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Undergraduate students' perception of the Indian dental curriculum: A focus-group based, multi-centric questionnaire survey

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ABSTRACT

Aim: the present study was designed to take a student's perception regarding the current dental education curriculum.

Methodology: A structured, pre-validated questionnaire made on Google Forms was shared amongst participants pursuing undergraduate dental program in a DCI recognized dental college via e-mail, Facebook or WhatsApp. The questionnaire consisted of questions about the admission procedure (5 questions), curriculum design (12 questions) teaching methods (5 questions) and assessment (5 questions) methods. The respondents were divided into 2 focus groups; Pre-clinical: BDS first & second year students and Clinical: BDS third & fourth year students.

Results: The questionnaire was circulated amongst a total of 510 potential candidates, out of which 403 responded (response rate 79%). 48.4% (195/403) were from government dental colleges and 51.6% (206/403) were from private dental colleges. Preclinical group had 89 students (1st year = 27, 2nd year = 62) and clinical group 344 students (3rd year = 138, 4th year = 176). Students of both focus groups responded similarly to many questions relating to curriculum (need of syllabus revision, $p = 0.912$; horizontal/vertical integration, $p = 0.076$; and early clinical exposure $p = 0.843$), teaching methods (need of mixed teaching methods) and assessment methods (methods which are not based on quota-chasing $p = 0.588$). Statistically significant difference was seen to "whether the students are able to retain or relate to the basic sciences subjects taught in first & second year" ($p < 0.0001$)

Conclusion: Students expressed a need for a horizontal & vertical integration of topics, frequent syllabus revision, Early Clinical Exposure, a mixed teaching method, and better assessment methods.

1. Introduction

The medical & dental education has seen a major revamp in the past few years globally in context of curriculum design, teaching-learning methodologies and assessment methods. In India, since the inception of the first dental college in the year 1920, dental education has come a long way.¹ Today, there are more than 300 government and private colleges in India running the undergraduate and postgraduate courses.² The curricula and the system of dental education is governed the Dental Council of India, which has been bringing forward amendments in the curricula from its revision time to time. In spite of constant revisions and amendments, the basic framework of curricula is still largely exam and assessment-driven. The approach to patient management is compartmentalized with no inclusion of a horizontal or vertical integration.³

Recently, the Medical Curriculum saw a major revamp with the

introduction of The Medical Council of India (MCI)'s new competency-based curriculum for Indian Medical Graduates. Unlike the old curriculum which focused on knowledge, was organized on systems and disciplines, was time-based, the current curriculum requires mastery over certain competencies and emphasizes on a continuous formative assessment rather than a summative assessment.

The new medical curriculum describes various topics along with the domains (Knowledge, Skill, Attitude, skill); suggested teaching learning method (Small group discussion, DOAP); and assessment methods (written, viva-voce, skill-lab).^{4,5} Even the newly introduced National Education Policy (2020) encourages a competency-based, credit-based and choice-based curricula.⁶

As the main stake-holders of dental education are the dental students themselves,⁷ the present study was designed to take a student's perception regarding what changes they think are required in the

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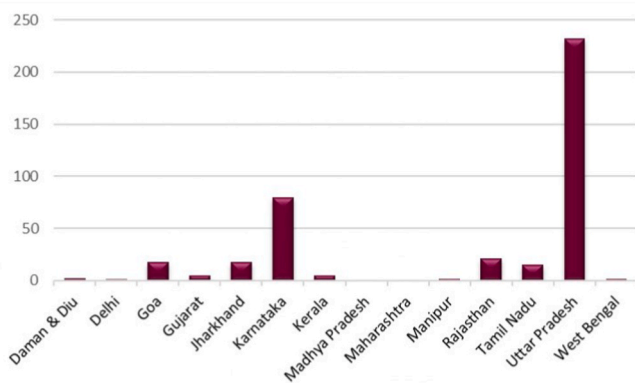


Fig. 1. Bar graph showing state-wise distribution of the respondents.

current dental education system.

2. Methodology

An Institutional Ethical Committee approval was obtained for the study (Ref. code XI-PGTSC-II B MBBS S-/P10) and was a part of ICMR STS 2022 project Reference ID: 2022-07012.

The instrument for collecting data was a Google form, comprising of a structured, pre-validated questionnaire <https://forms.gle/WuicQcbyac3iCn1u6>. The questionnaire was open to responses between 15/08/22 to 30/09/22. The first section of the form was a declaration explaining the purpose and confidentiality of the survey. The participant's choice to click the submit button at first page marked his or her consent to participate in the study. The study was designed to keep the anonymity of the respondents in mind, and no identification markers like name or e-mail address will be mandatory. Both convenience sampling (the PI directly contacted respondents to participate in the study) and snowball sampling (the participating respondents forwarded the questionnaire to their contacts) was used to ensure maximum participation. The survey was shared amongst participants pursuing undergraduate dental program (BDS) in a DCI recognized government or private dental college via e-mail and various social media platforms such as Facebook and WhatsApp.

The different sections of the questionnaire consisted of sets of questions about the admission procedure (5 questions), curriculum design (12 questions) teaching methods (5 questions) and assessment (5 questions) methods.

While statistically analysing the results, the respondents were further divided into 2 focus groups⁸:

Pre-clinical focus group: BDS first & second year students.

Clinical focus group: BDS third & fourth year students.

The questions in the survey were based on the entrance to dental course, curriculum design, teaching methods and assessment methodology. The survey questionnaire was pilot tested ($n = 25$) to ensure practicability, validity, and interpretability of answers and was slightly modified based on the results of the pilot study.

The responses of the Google form survey were converted into an Excel sheet format for data analysis. The results were analyzed using descriptive statistics and making comparisons among various groups. Categorical data were summarized as proportions and percentages (%). Statistical analyses were performed using SPSS version 19.0 (SPSS Inc., Chicago, IL, USA). All the associations were tested using the chi-square test and the value of $p < 0.05$ was considered statistically significant.

3. Results

The questionnaire was circulated amongst a total of 510 potential candidates, out of which 403 responded making the response rate 79%.

Out of these, 48.4% (195/403) were from a government dental college and 51.6% (206/403) were from a private dental college (Fig. 1). The set of students as per the division into pre-clinical and clinical focus groups were distributed as follows: Preclinical group comprised of total 89 students (1st year = 27, 2nd year = 62) and clinical group comprised of 344 students (3rd year = 138, 4th year = 176).

In the section about curriculum design, there was no statistical difference between the clinical and pre-clinical groups for most of the questions. Both the focus groups were not familiar with the Competency Based Curriculum which has been implemented by the MCI for the Indian Medical Graduate ($p = 0.057$). To the question "Do you face difficulty in applying the theory taught in first year into practical skills when treating patients in 3rd and 4th year", there was a statistical difference between the responses of the two groups ($p < 0.001$). To the question that "Do you feel the syllabus needs revision according to the current trends" both groups were in agreement, and almost 40% of both groups strongly agreed to it ($p = 0.912$). To the question "You are able to retain the anatomical and histological features taught in 1st and 2nd years of the curriculum till the 4th year", there was a statistical difference in the responses ($p < 0.001$). Both the groups were in agreement that clinical hours should be increased and lab hours should be reduced. Both groups very strongly agreed that there should be an early exposure to patients in the first year itself under faculty supervision.

In the Teaching methodology section, both the groups were in agreement when asked "Do you think integrated teaching of theory and practical/applied aspect should take place" ($p = 0.479$). When asked "What type of teaching methodology would you prefer" both groups opted mostly for a combination of blackboard and audiovisual.

Regarding Assessment methods, both groups were in agreement when asked "Do you think there should be a continuous formative assessment in place of a summative assessment at year end" and they also agreed that "The present assessment method is based more on quota chasing rather than evaluation of competency".

4. Discussion

Like any other health care sectors, the dental treatment needs and therapy has also changed much over a period of time. The modes of treatment, concepts of diagnosis, the equipment and armamentarium used are not the same they were many years ago. Thus, to keep pace with the changing treatment needs and the rapidly evolving technology, the curriculum also needs to be reformed, as the ultimate aim of the curriculum should be to produce a competent and confident Indian Dental Graduate who can translate his/her theoretical knowledge into clinical skills.

The present study, was an attempt to see the need for change and identify the areas needing change, when seen from a student's perspective. The questionnaire was divided into sections dealing with demographics, admission process, curriculum design, teaching methodologies and assessment methods. In the end, one open ended question was kept to know the opinions of the students.

4.1. Demographics

The results here are not discussed based upon the gender, or state where the student was studying, as all the students are offered same guidelines as governed by the Dental Council of India, thus gender or state don't seem to be a confounding factor. However, interestingly, the gender distribution showed that out of 403 respondents, 74.4% (300/403) were females. Although out of scope of this study, it is seen that this gender predominance is reflected in the post-graduate curriculum of most of the dental colleges too.

The set of students as per the division into pre-clinical and clinical focus groups were distributed as follows: Preclinical group comprised of total 89 students (1st year = 27, 2nd year = 62) and clinical group comprised of 344 students (3rd year = 138, 4th year = 176), and the

Table 1
Responses of students to questions based on curriculum design.

Question		Preclinical		Clinical		chi sq	p-value
		No.	%	No.	%		
As a first year dental student, you could relate to the applied aspects of the dental material and dental histology subjects	No response/NA	0	0.0%	3	1.0%	6.68	0.154
	Agree	63	70.8%	196	62.4%		
	Disagree	14	15.7%	74	23.6%		
	Strongly Agree	9	10.1%	19	6.1%		
	Strongly Disagree	3	3.4%	22	7.0%		
	Disagree						
Have you heard about the competency based medical curriculum implemented by MCI	No response/NA	2	2.2%	6	1.9%	7.52	0.057
	Maybe	10	11.2%	34	10.8%		
	No	44	49.4%	201	64.0%		
	Yes	33	37.1%	73	23.2%		
	Disagree						
Do you face difficulty in applying the theory taught in first year into practical skills when treating patients in 3rd and 4th year?	No response/NA	12	13.5%	4	1.3%	35.85	<0.001
	Agree	49	55.1%	144	45.9%		
	Disagree	21	23.6%	97	30.9%		
	Strongly Agree	6	6.7%	58	18.5%		
	Strongly Disagree	1	1.1%	11	3.5%		
	Disagree						
The present curriculum trains you about patient interaction and soft skills	No response/NA	3	3.4%	3	1.0%	5.56	0.235
	Agree	60	67.4%	191	60.8%		
	Disagree	18	20.2%	75	23.9%		
	Strongly Agree	4	4.5%	29	9.2%		
	Strongly Disagree	4	4.5%	16	5.1%		
	Disagree						
Do you feel the syllabus needs revision according the current trends	No response/NA	1	1.1%	5	1.6%	0.99	0.912
	Agree	45	50.6%	156	49.7%		
	Disagree	7	7.9%	17	5.4%		
	Strongly Agree	35	39.3%	133	42.4%		
	Strongly Disagree	1	1.1%	3	1.0%		
	Disagree						
You are able to retain the anatomical and histological features taught in 1st and 2nd years of the curriculum till the 4th year.	No response/NA	9	10.1%	5	1.6%	21.30	<0.001
	Agree	28	31.5%	80	25.5%		
	Disagree	40	44.9%	150	47.8%		
	Strongly Agree	4	4.5%	12	3.8%		
	Strongly Disagree	8	9.0%	67	21.3%		
	Disagree						
You are able to apply the pharmacology, general medicine and general surgery knowledge when working on patients	No response/NA	15	16.9%	7	2.2%	33.58	<0.001
	Agree	55	61.8%	186	59.2%		
	Disagree	14	15.7%	78	24.8%		
	Strongly Agree	3	3.4%	24	7.6%		
	Strongly Disagree	2	2.2%	19	6.1%		
	Disagree						
Do you think lab hours should be reduced to increase the hours of clinical and applied training	No response/NA	6	6.7%	9	2.9%	5.45	0.244
	Agree	48	53.9%	160	51.0%		
	Disagree	10	11.2%	32	10.2%		
	Strongly Agree	24	27.0%	112	35.7%		
	Strongly Disagree	1	1.1%	1	.3%		
	Disagree						
The subjects should be horizontally and vertically integrated with each other so that comprehensive interdisciplinary modules instead of different subjects is there	No response/NA	11	12.4%	14	4.5%	8.47	0.076
	Agree	54	60.7%	193	61.5%		
	Disagree	4	4.5%	19	6.1%		
	Strongly Agree	19	21.3%	86	27.4%		
	Strongly Disagree	1	1.1%	2	.6%		
	Disagree						
Do you think some clinical interaction with the patient like history taking or examination (under faculty supervision) should begin in first year itself?	No response/NA	4	4.5%	8	2.5%	1.41	0.843
	Agree	46	51.7%	158	50.3%		
	Disagree	11	12.4%	39	12.4%		

(continued on next page)

Table 1 (continued)

Question	Preclinical		Clinical		chi sq	p-value	
	No.	%	No.	%			
Do you think the clinical time provided is sufficient for training to practice after BDS	Strongly Agree	26	29.2%	104	33.1%	5.91	0.206
	Strongly Disagree	2	2.2%	5	1.6%		
	No response/NA	7	7.9%	8	2.5%		
	Agree	36	40.4%	133	42.4%		
	Disagree	30	33.7%	106	33.8%		
	Strongly Agree	6	6.7%	21	6.7%		
	Agree	10	11.2%	46	14.6%		
	Strongly Disagree						

responses were analyzed according to the two focus groups. For most of the responses, the pre-clinical and clinical groups were in agreement and there was no statistical difference and will be discussed further based on the various sections.

4.2. Admission process

The responses of this section gave an idea whether the dental graduates are taking up dentistry as a profession by their choice, number of attempts the students take to clear the qualifying entrance exam and whether they think there should be a separate entrance exam for dental education. The results showed that 48.6% students agreed and 51.4% students disagreed to this. Mostly it is seen that the entrance exams are tailored in a way that after the results are declared, the students who are scoring high choose medical education over dental education. And the students who do not have any choice to take MBBS then take up BDS as their profession. When asked whether becoming a dental surgeon was their dream profession, 81.9% of the students said that it was not their dream profession. Maybe a separate entrance exam, like the Dental admission test (DAT) conducted in USA,⁹ or University Clinical Admission Test (UCAT)¹⁰ conducted in UK will allow the students who want to take up dentistry as a profession to appear in the exam and the qualifying question paper would incorporate certain questions specifically related to dental skills or aptitude.

4.3. Curriculum design

The questions of this section focused on facts whether the students relate and retain the basic anatomy, histology or pharmacology subjects when they reach their final year of study; whether they are aware of the competency-based system as applied to medical curriculum, whether they feel there should be a horizontal & vertical integration of subjects and whether they feel there should there be a regular revision in syllabus

Table 2

Responses of students to questions based on teaching methodologies.

Question		Pre-clinical		Clinical		Chi.sq value	p-value
		No.	percentage	No.	percentage		
Do you think integrated teaching of theory and practical/applied aspect should take place	No response/NA	6	6.7%	14	4.5%	3.49	0.479
	Agree	57	64.0%	187	59.6%		
	Disagree	2	2.2%	5	1.6%		
	Strongly Agree	23	25.8%	107	34.1%		
	Strongly Disagree	1	1.1%	1	.3%		
Do you feel the class room teaching keeps you engaged enough	No response/NA	6	6.7%	9	2.9%	5.16	0.271
	Agree	47	52.8%	165	52.5%		
	Disagree	19	21.3%	91	29.0%		
	Strongly Agree	8	9.0%	27	8.6%		
	Strongly Disagree	9	10.1%	22	7.0%		
What type of teaching methodology would you prefer	No response/NA	5	5.6%	8	2.5%	8.05	0.090

(Table 1).

Surprisingly, only a small overall percentage of students (26.3%) were aware about the competency-based program although many students share same hostels and same resource facilities for their basic subjects as well as medical and surgical ward teaching areas with the MBBS students. According to focus groups, only 23.2% of Clinical group and 37.1% of pre-clinical group were aware of this term (p = 0.057),

The students of both groups strongly agreed that there should be a constant revision of syllabus over time (pre-clinical = 39.3%; clinical = 42.4%), there needs to be a horizontal and vertical integration amongst the various subjects (pre-clinical = 60.7%; clinical = 61.5%). Although the dental curriculum is regulated by the syllabus provided by the Dental Council of India, the institutes can add certain topics of relevance related to their local needs, or global contemporary needs to update the curriculum in the benefit of students. The concept of horizontal & vertical integration of various topics (taught in same year, or in different years), in place of the current 2 + 2 system (2 year clinical & 2 year preclinical) is the need of the hour. In a study by Chakrawarty et al.¹¹ where the studied the perception of BDS students regarding horizontal integration of curriculum, 88.5% students responded that horizontal integration made their understanding of the topic improved and they are able to relate basic & clinical sciences better.

Both the groups wanted that there should be some patient interaction like history taking, or basic steps of physical examination of the patient in the first year itself (under faculty supervision) (pre-clinical = 51.7%; clinical = 50.3%). Although the second year students have a pre-clinical training in subjects of conservative dentistry, and prosthodontics, where they learn the basic designs of restorative preparations and prosthesis work on phantom-heads(simulators), still they expressed a need for an early clinical exposure.

Early clinical exposure (ECE) is defined as “A teaching and learning methodology which fosters exposure of medical students to patients (actual human contact) as early as the first year of medical college, in a

Table 3
Responses of BDS students to questions based on assessment methodologies.

Question		Pre-clinical		Clinical		Chi.sq value	p-value
		No.	percentage	No.	percentage		
Do you feel teaching methods help you just to pass your exams but also help you to obtain a comprehensive theory and applied aspects of the topic	No response/ NA	6	6.7%	10	3.2%	2.38	0.667
	Agree	52	58.4%	187	59.6%		
	Disagree	18	20.2%	70	22.3%		
	Strongly Agree	7	7.9%	26	8.3%		
	Strongly Disagree	6	6.7%	21	6.7%		
Does the present system of assessment give enough chance to the students to improve upon his skills	No response/ NA	5	5.6%	19	6.1%	3.37	0.497
	Agree	42	47.2%	123	39.2%		
	Disagree	29	32.6%	131	41.7%		
	Strongly Agree	5	5.6%	11	3.5%		
	Strongly Disagree	8	9.0%	30	9.6%		
Do you think there should be a continuous formative assessment in place of a summative assessment at year end	No response/ NA	9	10.1%	20	6.4%	2.93	0.570
	Agree	46	51.7%	176	56.1%		
	Disagree	15	16.9%	45	14.3%		
	Strongly Agree	14	15.7%	61	19.4%		
	Strongly Disagree	5	5.6%	12	3.8%		
The present assessment method is based more on quota chasing rather than evaluation of competency	No response/ NA	7	7.9%	16	5.1%	2.82	0.588
	Agree	44	49.4%	166	52.9%		
	Disagree	3	3.4%	18	5.7%		
	Strongly Agree	33	37.1%	111	35.4%		
	Strongly Disagree	2	2.2%	3	1.0%		
The evaluation and assessment process is fair and without bias	No response/ NA	7	7.9%	21	6.7%	3.90	0.419
	Agree	42	47.2%	128	40.8%		
	Disagree	21	23.6%	90	28.7%		
	Strongly Agree	7	7.9%	15	4.8%		
	Strongly Disagree	12	13.5%	60	19.1%		
Do you think that the traditional methods of assessment focus simply on abilities to memorize, ignoring manual clinical skills, hypothesis formation and decision-making	No response/ NA	9	10.1%	20	6.4%	3.16	0.532
	Agree	43	48.3%	165	52.5%		
	Disagree	11	12.4%	46	14.6%		
	Strongly Agree	22	24.7%	76	24.2%		
	Strongly Disagree	4	4.5%	7	2.2%		

social or clinical context that enhances learning of health, illness or disease, and the role of the health professional.”^{12,13} It is a form of vertical integration bridges a gap between preclinical or basic and clinical sciences and helps the students to understand better how the anatomy or physiology or dental material topics are relevant clinically. The NMC has incorporated the concept of ECE in the new curriculum for Indian Medical Graduate.

4.4. Teaching methodology

This section had questions related to whether class-room teaching keeps the students engaged enough, whether integrated teaching of theory and practical skills should take place, and what teaching methods the students prefer (Table 2).

The students of both the study groups felt that the class room teaching keeps them engaged enough, though they expressed that out of all teaching methods, they would prefer a method combining both audio-visual and black-board teaching. (pre-clinical = 71.9%; clinical = 76.4%). In a similar questionnaire study amongst medical students by Roy M et al.¹⁴ to evaluate the views of medical students regarding

teaching methods, more than 50% of the participants opted for mixed methods and 88% of those who opted for mixed methods expressed that mixed method of teaching offered easy and better understanding of the subject. In the present study, students of both the focus groups also felt that the teaching methods are more focused on making the students pass the exam rather than making them understand the subject with depth and understanding. Teaching formats such as experiential learning, hands-on training and teaching through practical examples would be a more effective method rather than just listen to the lectures. This method would keep the students engaged and improve their clinical skills.¹⁵

4.5. Assessment methods

This section asked questions about whether present system of assessment helps in improving clinical skills, whether it is a biased or unbiased system of assessment or does it promote critical decision-making abilities rather than just focusing on memorising the content (Table 3).

32.6% pre-clinical and 46.7% clinical students disagreed to the fact

that the present assessment methods help the students to improve upon clinical skills. This points to the fact that the traditional system of evaluation does not let the student focus on critical areas, and doesn't let them know where they exactly need to improve upon. Students of both the groups agreed to the fact that there should be continuous evaluation through formative assessments rather than just summative assessments at the end of the year. Also, both the groups felt that present system of evaluation is more focused on quota chasing rather than evaluation of competency.

There is a definite need for inclusion of more contemporary & outcome-oriented assessment tools such as objective structured clinical & practical examinations (OSCEs & OSPEs), clinical scenario-based assessment, and methods which put into use the critical thinking skills of the students into the curriculum framework.¹⁶ More recently, the use of technology enhanced assessment tools such as computerised dental simulator (CDS) & virtual self-assessment (VSA) have also come up. These tools allow for the manipulation of the 3D model by means of rotating and zooming, thus provide enhanced spatial awareness and fine-motor coordination and enrich the depth and auditory perception.¹⁷

4.6. Suggestions by the respondents

In the end of the questionnaire, there was an open-ended question that asked for suggestions of the students. Out of the various responses collected, the most frequent were regarding initiating patient interaction at least from second year if not first year; continuous formative assessments, syllabus revision and introduction of newer technologies in the curriculum. Few students stated that most of the institutes still teach about the traditional clinical skills, and basic things like exposure to a composite restoration or crown reduction are not taught during the clinical years. The students want a reduction in lab work, and more time for clinical skill development.

Today, when all the spheres of education have significantly changed their way of teaching & assessment, making it more student centric, the dental education also needs a major revamp. Inclusion of Objective Structured Clinical/practical Exams, Problem based assessments, Workstation based assessments are the need of the hour. The assessment needs to be formative, thereby giving the student to assess himself as in how much he has improved over a period of time. The applied and practical translation of theoretical knowledge is a must, so is the development of ability to make independent critical decisions.

The study has some limitations such as a larger sample size of respondents would have validated the results better, and although anonymity was maintained, still students sometimes hesitate to express their honest views. So, responses of the students may have been affected by that reluctance.

5. Limitations

The present study was an attempt to assess knowledge of only a select population of Indian dental graduates. Larger sample size with a wider geographical distribution would be more conclusive. Although the

survey was kept without any identification markers and respondents were assured of confidentiality of the results, still social desirability bias is a limitation of survey studies. Furthermore, another limitation of any survey study is that it largely depends on the respondent's compliance with answering the questions honestly.

6. Conclusion

The results of the present questionnaire survey helped to get an insight into a dental student's mind, and their thought process pertaining to the current system of dental education, and also about the changes sought by them. The main highlights of the responses were a need for a horizontal & vertical integration of topics, frequent syllabus revision & Early Clinical Exposure, a mixed teaching method, and an assessment method which has clarity & helps in improving their clinical skills. Dental Schools in many parts of the world, and more recently the National Medical Council, India has incorporated the competency-based curriculum for medical education. Presently, there is a need to bring about the required changes/modification in the Indian Dental curriculum too, to be at par with global standards.

References

- https://dciindia.gov.in/History_DCI.aspx#. Accessed December 2, 2022.
- Kakkar M, Pandya P, Kawalekar A, Sohi M. Evidence and existence of dental education system in India. *Int J Sci Stud*. 2015;3:186–188.
- Lagali-Jirge V. Need for paradigm shift in Indian dental education: a case for change toward competency based education. *J Indian Acad Oral Med Radiol*. 2015;27:230–236.
- Jacob KS. Medical Council of India's New competency-based curriculum for medical graduates: a critical appraisal. *Indian J Psychol Med*. 2019;41:203–209.
- Frank JR, Mungroo R, Ahmad Y, Wang M, De Rossi S, Horsley T. Toward a definition of competency-based education in medicine: a systematic review of published definitions. *Med Teach*. 2010;32:631–637.
- www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf. Accessed February 8, 2022.
- Batra M, Ivanišević Malčić A, Shah AF, et al. Self assessment of dental students' perception of learning environment in Croatia, India and Nepal. *Acta Stomatol Croat*. 2018;52:275–285.
- Chandu VC, Pachava S, Baddam VRR, Marella Y, Panchumarti MST. Qualitative evaluation of learning environment in Indian teaching dental institutions from the students' perspective using focus group interviews. *Populat Med*. 2021;3:3.
- <https://www.shemmassianconsulting.com/blog/how-to-become-a-dentist>. Accessed November 30, 2022.
- <https://www.dentalschoolscouncil.ac.uk/wp-content/uploads/2021/07/Dental-school-entry-requirements-2022.pdf>. Accessed December 2, 2022.
- Chakrawarty K, Aggarawal S, Aggarwal A, Tomar SS. Perception of horizontal integration of basic and clinical sciences among students in undergraduate dental curriculum. *J Emerg Technol Innovat Res*. 2018;18:10–14.
- Verma M. Early clinical exposure: new paradigm in medical and dental education. *Contemp Clin Dent*. 2016;7:287–288.
- Tayade MC, Latti RG. Effectiveness of early clinical exposure in medical education: settings and scientific theories - Review. *J Educ Health Promot*. 2021;31(10):117.
- Roy M, Saha N. Medical students and the use of mixed audio - visual aids in lecture classes (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861 *IOSR J Dent Med Sci*. Dec. 2015;14(12), 00-00.
- Angelopoulou MV, Kavvadia K. Experiential learning in oral health education. *J Educ Health Promot*. 2018;12(7):70.
- Gerhard-Szep S, Güntsch A, Pospiech P, et al. Assessment formats in dental medicine: an overview. *GMS J Med Educ*. 2016;33(4):Doc65.
- El-Kishawi M, Khalaf K, Al-Najjar D, Seraj Z, Al Kawas S. Rethinking assessment concepts in dental education. *Int J Dent*. 2020;14, 8672303.