Comparing traditional and comprehensive clinical training methods in dental education: a study of students' self-confidence and clinical performance

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Key points

An overview of the different clinical education methods used in dental schools in India.

This highlights the importance of general dental practice skills in undergraduate dental students.

This study highlights the need for more objective, validated, and universal clinical skill set evaluation methods for dental education.

Abstract

Aim To compare students' self-confidence levels and clinical performance scores between traditional and comprehensive clinical training methods in dental schools in India.

Methods A snowball sampling of undergraduate dental students who had completed their final year during 2021–2022 was undertaken. A questionnaire was designed and distributed to investigate students' self-confidence in performing 35 clinical procedures on a 5-point Likert scale. Additionally, the clinical performance score in external practical assessment during final year was assessed to correlate the self-confidence levels with traditional and comprehensive clinical training methods.

Results Students reported a higher level of self-confidence trained under the comprehensive (3.41 ± 0.40) compared with the traditional method (3.07 ± 0.50) ($p < 0.05$). Interestingly, the median clinical performance score was higher for students using the traditional method (2.88) than for those using the comprehensive method (2.44); however, no significant difference was observed ($p = 0.460$). The correlation between self-confidence and clinical performance scores was strongly positive ($r = 0.521$).

Conclusion This study concluded that both traditional and comprehensive clinical training methods have strengths and weaknesses. Combining these two methods could improve clinical training in India.

Introduction

Currently, two different clinical training methods exist in dental schools in India: traditional and comprehensive. Under traditional clinical training (TCT), undergraduate students rotate through various dentistry departments and receive clinical supervision from instructors in one speciality at a time. However, in comprehensive clinical training (CCT), the students practise clinical skills of all specialties in one clinic simultaneously and are supervised by instructors from the different specialties during clinical years of study, without separation into speciality postings.[1] The CCT has received considerable attention in both medical and dental academic fields during the recent decade.[2] Dental schools worldwide have been actively reviewing, modifying, and implementing evidence-based, patient-centred, comprehensive care curricula, encouraging integrated learning methods.[3]

Clinical training is an essential component of dental education that aids students in developing their clinical skills and professionalism in dental practice.[4] In the context of clinical education, self-confidence is defined as 'students' belief in their knowledge and practical skills during patient care'.[5] Students must develop self-confidence in performing various clinical procedures in the transition from being a student to a practising dentist. Self-confidence is considered one of the most influential motivators and regulators of clinical performance skills among students.[6] As with medical education, the ability to self-assess one's clinical skills and identify gaps in knowledge is an essential skill developed during dental training, in both undergraduate and postgraduate training.[4]

The comprehensive model was extensively evaluated in terms of perceptions of faculty and students, patient satisfaction, students' self-confidence etc.[7,8,9,10,11,12,13] According to a study by Dehghan *et al.*,[8] students preferred a comprehensive care approach and felt that

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Refereed Paper.
Submitted 27 September 2022
Revised 30 January 2023
Accepted 7 February 2023
https://doi.org/10.1038/s41415-023-5791-z

it would allow them to practise dentistry in a more patient-centred setting, and with more consistent faculty supervision. In another study by Mascarenhas,[10] patients reported equal dental satisfaction index scores with a comprehensive care model compared with the traditional model. In studies conducted by Hattar *et al.*,[2] Park *et al.*,[3] Honey *et al.*[14] and Gilmour *et al.*,[15] it was demonstrated that a comprehensive model of teaching positively influenced students' self-confidence. Another study evaluated the disciplinary and CCT patterns for dental interns and concluded that both had benefits and drawbacks.[4]

However, little research has been conducted on CCT methods in Indian dental schools.[1] The influence of clinical training methods on students' clinical performance or skills has not been investigated. Hence, the objectives of this study are as follows: first, we assessed and compared the students' self-confidence and clinical performance scores using the TCT and CCT methods; and the second objective was to correlate the self-confidence score with the clinical performance score obtained during the final year of external practical assessment.

Methodology

Approval was obtained from the Institutional Ethics Committee of Vishnu Dental College before the commencement of the study (reference no: IECVDC/22/UG01/PHD/Q/61). An online survey using Google Forms was conducted among graduates of multiple dental institutions in India who had completed their final year during the academic year 2021–2022. All participants were provided with information regarding the nature and objectives of the study. Participants were required to provide online consent before anonymously recording their responses to survey questions. Participants who provided informed consent were included, whereas those who refused to participate were excluded from the study.

Snowball sampling was used in this study. Snowball sampling was used for two reasons: first, reaching our target subjects would be difficult unless snowball sampling was used; and second, to minimise bias brought on by the restricted inclusion. We also sought to collect data from a large number of dental schools in India. During the first stage of sampling, we identified known students with clinical training in TCT/CCT and provided them with a questionnaire via mail. In the second stage, we asked the participants to nominate other participants with similar criteria and administered a questionnaire. Subsequently, we asked participants to participate in the next round of contact. We used the following method to estimate the sample size because we used snowball rather than random sampling. The survey contained 35 questions and the sample size was five to ten times larger than the total number of questions. As a result, a sample size of 175–350 people was considered sufficient.

Two competent dental faculty members designed the questionnaire. This was based on the revised Bachelor of Dental Surgery (BDS) course regulations issued by the Dental Council of India in 2007.[16] These rules outlined the clinical skills students should have after completing their undergraduate education. When there was disagreement, a subject expert opinion was sought to reach a consensus. Before the distribution, 40 students validated the questionnaire. The internal consistency of the questionnaire was assessed using Cronbach's alpha, which was excellent (0.935).

The questionnaire was divided into three sections. Section A was designed to collect demographic details along with the clinical training method they followed during graduation, Section B consisted of 35 clinical procedures in which students were required to self-rate their confidence using a 5-point Likert scale (scale range: 1 = extremely not confident; 2 = not confident; 3 = somewhat confident; 4 = confident; 5 = extremely confident), and Section C gathered information related to practical marks obtained during the final BDS exams combined for eight specialties. The maximum number of marks obtained was 800 (100 for each speciality). The marks obtained were scaled to match the range of 1–5 to make better comparisons with self-confidence scores.

Data were statistically analysed using SPSS software version 25.0 (IBM Corp, Armonk, NY, USA). The normality of the data was assessed using the Kolmogorov-Smirnov test. Descriptive analyses were performed. The Mann-Whitney U test was performed to compare the mean self-confidence scores and practical exam scores between the different clinical training programmes. Spearman's test was used to determine the correlations. Statistical significance was set at $p < 0.05$.

Results

In total, 198 participants from 29 dental institutions responded to the survey. Of these, 119 (60.1%) belonged to the TCT and 79 (39.89%) to CCT. Most of the participants were women (n = 152; 76.76%). On analysis, dental students trained in CCT (3.41 ± 0.40) reported a higher level of self-confidence compared with TCT (3.07 ± 0.50) ($p < 0.05$). Interestingly, the median practical exam score was higher for students using the TCT method (2.88) than for CCT (2.44), but no significant difference was observed ($p = 0.460$). The correlation between self-confidence and practical exam scores was also examined. Of the 198 students, 21 returned questionnaires with no data on practical exam scores and were excluded from the comparison. Because of skewed data, the rank-order correlation (Spearman's test) was selected. It was strongly positive ($r = 0.521$) and statistically significant ($p = 0.000$) (Table 1).

Table 2 presents the self-confidence scores for the 35 items for both clinical training methods. There were no significant differences in self-confidence levels between the 12 clinical training methods. It also showed 22 items which students under CCT rated their confidence levels higher than those for TCT. The only item for which the TCT rated higher confidence levels than the CCT was the extraction of simple impacted teeth (Table 2). On further analysis, it was found that students under both clinical trainings reported the lowest level of confidence in performing biopsy (1.95 ± 0.78), frenectomy (2.0 ± 0.81), simple extraction of impacted teeth (2.10 ± 0.95), and minor periodontal surgeries (2.12 ± 0.88). However, the highest confidence was reported for performing oral prophylaxis (4.27 ± 0.68), giving oral hygiene instructions (4.18 ± 0.63), and providing amalgam/glass ionomer cement (GIC)/composite restorations (4.15 ± 0.66).

Table 1 Comparison of overall self-confidence and clinical performance scores between different clinical training methods (n = 198)

Characteristics	Traditional clinical training (n = 119)			Comprehensive clinical training (n = 79)			P value
	Mean	Median	SD	Mean	Median	SD	
Self-confidence score	3.07	3.08	0.50	3.41	3.40	0.40	0.000
Practical exam score	2.91	2.88	0.31	3.11	2.84	0.59	0.460

Table 2 Comparison of self-confidence scores in performing 35 clinical procedures between different clinical training methods

Items	Traditional clinical training			Comprehensive clinical training			P value
	Mean	Median	SD	Mean	Median	SD	
1. Items with no significant differences in ratings of self-confidence between TCT and CCT groups							
Appointment setting and communication with the patient	3.83	4	0.88	4.05	4	0.74	0.072
Simple orthodontic appliance therapy	2.67	2	0.9	2.44	2	0.88	0.080
Minor periodontal surgeries	2.21	2	0.91	2	2	0.81	0.102
Oral hygiene instructions	4.13	4	0.71	4.26	4	0.49	0.156
Biopsy	2.01	2	0.81	1.85	2	0.73	0.168
Root planning	2.35	2	0.92	2.17	2	0.84	0.177
Simple extractions	4.15	4	0.78	4.26	4	0.49	0.285
Administration of intramuscular and venous injections	2.51	2	1	2.64	2	0.92	0.348
Frenectomy	2.04	2	0.82	1.93	2	0.79	0.373
Fixed partial dentures	2.56	2	0.91	2.65	3	0.79	0.453
Dento alveolar procedures	2.13	2	0.9	2.22	2	0.93	0.482
Trans-alveolar extractions	2.51	2	1.01	2.54	2	0.97	0.827
2. Items for which the CCT group rated confidence levels higher than the TCT group							
History recording and clinical examination	3.64	4	0.74	4.2	4	0.49	0.000
Radiography	3.49	4	0.73	4.02	4	0.53	0.000
Case diagnosis	3.34	3	0.71	3.77	4	0.57	0.000
Treatment planning	3.46	4	0.8	3.86	4	0.59	0.000
Fluoride application	3.31	4	1.04	4.24	4	0.64	0.000
Pit and fissure sealants	3.59	4	0.97	4.46	5	0.59	0.000
Preventive resin restorations	3.21	3	1.07	4.3	4	0.73	0.000
Rubber dam placement	2.67	2	1.07	3.56	4	0.82	0.000
Pulp capping procedures	3.05	3	1.03	4.17	4	0.61	0.000
Anterior teeth endodontics	2.82	3	1.1	3.96	4	0.68	0.000
Administration of all forms of local anaesthesia	3.51	4	0.82	3.97	4	0.78	0.000
Simple suturing	3.15	3	1.15	3.74	4	0.75	0.000
Complete denture construction	3.26	3	0.88	3.86	4	0.74	0.000
Perform basic cardiac life support	2.82	3	0.97	3.26	3	0.79	0.001
Oral prophylaxis	4.15	4	0.73	4.45	4	0.55	0.002
Sub gingival scaling	3.13	3	0.93	3.55	4	0.94	0.002
Treatment of paediatric patients	3.21	3	0.88	3.53	4	0.74	0.008
Prescription of drugs, pre-operative/prophylactic/therapeutic requirements	3.25	3	0.81	3.54	4	0.74	0.011
Amalgam/GIC/composite restorations	4.06	4	0.73	4.29	4	0.53	0.021
Manage common complications that arise during/after minor oral surgery	2.94	3	0.89	3.2	3	0.82	0.039
Removable partial dentures	3.37	3	0.88	3.63	4	0.8	0.041
Manage medical emergencies in the dental office	2.79	3	0.87	3.03	3	0.74	0.047
3. Items for which the TCT group rated confidence levels higher than the CCT group							
Extraction of simple impacted teeth	2.26	2	1.03	1.86	2	0.76	0.003

Discussion

The findings of this study did not demonstrate competence; rather, they revealed the self-confidence levels of dental students when performing clinical procedures under CCT and TCT methods. Both the clinical training methods had their own advantages and disadvantages. The TCT method tends to focus on training students, while the CCT method was considered more holistic and patient-centred. Students in the TCT method rotate from one department to another, which makes it difficult for them to provide long-term care, followed up with incomplete clinical experience. Besides treatment procedures, the CCT method helps in developing comprehensive skills, such as communicating with patients, arranging appointments, and managing patients comprehensively. In the TCT method, by contrast, the instructor leans toward taking the dominant role in a specialised department. In addition, the TCT method provides students with adequate practise of more specialised clinical procedures compared to CCT.[4]

The most desired quality in dental graduates is their confidence in performing a range of clinical procedures.[1] Self-confidence is necessary for making the shift from a student to an independent practitioner.[4,17] Nowadays, the dental education system focuses on developing new strategies to support dental students during their studies to achieve high levels of clinical skills.[1,9] Moreover, the competitiveness of the workforce places high demands on the clinical skills of new dental graduates for their careers as a practitioner.[9] In light of this, we investigated the level of self-confidence and clinical performance scores among students who underwent TCT or CCT.

In the present study, students reported higher levels of self-confidence in CCT than in TCT. These results are following those of previous studies. The dental students from the University of Tennessee, USA, were satisfied with and supportive of their comprehensive care model.[8] In another study, interns' self-confidence levels regarding clinical procedures were higher in the one-stage pattern over the three-stage pattern.[4] Similar findings were obtained in a study carried out at the School of Dentistry, University of Jordan, where it was found that the comprehensive model of teaching allowed students to feel highly satisfied and self-confident, with improved clinical skills.[2] A recent study from the University of Bern, School of Dental Medicine, found that the comprehensive model was helpful because of frequent discussions with tutors.[9] The reasons for the above findings could be that traditional methods of undergraduate dental education were more focused on the educational needs of students and less on the dental needs of patients, whereas the comprehensive care model, on the other hand, is described as more patient-oriented, and it allows for comprehensive and timely dental care while providing students with an enhanced clinical experience. In the present study, the self-confidence score appeared to be overestimated, as the median self-confidence score exceeded the median practical exam score. This is similar to a study conducted at the University of Melbourne.[18] Some highly competent students tended to underestimate their self-confidence scores.[18,19] Therefore, the two groups of students (overestimation and underestimation) led to an erroneous correlation between self-confidence and practical exam scores.

Compared with the TCT, graduates trained using the CCT method showed greater confidence in performing 24 clinical procedures, including several basic clinical and some special procedures, such as rubber dam placement, anterior teeth endodontics, surgical extractions, simple suturing, subgingival scaling, treatment of paediatric patients, performing basic cardiac life support, and managing medical emergencies in the dental office etc. The development of confidence requires continuous practise with more patients.[4] This reflects to some extent that graduates trained under CCT had greater patient exposure performing basic clinical procedures. The reason for the high levels of confidence in performing some special procedures could be the availability of faculty members from different CCT specialties. A study conducted at the University of Bern, School of Dental Medicine, revealed similar findings.[9]

Additionally, no significant difference was found in the performance of certain clinical procedures, such as simple orthodontic appliance therapy, minor periodontal surgeries, biopsy, root planning, frenectomy, fixed partial dentures, dento-alveolar procedures, and trans-alveolar extractions. It has been noted that these procedures are challenging for undergraduates and require particular attention.[4] In fact, for a variety of reasons, training in these methods is not widely available in many dental schools. One challenge is the limited cases, and second, patients with unusual conditions are usually referred to speciality departments for additional care.[4] Ideally, traditional training methods offer students greater exposure to special cases and treatment procedures, since they are diagnosed and/or treated in the same department where they are posted at the time.

According to this argument, the CCT method offers students a situation in which they may interact with patients and explain treatment plans, schedule appointments etc. In contrast, under TCT, the faculty members tend to assume a leadership position in a specialised department, which gives students less time to communicate with the patients as independent practitioners.[4] However, no difference in self-confidence levels was reported for items such as appointment setting, communication with the patient, and oral hygiene instructions. Interestingly, the only clinical procedure for which students trained under TCT reported higher self-confidence than CCT was the simple extraction of impacted teeth. However, these findings have no explicit justification. However, this may be because of the higher frequency of exposure to such cases among students from government dental colleges using the TCT method, who may have expressed better self-confidence for a particular clinical procedure. This justification reiterates the significance of exposure to a range and quantity of cases in helping students develop their self-confidence.

Implementation of the CCT method is now a step in the right direction for dental institutions. Only a relatively small number of dental institutions provide clinical training using CCT. Numerous issues and difficulties must be considered before moving on to CCT. First is the need for additional investment in terms of infrastructure, facilities and workforce. Second, the decision to establish a comprehensive setup is completely in the hands of management and regulating bodies of dental education.[1] The third issue is the lack of faculty members with advanced skills in general dental practice. This can be avoided by having faculty from different disciplines of dentistry in the CCT method and conducting training programmes for advanced skills and competencies in comprehensive care that have been implemented in several countries. Alternatively, governing authorities may initiate a master's or diploma programme in general dentistry after graduation.[20]

It is important to consider the limitations for future studies. First, the findings cannot be generalised because of the non-probability sampling procedure. Larger sample size with an adequate representation from different countries is required to verify our findings. Second, we investigated students' self-confidence

and clinical performance scores, both of which are influenced by several factors. Self-confidence is a subjective reflection of student performance, and clinical performance scores are based on only specific clinical procedures students perform during practical assessment. Self-confidence is a subjective indicator of a student's success, whereas clinical performance evaluations only rate students on a limited set of clinical tasks. Additionally, it is not thought to be reliable when clinical performance scores are self-reported. Hence, a study with more objective indicators, such as a clinical competency checklist for each procedure, could provide a better direction for future research.

Conclusion

Within these limitations, the present study demonstrated a significant impact of CCT on students' self-confidence during patient care. The benefits and drawbacks of clinical training methods must be carefully considered when choosing and applying them in undergraduate dental education. Finally, combining different approaches may be a way to enhance clinical training, such as that provided in North America, which combines a year of comprehensive patient care with a year of speciality training.

Ethics declaration

The authors declare no conflicts of interest.

Ethical approval for the study was granted by the Institutional Ethics Committee of Vishnu Dental College (reference no: IECVDC/22/UG01/PHD/Q/61). Participants were required to provide online consent before anonymously recording their responses to survey questions.

Author contributions

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Acknowledgements

The authors would like to thank all students who participated in this study.

Data supporting the findings of this study are available upon request from the corresponding author. The data were not publicly available because of privacy or ethical restrictions.

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