equally affected by the pandemic. An effort to recognize the students' problems could play a major role in determining the future policy and guidelines in the dental education sector.

**Methodology:** An online survey of 25 close-ended questions including a four-point Likert scale was sent to dental undergraduate students of a Government Dental Institute that focused on their perception and impact of COVID-19 pandemic on their academic schedule that was undertaken during COVID-19 pandemic.

**Results:** A total of 106 dental undergraduate students responded with a 72.1% response rate. Almost 90% of the respondents were attending all the classes using their own smart/mobile phones. 68.9% of all respondents felt traditional classroom learning was effective compared to 18.9% who felt both were equally effective. A four-point Likert scale with Cronbach's alpha of 1.19 for internal reliability between each question was used to assess the stress among the students. 40.6% students felt COVID-19 had affected the routine academic year and 37.7% of them were extremely afraid of acquiring COVID-19 if asked to join back college.

**Conclusion:** Diverse themes pertaining to understanding the perception of an undergraduate dental student in these unprecedented times was noted in our study. There were apprehensions about extension of academic year, COVID-19 infection, restless sleep due to use of mobile phones and virtual online meeting app.

**Keywords:** COVID-19, Dental education, Likert scale, stress.

Dental education worldwide is perceived as highly skill-intensive as well as economically costly. This education varies considerably globally in terms of curriculum, hours of didactic lectures, and clinical hours. With time, traditional dental education methods should change and be supplemented with recent technology to keep itself in-synchronisation with the new generation.

The COVID-19 pandemic has affected every field and walks of life. From a dentist's perspective, it has thrown a routine set curriculum out of gear and presented a set of difficult challenges for the dental community as well as educators. There is irreversible loss of crucial time in the academic year for learning clinical know-how and pre-clinical procedures that necessitate hands-on patient work and in-person or traditional classroom learning. Often the traditional teaching methods employed have been criticized for lack of integrating learned theory with practical skills and knowledge fragmentation. Virtual or online learning was limited to internet use for searching online course material or during a presentation or seminar.

The Dental Council of India (DCI) along with various Health Universities and Dental colleges has been developing various standard operating protocols (SOPs) from time to time. In these challenging times, knowing the thoughts and perception of dental undergraduate students has become crucial to incorporate any changes in dental education in COVID-19 times. This study is a small attempt in assessing the integration of virtual learning classes and its psychological effects on undergraduate dental students in a world affected by the COVID-19 pandemic.

## **METHODS**

A cross-sectional survey was carried out using an online self-administered questionnaire on 147 dental undergraduate students of the first, second, third, and fourth years of RUHS College of Dental Sciences, Rajasthan University of Health Sciences, Jaipur, Rajasthan, India. The study protocol had been submitted to the institutional ethics committee. As a part of the need to adjust to the current scenario, subject-related virtual classes had been undertaken since the month of April 2020. On an average, for each undergraduate batch one or two subjects were being taught daily with regular coordination for scheduling of the classes. In the month of June, a need for taking feedback was felt, so after a briefing, the questionnaire was sent through Google form to the students.

The online questionnaire had a total of 25 close-ended questions in two-part format. It consisted of 4 questions on socio-demographic details and 21 questions on the students' knowledge, perception, and opinion towards the various challenges of virtual/online classes during the COVID-19 pandemic and subsequent lockdown in the country. Two questions related to subject identification were optional while the remaining 23 questions had to be answered to complete the survey. It was in a multiple-choice pattern with a section (6 questions) with a four-point Likert scale to assess the psychometric effect of the pandemic on the undergraduate students' mindset. The questionnaire domains were classified as:

Questions 1-7: General information on the student's date of birth, gender, present place of residence or stay (specific name of city or village), if their dental college was open? If they have been attending any virtual classes, and how are they taking part in their classes being conducted?

Questions 8-10: Knowledge about basic computers for virtual learning and how they are coping with it?

Questions 11-14: Assessment of the attitude towards virtual classes versus traditional classroom learning.

Questions 15- 20: Stress assessment of students during the lockdown period and added burden of the course. The statements in the questionnaire are scored on a four-point Likert scale, in which 1 represented not at all afraid/never, and 4 represented extremely afraid/always.

Questions 21-25: Regarding advantages and disadvantages of virtual learning. Future directions and thoughts regarding the future of dental education during COVID-19 pandemic were assessed via five-point Likert scale.

The survey was done online using Google forms and the survey link was shared on social networking platform of whatsapp groups of individual BDS batches. The choice for being part of the survey was voluntary. The responses were registered on a Google form generated excel sheet for 106 responses out of a total 147 under graduate students enrolled in the institute. Data were entered into the Microsoft Excel of Windows 10.

Descriptive statistical analysis using Microsoft Excel was carried out in the form of percent proportions of total responses recorded. For the Likert scale, the mode was calculated to scale the most common response for each of the questions. Cronbach's alpha was calculated for the 5 four-point Likert scale to check for their internal reliability between each item.

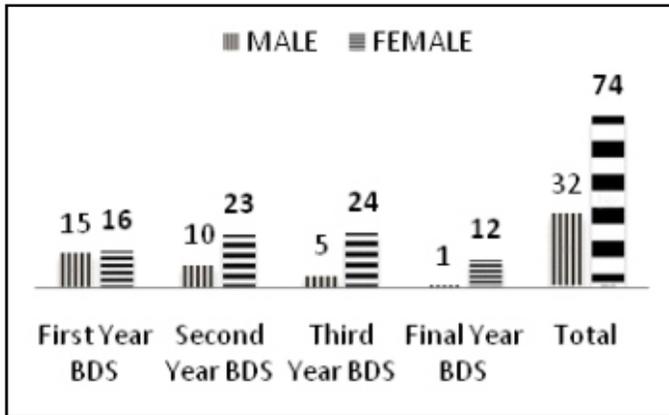
## **RESULTS**

A total of 106 undergraduate students responded to the online questionnaire (72.1% response rate). Out of the 106 respondents, 69.8% were female (Figure 1) and 87.72% were from first, second, and third year of the course (Table 1). All the 106 respondents were attending the virtual classes being conducted. Among them, only 9.4% students were not attending all the classes. 89.6% of students were using their smartphone/mobile phone to attend classes. None of them was using a borrowed device (Figure 2). 60.4% students felt that it was very easy to use the various platforms while 35.8% students were still understanding how to use or navigate through it. 84% found a basic knowledge of computer applications helped in using the online resources faster and better. 68.9% of all respondents felt traditional classroom learning was effective compared to 18.9% only who felt both were equally effective (Figure 3) 80.2% preferred the physical traditional classroom learning for one-to-one interaction with faculty compared to 11.3% students who felt both as equally effective. 73.6% were able to solve their problems, and doubts through the virtual platform while 10.4% students preferred to enquire through personnel messages to the concerned staff. 15.1% students faced some difficulties as the medium of virtual classes is completely in English (Table 2).

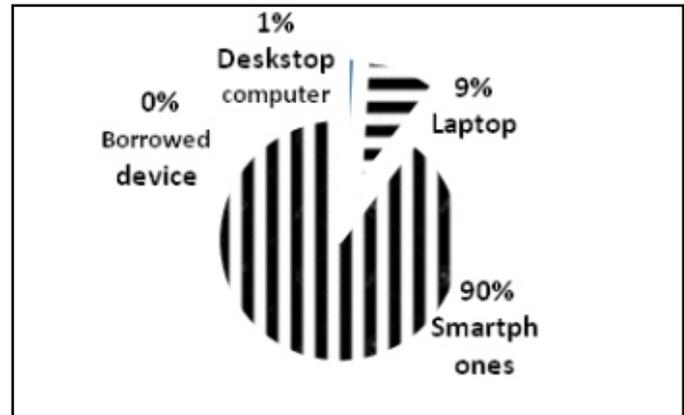
77.4% undergraduate students responded as 'yes' for being stressed about coping up with ever increasing syllabus and ongoing classes. Five questions assessed stress on the undergraduate students via a four-point Likert scale (Table 3). The Cronbach's alpha of the questionnaire was found to be 1.19 which is a high acceptable level of reliability. 40.6% of undergraduate students felt COVID-19 had

**Table 1: Demographic information of the study participants**

	I <sup>st</sup> Year BDS	II <sup>nd</sup> Year BDS	III <sup>rd</sup> Year BDS	IV <sup>th</sup> Year BDS	Total
<b>Male</b>	15	10	5	1	32 (30.18%)
<b>Female</b>	16	23	24	12	74 (69.8%)
	31(29.24%)	33 (31.13%)	29 (27.35%)	13 (10.31%)	106



**Figure 1: Gender wise distribution of study participants.**



**Figure 2: Modes of attending e-learning classes.**

**Table 2: Response to questions on knowledge assessment of the students about virtual classes**

Questions	Responses	Total	Percent
Are you attending all the e-learning/virtual classes being conducted for your batch?	Yes	96	90.6%
	No	00	00%
	Not at all	10	9.4%
How are you taking part in your e-learning classes being conducted?	Desktop computer	01	0.94%
	Laptop	10	9.4%
	Smartphone	95	89.6%
	Borrowed device	00	00%
How did you find the various virtual conferencing platforms to use?	Very easy	64	60.4%
	Still understanding it	38	35.8%
	Difficult	02	1.88%
	Need help from others.	02	1.88%
How much has prior basic computer knowledge helped in using virtual teaching/ learning methods?	Helpful	89	84%
	Don't Know	14	13.2%
	Did not Help	03	2.8%
Which mode of teaching is effective for learning/ understanding?	Traditional classroom learning	73	68.86%
	Virtual classes	08	7.54%
	Both are equal	20	18.86%
	Self study	05	4.71%
Which mode has been better for one to one interaction with faculty?	Traditional classroom learning	85	80.18%
	Virtual Classes	09	8.49%
	Both are equal	12	11.32%
	None	00	00%
During your virtual classes were you able to ask or solve your query/ problem?	Yes	78	73.6%
	No	08	7.54%
	Could not ask	09	8.49%
	Through personal message	11	10.4%
As the medium of virtual classes is completely in English so do you face any difficulty in accessing?	Yes	16	15.1%
	No	90	84.9%

affected the routine academic year. 44.3% of them were often afraid about the academic session getting extended due to the pandemic. 37.7% of the students were extremely afraid of acquiring COVID-19 if they were asked to join back college for normal classroom lessons and assessments. 47.2% felt seldom their sleep got affected because of extra strain of e-classes and piling syllabus. 48.1% students seldom were told to reduce screen time with increasing shift to virtual classes.

The most common advantage for the virtual classes was the ease of access from any location along with flexibility of class timing. Other advantages of virtual classes include ease of sharing data and storage of didactic lectures, increased accessibility to staff, environment friendly and cost effective. The frequently occurring disadvantage were the internet connectivity issues, poor clinical skill training, and lack of in person interaction. One-third of the respondents were neutral in their response to virtual learning being a part of the dental teaching curriculum. 53.8% dental undergraduate students participating in the survey agreed that the COVID-19 pandemic will change the future of dental education (Table 4) (Figure 4).

### DISCUSSION

Dental school education in India is a challenging branch

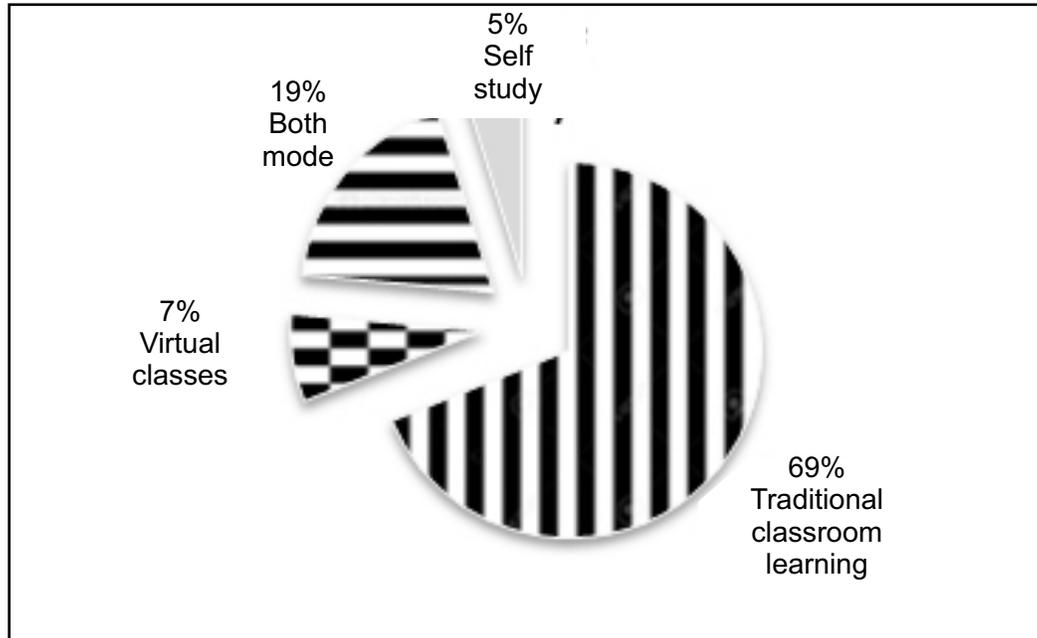
with a mix of clinical and laboratory work. Dental education in India plays an important role in maintaining supply of skilled and trained human resources, and in ensuring good quality and equal access to oral health care services to all.<sup>1</sup>

Chang et al<sup>2</sup> summarized dental education teaching methods into 3 parts:

1. Didactic lectures and seminars including Problem Based Learning- Has now mostly switched to online mode. There are different virtual platforms available in the internet like: ZOOM meeting, Google Meet, Skype for online learning.
2. Simulation or pre-clinical laboratory work-Traditionally, a demonstration by the teachers is given and the students practice in the simulation models, typodonts or wax blocks with step-by-step checks by the teachers till the final work. This requires a close interaction with the student and teacher. At present this part is done using modern digital (pre-recorded self-explanatory videos/live demonstrations) or virtual reality techniques.
3. Clinical skill training during third, final graduate years and internship- This is the most important

**Table 3: Stress assessment among study participants**

Questions	Responses						Total	Percent	
Are you stressed about coping-up with ever increasing syllabus and ongoing classes?	Yes						82	77.4%	
	No						24	22.6%	
<b>STRESS ASSESSMENT</b>	<b>1</b>		<b>2</b>		<b>3</b>		<b>4</b>		<b>Mode</b>
On likert four-point scale	N	%	N	%	N	%	N	%	
Do you feel that COVID-19 has affected your routine academic year? (not at all to extremely)	6	5.7%	17	16%	43	40.6%	40	37.7%	3
Are you afraid about the academic session getting extended due to the COVID-19 pandemic? (not at all to extremely)	6	5.7%	24	22.6%	47	44.3%	29	27.4%	3
Are you afraid of acquiring COVID-19 if you are asked to join back your college for normal classroom lessons and assessments? (not at all to extremely)	11	10.4%	28	26.4%	27	25.5%	40	37.7%	4
How frequently is your sleep affected because of extra strain of e-classes and piling syllabus. (Never to always)	22	20.8%	50	47.2%	30	28.3%	4	3.8%	2
How frequently are you being told to reduce screen time? (Never to always)	23	21.7%	51	48.1%	20	18.9%	12	11.3%	2



**Figure 3: Pie chart on effectiveness of mode of teaching for learning and understanding.**

infrastructure of dental education. There is close contact between the internee, patients as well as the teacher. This part has suffered the most in dental education during the COVID-19 pandemic environment.

A number of review articles, letters to editor, commentaries regarding the present scenario of dental education and effect of COVID-19 have been published.<sup>3-13</sup>

The immediate effect of COVID-19 resulted in discontinuation of all in-person teaching, pre-clinical laboratory work and non-essential dental treatments. The dental college hostels were completely vacated and regular in-person classes have not been started yet. Presently, the various challenges for dental education include completion of courses/syllabi, how to undertake clinical posting, establishing patient management and sterilization protocols, conducting year-end assessment or examinations all along maintaining adequate COVID-19 protocols.

The Association of Dental Education in Europe (ADEE) conducted an online questionnaire survey from 25<sup>th</sup> March 2020 to get an idea of the initial responses of various European dental schools to the COVID-19 crisis and help identify what was determining their decisions. They created this survey to map responding faculties and building of a community of European dental education

institutions. The questionnaire is still ongoing and available on the ADEE website.<sup>14</sup>

Turner et al<sup>15</sup> in their study conducted an online survey in May-June 2020 among all the four years Oral Health Sciences graduates to rate and comment on different formats of remote teaching. Shrestha et al<sup>16</sup> conducted a cross sectional study about the online education status at dental colleges during COVID-19 pandemic in Nepal among 208 dental faculties. Chang et al<sup>2</sup> by means of 3 online symposiums compiled information and experiences of dental educators from different countries (Australia, Cambodia, Hong Kong, Japan, Malaysia, Philippines, Switzerland, Taiwan, Thailand and USA) regarding the innovations of dental education during the COVID-19 pandemic.

The themes that emerged from this survey are diverse and pertain to understanding the perception of an undergraduate dental student in these unprecedented times. Turner et al<sup>15</sup> in their study had a 66% response rate (19/29) of the total respondents while there were 145 dental students in the study by Hung et al.<sup>17</sup> Similar ranges were observed in the present study while Amir et al<sup>18</sup> achieved 84.3% response rate. This study was voluntary and the non respondents could lead to a potential response bias. Our study has more than two-thirds female undergraduate dental students compared to 48.2% females in the Hung et al study.<sup>17</sup>

**Table 4: Feedback of study participants regarding virtual classes**

Questions	Response	Total	Percent			
Do you want to continue with the virtual learning methods post- COVID-19 pandemic?	Yes	25	23.6%			
	No	41	38.7%			
	Maybe	40	37.7%			
<b>Five point Likert items for accessing future for virtual/e- learning in dental curriculum.</b>						
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mode
Should virtual learning be a part of future dental teaching curriculum?	30 28.3%	20 18.9%	35 33%	15 14.15%	6 5.66%	3
Do you agree COVID-19 pandemic will change the future of Dental education?	00 0%	11 10.4%	29 27.4%	57 53.8%	9 8.5%	4

In the present survey, 90% dental undergraduate students used their mobile/smartphone to attend all their virtual classes. Mobile/smartphone penetration in India is at an all-time high and an asset when the didactic teaching turned to virtual mode.<sup>19</sup> Most of these platforms have individual apps that are user friendly but the sheer number of them is overwhelming. In this study, the present batches of students (60%) show good adaptation and high degree of comfort with the technology as also observed by Hung et al<sup>17</sup> in 87.6% of their students. The COVID-19 pandemic has forced a lot of the older generation academicians to brace technology like never before. This helps in accessibility and equal opportunity for education to all. Basic computer and English knowledge are necessary now, but one third of students found it difficult to use these meeting apps that are usually based on English. It is now increasingly important to communicate and eventually develop knowledge and expertise in local prevalent language for better understanding. New applications (apps) development in Hindi or the regional languages need to be encouraged.

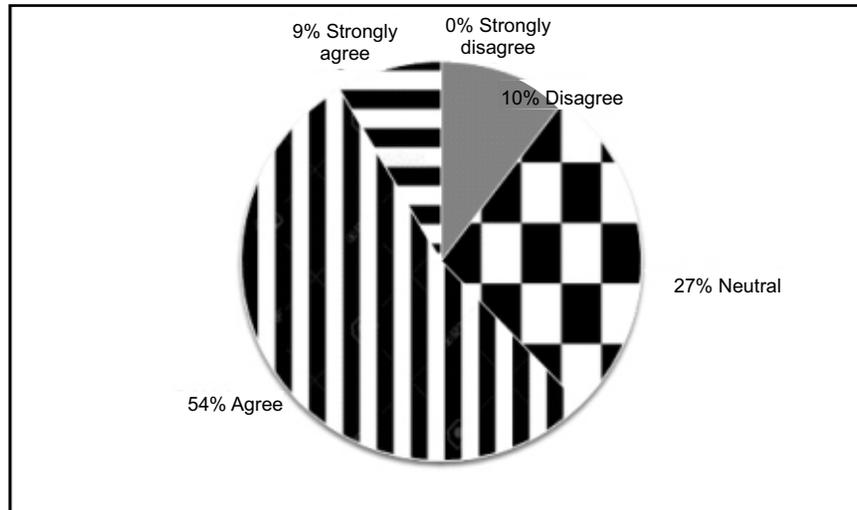
A two-third of our study students preferred traditional classroom learning over virtual classes. Amir et al<sup>18</sup> also found that distance learning resulted in more difficult communication and gave less learning satisfaction though it provided more time to study (87.9%) and to review study materials (87.3%). Majority of the student respondents preferred the classroom mode for faculty interaction. The faculty or instructors' interactive pedagogy ability, efficacy, knowledge, accessibility and confidence toward utilization of technology<sup>18</sup> guide the degree of faculty supportiveness

felt by the students during the pandemic times. A favorable response was achieved for remote teaching and assessment while clinic session cancellations and clinical simulated case cancellations were problem areas.<sup>15</sup>

Likert scales are most frequently used psychometric scale for questionnaires, the four-point scale were used for eliciting/gauging specific responses of the undergraduate student's psyche. More concerns regarding the emotional health were seen in younger students.<sup>17</sup> Most students suffered from increased stress levels about timely completion of their syllabi and extension of the present academic session.<sup>17</sup> Few students often or always felt anxious that they might be infected with the COVID-19 virus, with the one-third to two-third students fearful about contracting it from attending classes in dental college.

In the present study, sleep was affected a little less than one-third of the students compared to 18.1% often or always experiencing restless sleep in Hung et al<sup>17</sup> study. Likely challenges for virtual learning are internet connectivity and security, lack of face-to-face interaction, time management and difficulty to focus the long hours of e- learning online. Shrestha et al<sup>16</sup> concluded that the pandemic opened the option for e-learning in dental education in Nepal and recommended training and institutional guidelines on online education.

The learning experiences from the present study could be used for development of future assessments and surveys. Our study was cross sectional in nature and is limited to one dental college as a result the sample size was small. There were one-third non respondents who could potentially influence the responses (bias). As only perceptions and



**Figure 4: Response of students on future of dental education.**

attitude of students related to didactic learning was assessed, it is unclear about the effect of lack of clinical experience and exposure.<sup>18</sup> Since the pandemic continues to evolve, it appears likely that recommendations and guidelines will change. The findings reported here only represent a snapshot in time.

Future longitudinal studies can be performed to compare different dental schools, or compare dental schools with other health professional schools to track outcomes and share strategic initiatives. Concept of blended learning could be the future of dental education. Studies are required to help understand the psyche of students in this fast-changing world. We need to catch-up with newer technology, appropriate national and institutional guidelines and policies so as to achieve our goals. With the COVID vaccine in near future, there is hope of the return to normal curriculum and schedule soon.

### CONCLUSION

Dental education should be assessed based on not just the student's academic performance but also by the student's view towards the system and its appraisal. This feedback helped us understand the perceived advantages and disadvantages of the virtual classes being undertaken for the undergraduate dental students. Time and again teaching capabilities of the educators need to be enhanced to meet the expectations.

A revamped tele dentistry and virtual teaching could be a silver lining behind the dark clouds in the COVID-19 pandemic as a possible solution to poor oral health outcomes along with disproportionate distribution of

trained health care personnel and resources in developing countries.

### REFERENCES

1. Mahal A, Shah N. Implications of growth of dental education in India. *JDental Education*. 2006;70(8): 884-91.
2. Chang TY, Hong G, Paganelli C, Phantumvanit P, Chang WJ, Shieh YS, et al. Innovation of dental education during COVID-19 pandemic. *JDent Sci*. 2021;16(1):15-20.
3. Iyer P, Aziz K, Ojcius DM. Impact of COVID-19 on dental education in the United States. *JDent Educ*. 2020;1-5.
4. Desai BK. Clinical implications of the COVID-19 pandemic on dental education. *JDent Educ*. 2020; 84(5):512.
5. Bennardo F, Buffone C, Fortunato L, Giudice A. COVID-19 is a challenge for dental education: A commentary. *Eur J Dent Educ*. 2020;00:1-3.
6. Machado RA, Bonan PRF, Perez DEDC, Martelli JÚnior H. COVID-19 pandemic and the impact on dental education: discussing current and future perspectives. *Braz Oral Res*. 2020; 34:e083.
7. Gaudin A, Arbab-Chirani R, Pérez F. Effect of COVID-19 on dental education and practice in France. *Front Dent Med* 2020; 1:5.
8. Sunavala-Dossabhoy G, Spielman AI. Restructuring of dental education in a post-COVID-19 era. *Oral Dis*. 2020; 00:1-2.
9. Klemmedson D. Is there an upside to COVID-19 for dentistry? *JAm Dent Assoc*. 2020; 151(10):713-15.
10. Haroon Z, Azad AA, Sharif M, Aslam A, Arshad K, Rafiq S. COVID-19 era: Challenges and solutions in dental education. *J Coll Physicians Surg Pak*. 2020; 30 (Supp2): S129-S131.

11. Zhao J, Zhao X, Zhou N, Wang S, Ye G, Wang J et al. A comparison of dental education between University of Toronto and Zhejiang University during COVID-19 pandemic. Preprint from Research Square, 23 Nov 2020 DOI: 10.21203/rs.3.rs-112022/v1 PPR: PPR242060.
12. Gambarini G, Di Nardo D, Valenti Obino F, Patil S, Bhandi SH, Testarelli L, et al. Academic dental activities and COVID-19 pandemic. *J Contemp Dent Pract.* 2020, 21;(6): 598.
13. Hong G, Chang TY, Terry A, Chuenjitwongsa S, Park YS, Tsoi JK, et al. Guidelines for innovation in dental education during the coronavirus disease 2019 pandemic. *J Oral Sci.* 2021; 63(1): 107-10.
14. Quinn, B, Field, J, Gorter R, Akota I, Manzanares MC, Paganelli C, et al. COVID-19: The immediate response of European academic dental institutions and future implications for dental education. *Eur J Dent Educ.* 2020; 24: 811-14.
15. Turner S, Healy J, Conner E, Wands L. Oral Health Sciences students' views of the shift to remote teaching and assessment in response to COVID-19. *BDJ Team.* 2020;7 (10):16-20.
16. Shrestha RM, Shrestha S, Acharya A, Gupta A. Online education status at dental colleges during COVID-19 pandemic in Nepal. *Kathmandu Univ Med J.* 2020; 70(2): 15-20.
17. Hung M, Licari FW, Hon ES, Lauren E, Su S, Birmingham WC et al. In an era of uncertainty: Impact of COVID-19 on dental education. *J Dent Educ.* 2020:1-9.
18. Amir LR, Tanti I, Maharani DA, Wimardhani YS, Julia V, Sulijaya B, et al. Student perspective of classroom and distance learning during COVID-19 pandemic in the undergraduate dental study program Universitas Indonesia. *BMC Med Educ.* 2020; 20(1):392.
19. Smartphone use in India. <https://www.statista.com/statistics/257048/smartphone-user-penetration-in-india/> accessed on 29th December 2020.

### **Corresponding Author**

Dr Krishna Sireesha Sundaragiri, Associate Professor,  
Department of Oral Pathology and Microbiology, RUHS  
College of Dental Sciences, Jaipur, Rajasthan, India.  
email: sksireesha@yahoo.co.in