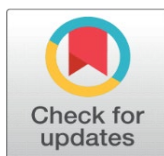
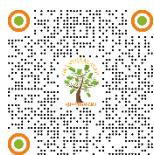


IMPACT OF ONLINE TEACHING AND LEARNING EXPERIENCES OF UNDERGRADUATE DENTAL STUDENTS OF BAPUJI DENTAL COLLEGE DURING COVID-19 PANDEMIC – A CROSS SECTIONAL SURVEY

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Received 26 September 2022

Accepted 27 October 2022

Published 15 November 2022

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DOI [10.29121/granthaalayah.v10.i10.2022.4844](https://doi.org/10.29121/granthaalayah.v10.i10.2022.4844)

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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ABSTRACT

Background: Dental schools were compelled to temporarily close clinics due to the coronavirus disease (COVID-19) and switch from traditional classroom instruction to distance learning. The aim of our survey was to determine the impact of online education on dental students and to find out the preparedness of final year dental students for independent practice after their graduation.

Methods: A cross sectional survey was conducted among 300 BDS students studying in Bapuji dental College. The questionnaire was distributed online using email. The questionnaire was divided into two parts: the first portion included online learning experience, while the second section concentrated on readiness for independent dental practise.

Results: The survey received an 81% response rate. Nearly 95.6% of fourth-year BDS students reported that their clinical training had a negative impact. Due to lockdown, the majority (82%) of our students missed their clinical classes. BDS students in the first (81%) second (85%) third (54%) and fourth (82%) years favoured the traditional lecture method ($p < 0.001$). Online lessons are not a suitable way to improve communication skills, according to our students (70.5%). Students in the final year reported decreased confidence in their ability to set up independent practise following graduation.

Conclusion: Online learning is not a substitute for in-person clinical classes, according to our students. The amount of readiness for independent practise was not positive.

Keywords: Online Education, Covid-19, Dental Students

1. INTRODUCTION

The Covid-19 pandemic has spread throughout the entire world, forcing human society to maintain social distance [WHO \(2019\)](#). So, in order to stop the spread of virus, lockdown protocols were initiated in every nation. The lockdown forced educational institutions to temporarily close and forced students to choose online learning as a distance education. [Cheng et al. \(2021\)](#), [Trivandrum et al. \(2022\)](#).

Medical and dental professionals around the world faced great challenges not just in terms of clinical care but also in terms of training and research. In an effort to

balance the protection of students and faculty dental universities were compelled to adopt the online learning model to maintain consistency in their students' learning behavior during the COVID-19 pandemic [Hattar et al. \(2021\)](#), [Zitzmann et al. \(2020\)](#), [Sahu \(2020\)](#). Although this change has clearly guaranteed the continuity of dental education, it hasn't given students the clinical and interpersonal skills, manual dexterity, or fine motor abilities they need to provide high-quality dental treatment in close proximity to patients. [Cheng et al. \(2021\)](#), [Noor et al. \(2022\)](#).

To the best of our knowledge, there aren't much research that have looked at the effects and educational experience of dental students who took online courses during the COVID-19 pandemic in India. Understanding how COVID-19 has affected dental education will aid policymakers and academic institutions in preparing scientifically proven teaching strategies for use in the near future during such outbreaks. Hence, we planned a survey with the aim to investigate the impact of online classes during COVID-19 on the educational experiences of undergraduate dental students studying in Bapuji Dental College and Hospital. Also, to understand the readiness for independent dental practice after their graduation.

2. METHODOLOGY

2.1. STUDY DESIGN AND SAMPLE

A descriptive cross sectional online survey was conducted on undergraduate students at Bapuji Dental College, Davanagere, Karnataka, India.

2.2. DATA COLLECTION

The study protocol was reviewed and approved by the Institutional Review Board of Bapuji Dental College and Hospital.

At the end of the academic year 2020-21, all the undergraduate students (N=300) were invited to participate in our survey before their university examinations. The required information about the number of students studying each year was obtained from the administrative section of college. The electronic survey link was shared with the study participants. The introductory part of the questionnaire had the purpose and objectives of our survey. To maintain anonymity, no personal identifiers were used in the online questionnaire. Consent was implied by responding to the questionnaire.

The questionnaire comprised of two main sections. The first section consisted of ten close-ended questions which were related to their demographic details, educational experience with e-learning, communication skills, preparedness to take up university exams, confidence in skills to diagnose and treat patients. Three close-ended questions made up the second component, which was given to final-year students (N=45) in order to find out how prepared they thought they were to start working as dentists after graduation. The response rate was 81% with 244 of 300 students returning the survey. The most frequent excuses for non-response were lack of time and lack of interest.

2.3. STATISTICAL ANALYSIS

Statistical analysis was performed using SPSS for windows release 20.0. Descriptive statistics were generated, and chi square test was applied to examine differences between groups. The significance level was fixed at $p < 0.05$. [Table 1](#)

3. RESULTS

Table 1

Table 1 Demographic Characteristics of Study Participants		
Demographic characteristics	N	%
Gender		
Male	47	19.3
Female	197	80.7
Age		
<22 years	125	51.2
>22 years and above	119	48.8
Year of the study		
I BDS	63	25.8
II BDS	73	30
III BDS	63	25.8
IV BDS	45	18.4

A total of 244 students responded to online questions. The study sample was composed of 197 (80.7%) female and 47 (19.3%) male dental students. About 63 students (25.8%) were in first year, 73 (30%), 63 (25.8%) and 45 (18.4%) in second, third and final year BDS respectively. Of the 244 respondents, 125 (51.2%) belonged to the age range of 18- 22 years and remaining 119 (48.8%) were 22 years and above.

Table 2

Table 2 Educational Challenges and Impact of Online Education on Dental Students									
Questions	Overall N=244	Male N=47	Female N=197	<22 yrs N=125	>22 yrs N=119	I BDS N=63	II BDS N=73	III BDS N=63	IV BDS N=45
Were you able to understand difficult concepts in online classes?	75	19	56	41	34	19	20	21	15
	(30.7%)	(40.4%)	(28.4%)	(32.8%)	(28.6%)	(30.2%)	(27.4%)	(33.3%)	(33.3%)
Yes	169	28	141	84	85	44	53	42	30
	(69.3%)	(59.6%)	(71.6%)	(67.2%)	(71.4%)	(69.8%)	(72.6%)	(66.7%)	(66.7%)
No									
Was there enough content in the online classes to confidently take university exams?	60	14	46	32	28	12	11	29	8
	(24.5%)	(30%)	(23.3%)	(25.6%)	(23.5%)	(19%)	(15%)	(46%)	(18%)
Yes	184	33	151	93	91	51**	62**	34**	37** (82%)
	(75.4%)	(70%)	(76.7%)	(74.4%)	(76.5%)	(81%)	(85%)	(54%)	
No									
Did online classes focus on clinical training?	28	13	15	16	12	4	7	15	2
	(11.4%)	(27.7%)	(7.6%)	(12.8%)	(10%)	(6.3%)	(9.6%)	(23.8%)	(4.4%)
Yes	216	34**	182**	109	107	59**	66**	48**	43**
	(88.5%)	(72.3%)	(92.4%)	(87.2%)	(90%)	(93.7%)	(90.4%)	(76.2%)	(95.6%)
No									
Do you have confidence in the clinical skills acquired during online classes?	25	8	17	12	13	4	3	11	7
	(10.2%)	(17%)	(8.6%)	(9.6%)	(11%)	(6.3%)	(4%)	(17.5%)	(15.5%)
Yes	219	39	180	113	106	59**	70**	52**	38**
	(89.8%)	(83%)	(91.4%)	(90.4%)	(89%)	(93.7%)	(96%)	(82.5%)	(84.5%)
No									

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Are you confident with technology-based education to perform clinical procedures?	56 (23%)	15 (32%)	41 (20.8%)	29 (23.2%)	27 (22.7%)	12 (19%)	11 (15%)	22 (35%)	11 (24.4%) ^{34*}
Yes	188 (77%)	32 (68%)	156 (79.2%)	96 (76.8%)	92 (77.3%)	51* (81%)	62* (85%)	41* (65%)	34* (75.6%)
No									
Did online classes enhance your communication skills?	72 (29.5%)	17 (36.2%)	55 (28%)	44 (35.2%)	28 (23.5%) ^{91*}	21 (33.3%)	17 (23%) ⁵⁶	25 (40%)	9 (20%)
Yes	172 (70.5%)	30 (63.8%)	142 (72%)	81* (64.8%)		42 (66.7%)	38 (60%)	36 (80%)	
No									
Do you prefer smartphone classes to learn new clinical skills?	37 (15.2%)	12 (25.5%)	25 (12.7%)	21 (16.8%)	16 (13.4%)	11 (17.5%)	7 (9.6%)	15 (24%)	4 (8.9%)
Yes	207 (84.8%)	35** (74.5%)	172** (87.3%)	104 (83.2%)	103 (86.6%)	52 (82.5%)	66 (90.4%)	48 (76%)	41 (91.1%)
No									
Which educational experience was most affected during Covid-19 pandemic?									
• Clinical training	160 (65.6%)	31 (66%)	129 (65.5%)	65 (52%)	95 (80%)	20 (31.7%)	52 (71%)	44 (70%)	44 (97.8%)
• Regular lectures	20 (8.2%)	4 (8.5%)	16 (8.1%)	8 (6.4%)	12 (10%)	6 (9.6%)	3 (4%)	10 (1.6%)	1 (2.2%)
• Practical classes	64 (26.2%)	12 (25.5%)	52 (26.4%)	52 (41.6%)	12 (10%)	37 (58.7%)	18 (25%)	9 (14.4%)	0
How do you rate your educational experience during Covid-19 pandemic?									
Extremely satisfied	2 (0.9%)	0	2 (1%)	2 (1.6%)	0	0	2 (2.7%)	0	0
Satisfied	6 (2.4%)	3 (6.4%)	3 (1.5%)	3 (2.4%)	3 (2.5%)	2 (3.2%)	4 (5.5%)	0	0
Dissatisfied	36 (14.7%)	14 (29.8%)	22 (11.2%)	12 (9.6%)	24 (20.1%)	11 (17.4%)	20 (27.4%)	8 (12.7%)	6 (13.3%)
Extremely dissatisfied	200 (82%)	30** (63.8%)	170** (86.3%)	108** (86.4%)	92** (77.4%)	50** (79.4%)	47** (64.4%)	55** (87.3%)	39** (86.7%)

* p<0.05, ** p<0.001

Without any discernible impacts of gender, age, or study year, a higher percentage (69.3%) of dental students thought that online classes did not aid in learning complex topics. Most first-year (81%) second-year (85%), third-year (54%) and fourth-year (82%) dental students reported feeling uneasy about taking university exams. There wasn't enough content on the online classes to adequately study for the final exams. This was found to be statistically significant (p<0.001).

About 93.7% of 1st BDS students and 90.4% of 2nd BDS students missed their preclinical classes on their virtual learning platform. According to 95.6% of 4th BDS students, clinical training was not centred on online classes, which yielded

statistically significant outcomes ($p < 0.05$). Additionally, because of quarantine 89.8% of the students felt unconfident in their preclinical and clinical skills.

Most of the students (77%) expressed a lack of confidence in their ability to learn clinical skills using technology-based instructional platforms. However, 23% of the pupils showed optimism in technology-based education ($p < 0.05$). Regardless of their age, about 70.5% of dental students reported feeling isolated from their cohort ($p < 0.05$). A higher percentage of (84.8%) of the dental students inclined towards traditional mode to learn new clinical skills nevertheless 15.2% of the students preferred smart classes for clinical skills. Among the 244 students, 200 (82%) dental students expressed dissatisfaction with the online classes, regardless of their gender, age, or study year ($p < 0.001$), while 6 (2.4%) students said their educational experience was very satisfying [Figure 3](#). Clinical training was the educational experience that was most impacted by lockdown, according to 4th BDS students (97.8%), who were followed by 1st BDS students (58.7%), who reported preclinical classes [Figure 2](#).

Table 3

Table 3 depicts readiness for general practice			
Questions	Overall	Male students	Female students
Do you prefer to be mentored or indirectly supervised during your internship program?	28 (62.2%)	2* (33.3%)	26* (66.7%)
Yes	10	4	6
No	22	0	16
Not sure	7 (15.6%)	0	7 (18%)
Do you have confidence in starting an independent dental practice after your graduation?	7 (15.5%)	2 (33.3%)	5 (12.8%)
Yes	26	4	22
No	26 (57.8%)	4 (66.7%)	22 (56.4%)
Not sure	12 (26.7%)	0	12 (30.8%)
Do you prefer a well-structured internship program with proper training in certain dental specialties?	42 (93.3%)	5 (83.3%)	37 (95%)
Yes	2	1	1
No	2 (4.4%)	1 (16.7%)	1 (2.5%)
Not sure	1 (2.2%)	0	1 (2.5%)

Nearly two thirds of students in their final year prefer to have a mentor or receive indirect supervision during their internship. Only 15.5% of them expressed confidence in starting an independent practice after graduation. About 93.3% of them prefer to have a well-structured internship program with proper training in certain dental specialties.

Figure 1

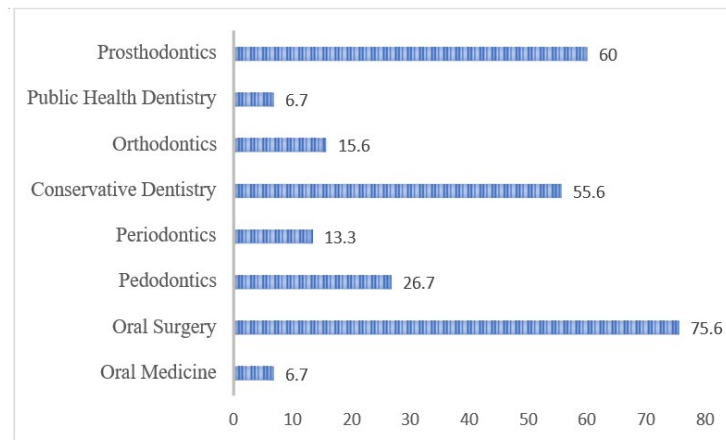


Figure 1 Illustrates the Dental Specialties Most Negatively Affected by Lockdown

Figure 2

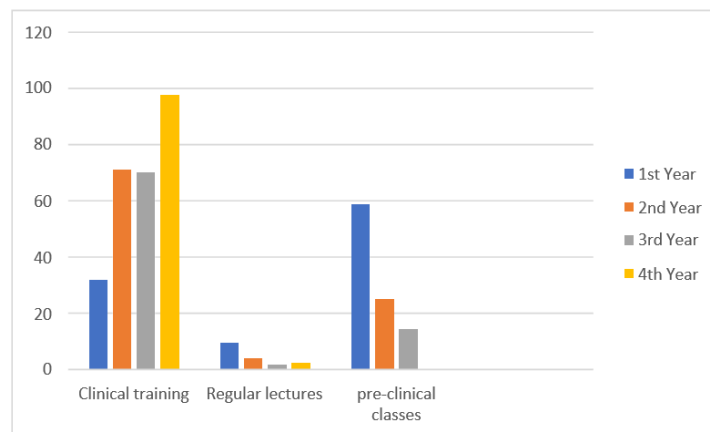


Figure 2 Educational Experiences Negatively Affected by Quarantine

Figure 3

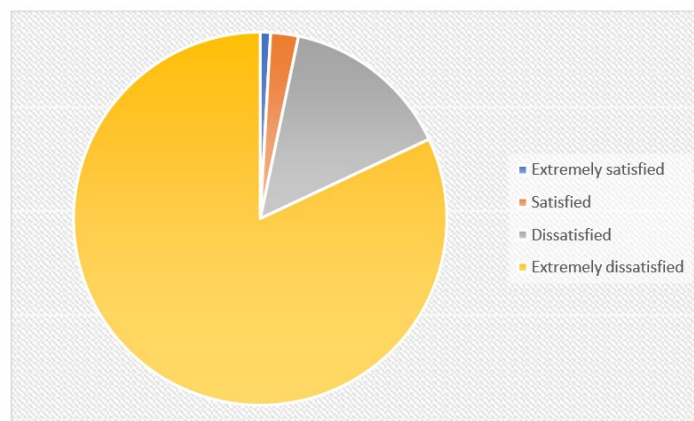


Figure 3 Impact of Online Education

The dental specialties most adversely impacted by lockdown, according to final-year BDS students, are oral surgery (75.6%) and prosthodontics (60%) while public health dentistry (6.7%) and oral medicine (6.7%) are the two least adversely impacted dental specialties.

4. DISCUSSION

In India, educational institutions such as schools, colleges, universities are majorly based on traditional methods of learning. This method follows face-to-face lectures in classrooms. In the beginning of March 2020, the World Health Organization (WHO) declared the outbreak of COVID-19 as a pandemic. The outbreak of COVID-19 has forced innovation in all sectors and the educational sector was no exception to this. Universities were closed down and all traditional teaching methods were quickly converted to digital education [Roberts \(2014\)](#). As a result, many dental institutions rapidly adopted a virtual mode of education. Dental education is mainly composed of clinical/practical training and theoretical teaching. The dental students spend a lot of their time face-to-face teaching and hands on practical to achieve manual dexterity and clinical skills. With the COVID 19 pandemic and the high risk of infection transmission through dental procedures, clinical classes were replaced by virtual clinical seminars and assignments [Cheng et al. \(2021\)](#).

Little evidence has been reported regarding the impact of online education on dental students studying in India. The results of the present study showed that 69% of our students had a hard time following difficult concepts through online classes. The probable reason could be that dental education cannot be carried out in the virtual mode alone. Students spend their major time in hands on training. It is difficult for the students to understand and correlate the theoretical concepts without demonstration or simulation on live study models [Noor et al. \(2022\)](#). Another reason could be the sudden shift from traditional teaching methods to distant learning did not allow sufficient time for the implementation of well-planned standardized teaching methods.

In our study, the majority (81%) of the students expressed a lack of confidence in taking university exams. This could be attributed to the fact that online pedagogical methods were restricted to the non-clinical teachings without any change in the university examination pattern. During university exams, summative assessment of clinical skill is usually assessed through performing clinical procedures on patients [Trivandrum et al. \(2022\)](#), [Hattar et al. \(2021\)](#). Missed hands on training, patient management created a lot of stress for students performing well in their university exams. Also, due to a lack of engagement between students and teachers, as well as ambiguity over exam dates. The fourth-year students experiences were concerned with lack of clinical training compared to third year students. Students receive a considerable amount of clinical training in their fourth year academic. They were also worried about not sufficiently trained as dentists when they graduate. Similarly, first and second BDS students missed their preclinical laboratories as they learn precision manual skills required for the clinical as well as laboratory works. This is very much in accordance with the previous studies [Cheng et al. \(2021\)](#), [Hattar et al. \(2021\)](#), [Noor et al. \(2022\)](#).

Rising evidence suggest that technology-based education is more flexible and accessible [Paul and Jefferson \(2019\)](#), [Chang et al. \(2021\)](#). However, in our study only 23% of the students preferred technology based educational platform. This could be

due to the structure of dental curriculum, and it has three learning domains such as cognitive, psychomotor, and affective. Clinical skills (Psychomotor), communicative abilities, and empathy (affective) are crucial part of dental education those cannot be easily replaced by digital aids. [Kanzow et al. \(2021\)](#). Hence, the majority of our students are inclined towards attending physical classrooms as compared to virtual rooms.

Furthermore, fourth year students stated that oral surgery and prosthodontics were the subspecialties most negatively affected. This might be due to insufficient clinical exposure in their previous academic year resulting in a lower sense of confidence and competence. Restorative dentistry, prosthodontics and oral surgery are the major clinical subspecialties. They require a lot of clinical exposure and precision skills to meet the needs of patients.

We made an attempt to understand the fourth-year students' readiness for general practice after graduation. Nearly two thirds of our students preferred indirect supervision after their graduation and the majority of them expressed a dearth of confidence in starting an independent practice. This could be related to limited exposure to clinical experience during their final year. One way to overcome their anxiety related to independent dental practice would be to expose them to community dental care. Studies have proved it to be a useful adjunct for clinical experience and communication skills. However, our students showed interest in continuous learning to acquire competence over their practice.

One of the limitations of our study is the cross-sectional study design. The cross-sectional survey is not a useful design to understand the relationship between the impact of online education on educational experience or to find out the change in the perception of dental students towards online learning over a period of time. Another limitation was the sample size. The survey was conducted at a single dental school; therefore, the study findings cannot be generalised. Hence, we recommend longitudinal study in different dental schools with different online learning experiences to get deeper knowledge of digital academia.

5. CONCLUSION

According to our research, students still favour in-person clinical and preclinical training. They acknowledge missing many educational experiences. The overall preparedness level for independent practice was not promising.

CONFLICT OF INTERESTS

None.

ACKNOWLEDGMENTS

The authors wish to thank all the dental students who sincerely participated in the survey.

REFERENCES

- [Chang, T.Y., Hong, G., Paganelli, C., Phantumvanit, P., Chang, W.J., Shieh, Y.S., et al. \(2021\). Innovation of Dental Education During COVID-19 Pandemic. Journal of Dental Sciences, Jan, 16\(1\), 15-20. <https://doi.org/10.1016/j.jds.2020.07.011>.](#)

- Cheng, H.C., Lu, S.L., & Yen, Y.C. et al. (2021). Dental Education Changed by COVID-19 : Student's Perceptions and Attitudes. *BMC Medical Education*, 21, 364. <https://doi.org/10.1186/s12909-021-02806-5>.
- Coronavirus disease (COVID-19) advice for the public (2022, September 30) World Health Organization.
- Hattar, S., AlHadidi, A., Sawair, F.A., Alraheem, I.A., El-Ma'aita, A., Wahab, F.K. (2021). Impact of Covid-19 Pandemic on Dental Education : Online Experience and Practice Expectations Among Dental Students at the University of Jordan. *BMC Medical Education*, Mar 8, 21(1), 151. <https://doi.org/10.1186/s12909-021-02584-0>.
- Kanzow, P., Krantz-Schäfers, C., Hülsmann, M. (2021). Remote Teaching in a Preclinical Phantom Course in Operative Dentistry Duringthe COVID-19 Pandemic : Observational Case Study. *JMIR Medical Education*, 14. <https://doi.org/10.2196/25506>.
- Noor, R., Singh, D., Agarwal, A., Mansoori, S., Ansari, M.I. (2022). Perception of Dental Students Towards the Online Method of Dental Education During The COVID-19 pandemic. *Journal of Oral Biology Craniofacial Research*, Mar-Apr, 12(2), 223-227. <https://doi.org/10.1016/j.jobcr.2022.02.002>.
- Paul, J., and Jefferson, F. (2019). A Comparative Analysis of Student Performance in Anonline Vs. Face-To-Face Environmental Science Course from 2009 to 2016. *Frontiers of Computers Science*, 1. <https://doi.org/10.3389/fcomp.2019.00007>.
- Roberts, N., Rees, M. (2014). Student Use of Mobile Devices in University Lectures. *Australian Journal of Educational Technology*, 30, 4. <https://doi.org/10.14742/ajet.589>.
- Sahu, P. (2020). Closure of Universities Due to Coronavirus Disease 2019 (COVID-19) : Impact on Education and Mental Health of Students and Academic Staff. *Cureus*, 12(4). <https://doi.org/10.7759/cureus.7541>.
- Trivandrum, A.L., Ramani, P., Ramadoss, R. et al. (2022). Effect of COVID-19 on Dental Education : A Review. *Cureus*, 14(4). <https://doi.org/10.7759/cureus.24455>.
- Zitzmann, N.U., Matthisson, L., Ohla, H., Joda, T. (2020). Digital Undergraduate Education in Dentistry : A Systematic Review. *International Journal of Environmental Research Public Health*, 17(9), 3269. <https://doi.org/10.3390/ijerph17093269>.