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Original Research Article

Perceptions of Indian dental students about online training on preclinical orthodontics during the COVID pandemic: A qualitative study

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ABSTRACT

Objectives: The objective of the study was to determine students' perceptions about online training in preclinical orthodontics during the COVID lockdown.
Materials and Methods: After obtaining ethical approval this phenomenological descriptive qualitative study was conducted for sixty minutes on two different days. It reported students' experiences during the pandemic through focus group discussions. These were recorded on audio and video platforms. The researchers then transcribed and analyzed the recordings and codified the answers into categories to determine the emerging topics until a saturation point was reached.
Results: The core emerging themes were (1) Angst and apprehensions (2) Perception about the learning experience (3) Challenges encountered.
Conclusion: Even though online learning has been a useful tool for delivering didactic (theoretical) concepts, we attempted to teach preclinical orthodontics to students of final year BDS. Students reported being skeptical and worried at first, but they soon were able to overcome the initial apprehensions and perform well.

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1. Introduction

The COVID-19 pandemic has had an unprecedented impact on the education sector. All the educational institutions were forced to adopt digital platforms to meet students' learning goals and complete the syllabus including dental education. The dental curriculum is primarily based on hands-on training for various preclinical skills and procedures.

The conventional practical orthodontic class for undergraduates consists of weekly postings of two and half hours each for the third and final-year BDS Students. The pre-clinical exercises are divided for the third and final year. The third year comprises basic wire bending exercises for beginners and the final year consists of active and passive wire bending exercises, basic cephalometric tracing, and recording case histories. Each student's work is critically analyzed. Assignments and assessments of related topics are given and graded.[1]

Group activities are conducted to create a collaborative learning environment. The best group is awarded and appreciated. Apart from psychomotor skills, presentation skills are also assessed by asking them to deliver PowerPoint presentations to improve their communication skills and increase their confidence.

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Computer-aided learning (CAL) is not yet a part of the undergraduate dental curriculum in India. The success of CAL depends on the attitudes and interactive teaching styles of the faculty, as well as on the experience and attitudes of students about technology.[2] Lectures are generally easy to adopt online, however, teaching and learning and assessment of practical skills are challenging. With the onset of a lockdown, completing the syllabus and the required preclinical training seemed impossible. The faculty members of the Department of Orthodontics developed an online instructor-led model to train students in preclinical orthodontics. We conducted focused group discussions using the phenomenological approach to determine student perceptions after undergoing this training.

2. Method

After obtaining consent from the institutional ethics committee, we conducted focus group discussions (FGDs) with final-year BDS students studying in KAHER's V K Institute of Dental Sciences, Belagavi, Karnataka, India. The FGDs would help in determining students' perceptions about online instruction in Preclinical orthodontics which included lectures, demonstrations, and hands-on work. In FGD themes, we have used an inductive approach for thematic analysis for data analysis. Based on student responses we coded and categorised them after deriving meaning from their responses.

2.1. Research team and reflexivity

All five investigators have a dental background, have completed their masters, and have been in an academic setting for ≥ 3 years. They have been involved with students in various settings – lectures, clinical, and preclinical instruction. Among the five, one is trained in qualitative research methods.

The authors AB, VLJ, and RJ contributed to the development of the FGD guide and identified key strategies to be adopted for conducting the discussion thus contributing towards strengthening qualitative research methods.

Three faculty (VLJ, SK and PG) were involved in conducting FGDs and took turns as moderator and assistant moderator in each FGD. All the researchers were associated with their respective dental institutions at the time of the study.

2.2. Study setting

The focus group discussion was organized offline at the KAHER's V K Institute of Dental Sciences after the lockdown was lifted and students started attending the college. The designing and documentation of the FGD guide and analysis were done in Google Docs.

2.3. Study design/ theoretical framework

Phenomenological Descriptive qualitative study

2.3.1. Participant selection

The participants who were final-year BDS students were selected because, during lockdown, they received preclinical training from their batch in-charge teachers by online mode. A major portion of orthodontic subject content is covered in the final year. The study participants were contacted verbally during their offline postings and informed about the study, their interest was elicited, and consent to participate was sought. Out of 20 students who underwent the online training, 12 participated in the study.

2.3.2. Focus group discussion guide

Current literature and experience of the faculty were used to design the FGD guide. The guide consisted of a total of four questions with supporting questions as provided in the appendix.

2.3.3. Data collection

Consent from all participants regarding participation was obtained before the start. The FGDs were conducted in the seminar room of the Department of Orthodontics until data sufficiency was achieved. The participants were assured of the confidentiality of their responses as they were provided with codes and were encouraged to utilize the codes while referring to themselves and each other. They were also assured that their audio-recorded data will be used only for publication purposes and will not be shared with anyone outside the team.

In this qualitative study, sample selection is purposive and convenient sampling.

The FGDs were facilitated by a moderator, a rapporteur, and a timekeeper and lasted for about forty minutes each. The focus group discussion was recorded using a Video camera and voice recording application of a mobile phone. The recording was transcribed verbatim manually.

2.4. Data analysis

Data analysis was performed using an inductive approach. All the investigators were involved in the data analysis phase to ensure data triangulation. The investigators read the transcripts verbatim to get the tone and content of the discussion. A total of three themes were identified from the data analysis process.

3. Results

A total of twelve students participated in this focus group discussion. Two rounds of focus group discussion were conducted consisting of students of final year BDS who attended the online modules of preclinical orthodontics. Four major themes were identified. The focus group number

and the participant number have been described as F, P. The themes that were identified based on the discussions with the investigators were:

Major themes

3.1. Angst and intrigue

The students' responses were mostly similar. They all felt initial apprehensions and curiosity about learning practical procedures at home after watching demonstrations through live online meetings. Their concerns included access to required materials and instruments to perform all the preclinical exercises, internet connectivity, ability to learn finer aspects of the exercises after watching online demonstrations.

"I would like to say that first of all it was upsetting because this needs to be hands on" (F1.P1)

"It was exciting but at the same time also upsetting because without guidance you can't do it properly" (F2.P2)

"My first response was like first time only got to know we didn't know like we didn't have stuff at home so the first thing that came to our mind was from where we will arrange the stuffs and most of the shops were closed. But then we could arrange and then still we won't have one to one interaction, so we were like how will we get to know something is wrong technique, then eventually we understood how it works." (F1. P3)

"I am actually from village. It was difficult for me to arrange for the necessary instruments" (F1, P6)

"I was very intrigued about how it will go about because uh it was very new for us and even though we know there is Zoom and everything, but we just wanted to know how we are going to focus online and everything and sometimes there were network issues present. Even in the regular classes there are lot of network issues" (F2,P3)

3.2. Positive learning experience

The next theme that emerged was their learning experience which included planning and execution of the online modules. Overall, there was a great appreciation and gratitude for the kind of learning experience, support and engagement that was offered by the teachers. The module also had assessments and assignments.

3.2.1. Planning and execution of the modules

The online program was well received by the students. They felt that the program was conducted well and appreciated the efforts made by the teachers. They were satisfied with the smooth and timely conduct of the online program which involved multiple resources of online teaching. Some students felt that their learning was compromised because face to face learning was perceived to be better than online learning for preclinical orthodontics. One participant suggested that such online classes should be conducted in the event of further lockdowns in the future.

The students mentioned that the module was planned to effectively accommodate learning issues if any.

"I think there is no hindrance during this lockdown and online classes. Sir and ma'am both made most use of all the resources, possible resources whichever they have got. They tried maximum to teach us mam. This was the best online class." (F2, P1)

"Ma'am if there is any further lockdown, we would like to have this kind of classes instead of no class" (F1, P4)

"Then coming to planning and execution it was done very systematically. One day prior to the online classes everybody was notified, and the response is very satisfactory. So timing was also maintained, every step was properly assessed, teachers were also motivated and educated." (F1, P5)

3.2.2. Instruction and learning

The students found the module informative and interactive. They felt that the modules were designed well. They were able to reach the instructors during live sessions and through emails and phone calls.

They also mentioned that the instructors ensured seamless communication throughout the module. They felt more responsible for their learning due to the lockdown. This facilitated greater engagement and interest in their learning. They spent more time reading and self-evaluating their work.

"Ma'am I think they utilized all the modes of teaching. They used to send YouTube videos, PowerPoint presentations, during the call also face to face interactions, like in some interesting cases like Kahoot, so almost all the modes of teaching were used." (F1, P4).

"In spite of all this COVID situation and all these things, we tried our maximum to learn, and we thought that we have learnt something" (F2, P3)

"So actually, we need to put more effort from our side we were not knowing what is going on and as she said we couldn't ask our friends for help or teachers. Read, Learn the wrong done procedures on ourselves so had put more efforts compared to offline classes." (F2, P4)

"We didn't have any classes so I feel is what we had is much better when compared to others and it was not that we could not learn anything, we learnt a lot from that, from these and I feel we have as she said they included all the methods which were possible."(F1,P1)

3.2.3. Assessment and feedback

Most of the students felt that the quizzes on Kahoot and home assignments helped them perform well. They were given feedback by the faculty members who were approachable to the students.

"Every after every assignment we used to receive feedback and the staff was also very happy with our

punctuality. We used to send on time and if there were any problems with the points, they used to explain to us if we have any doubt"(F1, P3)

3.3. Difficulties/ Challenges encountered during the module

"Here they were taking classes both in the morning and afternoon sessions. They have put a lot of effort but still the learning process was compromised due to many factors like I could not see some practical aspects clearly." (F2, P1)

"Some clear pictures were not present like the bends and all. Then learning was not clear because they could not show and get them corrected then and there itself. So, I feel hands -on practical classes are better than the online class that was conducted." (F1, P2)

4. Discussion

This study aimed to explore student perceptions of preclinical training in orthodontics through digital platforms for final-year BDS students. Orthodontics is a skill-based profession. A significant portion of learning time is spent in labs in developing preclinical skills with the opportunity for one-to-one interaction with the instructor and immediate feedback. With the announcement of an extended lockdown, we had to evolve methods of delivering instruction to our students so that learning is not compromised. We had no previous experience of delivering instruction through digital platforms. The greatest challenge to such a course that relies heavily on practical training is getting the students to learn the same tasks remotely. We initially started with an idea of what to do to ensure continuity in learning and improvised as we progressed, with inputs from all faculty and residents in the department and the undergraduate students. With multiple inputs and reverse mentoring, we were able to deliver an acceptable instruction program in preclinical orthodontics.

Since the onset of the COVID-19 pandemic, education systems have undergone disruptive changes with a major overhaul in the way content has been delivered. Online education existed before the onset of the pandemic as a part of distance learning programs or online courses. Since March 2020, due to the COVID pandemic, nearly all schools across the world have switched to online modes of learning starting from primary school and up. In our dental college, we used Google Meet to conduct online instruction.

After coding and thematic analysis, we found that all the students had their reservations about 1) the effectiveness of these online modules because of the hands-on nature of the preclinical wire-bending exercises 2) Availability of resources at their places of residence to perform wire bending 3) Internet connectivity and 4) the overall learning outcome because of the absence of face-to-face experience. However, after attending the modules most of their apprehensions were overcome.

In India students in the final year of BDS are usually aged 21- 22 years. Most distance learning programs cater to individuals aged 25 years and above. Their programs are created in the backdrop of adult learning theories.[3] Many universities overseas have included online learning modules as electives or as a required part of their course. Consequently, it may have been easier for them to switch to online learning due to the availability of infrastructure and training.[4] In Indian dental education however the scene is different. We do not currently have any course content that is delivered online.

In India, the learner profile in undergraduate dental education is different compared to the Western counterparts. After fulfilling the necessary criteria, students are eligible to enter dental education after their twelfth grade. It takes them about a year to transition into adult learning after grade twelve. Most students perceive learning as an instructor-led activity that occurs in a building where students sit to learn. This model has been greatly revered in our cultural context because it is cohesive and personal.[5] There are multiple benefits of this model of learning including deeper learning, social interaction between teachers and learners, teachers speaking from experience, they are available to clarify doubts, etc. which is our observation, and this has also been reported in studies.[6,7] With the introduction of online learning, learners and instructors both need to adapt to the use of online learning.

Dental colleges in India were closed for a considerable amount of time ranging from one to nine months. The learning period during the COVID pandemic has been stressful for dental students worldwide, including in India.[8] When our module was planned, we had very little information or experience available on conducting online training. We relied on our past experiences and available resources to organize this module. Online learning is not a new concept. Massive Open Online Courses (MOOCs)[9] and flipped classrooms[10] have been introduced in several health professions education colleges in other countries. Recently in our college blended learning has been introduced in Oral Medicine and Radiology[11] and is being piloted in other departments as well. Blended learning in post-graduate orthodontics training has been received favorably by students.[12] Research on the acceptability and usefulness of MOOCs in undergraduate dental education appears to be scarce.[13]

Several authors have reported the outcomes of online learning in dental colleges during the pandemic through surveys, assessments, and focus group discussions. Some investigators found that students were not satisfied with online learning. Shrivastava KJ found that 55.5% of students were able to grasp <50% of the knowledge from online lectures. This study reported internet connectivity as the most common problem encountered by professors while

conducting lectures as well as students while attending online lectures. 86.4% of students preferred offline lectures than online lectures and only 8.3% received practical demonstrations. Our students reported internet connectivity as a concern when the online module was announced. They reported not having any problems during the modules. Lau MN conducted a focus group discussion to explore students' perceptions of the flipped classroom (FC) compared to live demonstration (LD) in learning the fabrication of orthodontic wire components for orthodontic removable appliances. Students who learned by FC reported that FC promoted personalized learning, better teaching efficiency, and accuracy of three-dimensional demonstration from online videos. This was similar to student perceptions in our study. Students who received live demonstrations felt LD was more advantageous than FC in allowing immediate questions and answers.[14] Since our online module was conducted for small groups, it was found to be effective.

Students who received online education during the lockdown have reported anxiety and concern about learning clinical skills but improvement in didactic learning.[15] This was similar to the findings in our study. Our students felt they were unable to view finer details of wire bending through videos. This was however overcome with good-quality images of the devices that were made available through PDFs for reference. A study on dental students in Wuhan reported that some students continued to study through free online learning resources.[15] In our study learning resources were created and delivered online. While social presence is greater in face-to-face learning Qiu M & McDougall D in their mixed methods study found that students felt online small-group learning had more advantages than face-to-face learning.[16] While this study was performed in the context of COVID the findings seem to be valid in any situation. In our study, the students also reported feeling more responsible for their learning due to the lockdown. This facilitated greater engagement. Wang K et al conducted a survey on Chinese dental students and faculty in 39 dental colleges in China. The students reported satisfaction with the online learning content, which was followed by the style of online teaching, online learning materials, and effective time management.[17] In a survey of dental students in Germany, the investigators reported the students showed a positive perspective toward online learning as a substitute for face-to-face learning.[18] These findings are similar to our findings. In the same study, the faculty respondents reported the poor learning initiative of students as the main influencing factor in the process of online dental education, along with network problems, and lack of teacher-student interaction as important difficulties in online teaching. Additional challenges reported include a lack of objective teaching assessment, platform instability, and inefficient online teaching ability.

Our students attended online assessments that were created by the batch instructors. Their knowledge was assessed using the online quiz platform Kahoot and practical assessments were conducted using a virtual OSPE. In our study, the students were satisfied with the assessment methods used. They were also given feedback by the instructors after each activity and after each assessment. Donn J[19] et al conducted a virtual OSCE for BDS final-year students. The students and the faculty members felt that the process was feasible. Hytönen et al reported student satisfaction with online OSCE. The students felt that such an exam allowed them to progress to practicing dentistry although it is not the same as a clinical OSCE.[20] In our study, students reported satisfaction in the way the learning modules were conducted, and the assessments and support provided by the teachers.

Since we are dealing with adult learners, we ensured that there was sufficient hands-on activity, assessment, self-directed learning, reflection, and feedback during the module. In our study, we anticipated students would express more challenges and less engagement because this kind of teaching was a first for us. However, this was not the case as we found through this FGD. Some countries have made online learning and MOOCs a part of their curriculum.[17] Their students and faculty are familiar with the process. This may have made the transition easier. However, in India, undergraduate dental education is still conducted conventionally with only face-to-face teaching and assessments.

Pre-clinical orthodontic training for undergraduates occurs in small groups. Small group teaching has been found to be effective both offline and online. Indian dental colleges should start developing online training modules for certain topics where skills and procedures do not require close and continuous monitoring such as preclinical orthodontics. We recommend that The Indian Orthodontic Society create guidelines for the successful implementation of online modules for undergraduate students. Using the Delphi approach a consensus can be generated to create an online curriculum. In-class sessions can be used for reflection and assessment of their work and provide feedback. This will also enable freeing up of time for other academic activities in Orthodontics. This will also increase familiarity with online learning and consequently develop or facilitate new learning behaviors among teachers and students.[21] An online mode of delivery of instruction may also increase student interest and engagement as reported by Agarwal in their survey on pediatrics residents, because it breaks the monotony.[22]

We feel that this global event has triggered a sea of change regarding learning on digital platforms in not only dentistry but every discipline. The apex bodies need to create long-term standards and action plans to deal with unforeseen challenges such as COVID-19. Learning cannot

suffer in the face of unpreparedness or lack of foresight. We recommend that the apex bodies establish standards for delivering content through digital platforms.

4.1. Limitations

The undergraduate orthodontics curriculum consists of didactic lectures and practical training. We offered the students what we could to the best of our ability and availability of resources. We did not explore the impact of remote learning on social interactions between the students. The students seemed very eager to give us a positive response in the focus group discussion. This positive attitude may be because the program is a new learning method that may alone create a positive response given the general disconsolate sentiment prevailing during the time of the pandemic. This is known as the Hawthorne effect. We feel that using in-depth interviews may help us go deeper into their perceptions. We did not consider faculty views of online learning during the pandemic. This could have thrown light on faculty perceptions and readiness for online teaching and assessments.

5. Conclusion

The onset of the pandemic left all dental colleges in an indeterminate state. However, within a span of a few weeks, the whole world brought education back to its feet with online learning. Though it was not easy, educational institutions found a way to continue instruction. In orthodontics, students learn wire-bending for removable appliances during their third and final years. Virtual platforms may not be able to address all the learning requirements in orthodontics. Although the students find face-to-face interaction a better way to learn they also perceived online training as an effective method given the prevailing circumstances. It is therefore possible to create online instructor-led modules for preclinical orthodontics with live interaction, recorded video demonstrations, assessments, and feedback. We recommend that the apex bodies establish standards for delivering content through digital platforms.

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7. Conflict of Interest

None.

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