

Level of Self-Confidence in Performing Root Canal Treatment by Undergraduates: A Cross-Sectional Study

Md Asad Iqbal¹ Stuti Kumari^{2*} Shandar Siddiqui³ Kunal Kumar⁴ Vishwendra Pratap⁵ Watsala Kashyap⁶

¹Lecturer, Department of Oral Medicine and Radiology, Patna Dental College & Hospital, Patna, Bihar, India.

²Senior Resident, SKMCH, Muzaffarpur, Bihar, India.

³MDS, Department of Pedodontics and Preventive Dentistry, Private Practitioner, Sabzibagh, Patna, Bihar, India.

⁴BDS, Private Practitioner, Muzaffarpur, Bihar, India.

⁵BDS, Private Practitioner, Danapur, Bihar, India.

⁶BDS, MPH, Amity University, India.

ABSTRACT

Background: The Dental Council of India expects graduating dentists to be competent at treating all tooth related disease. In Prior studies it was found that dental undergraduates have low levels of self-confidence with respect to endodontic treatments.

Aim and objective: The main aim of this study is to explore the self-confidence of undergraduate dental students at a dental college in Bihar in performing root canal treatment, and to investigate their insight of the quality of their endodontic education.

Material and method: An anonymous questionnaire, based upon one used in a 2015 study at Cardiff University, was distributed to all (n = 102) undergraduate students. The results were analysed using the Statistical Package for the Social Sciences software (SPSS).

Result: There was a 59% (n = 60) response rate and a significant (p < 0.01) difference in confidence levels for root canal treatments (RCTs) completed between these students. All (100%) interns felt confident in completing anterior RCTs, and 91% felt confident in completing posterior RCTs. The majority (93%) of final year students felt confident in completing anterior RCTs, and 77% felt confident in completing posterior RCTs. Over one-half (56%) of 3rd year students felt confident in anterior RCTs and 17% in posterior RCTs.

Keywords: undergraduate, root canal treatment, self-confidence.

INTRODUCTION

Endodontics is the characteristic feature of dentistry that focuses on the health and the disease status of the dental pulp and peri-radicular tissues. Following a diagnosis of apical periodontitis infection [1], the aim of treatment is to restore the health of the peri-radicular tissues. The most common way of doing this is by performing root canal treatment (RCT), which aims to either create or maintain (depending on the pre-operative status) an aseptic environment within the root canal system [1]. During their course of study,

undergraduate dental students in Bihar are expected by the Dental Council of India to achieve the learning outcomes set out in its document entitled revised BDS course regulation 2007 [2]. There are various guidelines available to dental colleges that are used to aid the direction of endodontic teaching, including those of the Indian Society of Endodontology. with an satisfactory clinical knowledge to be able to resolve clinical problems encountered self-sufficiently or without assistance' [3]. A research paper published by

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*Correspondence Dr. Stuti Kumari.

SKMCH, Muzaffarpur, Bihar, India.

Email: stuti.singh011@gmail.com

Dublin University students' root canal treatments from 2009 to 2010 exhibited that inadequate RCTs were performed in 83% of cases [4]. A comparable result (87%) was found amongst students at Cardiff University in 2001 [5]. Other analogous studies performed across the EU have produced similar results with the highest percentage of acceptable root fillings reaching only 55% [6–9]. However, other studies have found contrary results. A 2007 research work showed that 63% of RCTs performed by undergraduate dental students at the Glasgow dental school were of a satisfactory standard [10]. More lately, a study found that over 84% of 258 root canal treatments supported out at Kaunas University in Lithuania were of an adequate standard [11].

The reasons for this dissimilarity in standard are unidentified and may be due to the ability of the numerous student allies, the clinical methods used, or the quality of their endodontic teaching. If students sense that their training is not of a high standard, their ability and self-confidence in carrying out RCTs may be affected [12]. Yet, studies have initiated that the suitability of root canal treatment can be highly predisposed by various factors including the intra-canal drug used between visits, the type of tooth, root morphology, pulpal and periapical status, and the radiographic position of voids in the root filling [13,14]. By associating the primary teaching methods used in different dental schools, it may be possible to govern which training methods produce the best quality outcomes. The training of endodontics in dental colleges has changed over recent years. Dentists should be providing evidence-based treatments—which permits dentists to keep up to date with the best conceivable treatments available, as well as including their own clinical aids with patients' needs, concerns, and values. The type of endodontic teaching available differs between dental schools. Many dental schools take the approach of teaching through problem-based learning, case-based learning, seminars, lectures, tutorials, e-learning, OSCEs, computer-assisted learning, self-teaching, combinations of all these methods (which is common), and more [15]. There remains a sturdy favoritism towards the old-style technique of amphitheatre lectures despite there being strong evidence behind there being a need for varied teaching methods in order to achieve the best

educational results [12]. A problem-based knowledge approach has been found to be very useful for improving students' confidence when they go on to perform clinical procedures for themselves [16]. In addition, a case-based discussion method of teaching can increase students' own perception of how competent they are at carrying out clinical tasks, or, in other words, their confidence in carrying them out [17]. The results of these studies suggest that it would be sensible for dental schools to include either more problem-based learning or case-based discussion teaching within their future courses to compliment or substitute for the more traditional methods that are currently used.

A current study at Cardiff University discovered the quality of endodontic education at its dental school by examining undergraduate dental students' observation of how root canal treatment was taught [18]. The study also investigated the self-confidence that dental undergraduates at Cardiff University had when performing either complicated or uncomplicated RCTs clinically. Almost one-half (49%) of students did not feel competent at carrying out root canal treatment on single-rooted teeth, and this figure increased to 74% for multi-rooted teeth. The authors resolved that there was a need for improving the level of endodontic education delivered to the undergraduate dental students at Cardiff University in order to increase their levels of confidence and competence in the subject. Two further studies have found a strong association between the perceived adequacy of undergraduate endodontic education and student confidence in performing RCTs [19,20].

MATERIAL AND METHODS

A cross-sectional survey of all dental undergraduates ($n = 102$) from 3rd to internship at the dental college was carried out. There were no exclusion criteria. A survey form was formulated, based upon the one used in the 2014 Cardiff study, [18] and as the questionnaire had been previously used successfully, no pilot study was undertaken. and these students would be likely to perform RCTs in both single-rooted and multi-rooted teeth. Undergraduate endodontic teaching at dental colleges across India covers both traditional hand-filing techniques and the use of rotary instrumentation using Protaper files (Dentsply).

Data was analysed using Statistical Package for Social Sciences (SPSS). Students' awareness of their self-confidence at carrying out procedures was determined by use of a series of questions that could be replied with Likert scale values from 1 to 10, with a score of 5 being used as the cut off between 'confident' and 'non-confident'. A Kruskal-Wallis Test resolute the difference in students' confidence between carrying out RCT on anterior and posterior teeth. These tests discovered p-values for the data that acknowledged whether or not significant trends between year groups appeared in the data. The tables presented in the Results section include both mode values for the data, which allow comparisons with the recent Cardiff study.

RESULTS

There was a 59% response rate with $n = 60$ students completing the questionnaire, with response rates from individual years of 62% (3rd), 65% (4th), and 48% (interns).(table 1)

Table 1: Breakout of students who completed the questionnaire.

3 rd year students	4 th year students	interns	total
23	21	16	60

Endodontic Experience of Completing RCT

3rd students had completed a mean of 3.20 RCTs in the Clinical posting, with the mean for 4th year and interns being 4.42 and 4.38, respectively. In terms of clinical RCTs, the interns were unsurprisingly more experienced, with a mean of 5.5, compared to means of 0.18 (3rd year) and 1.63 (4th year), completed RCTs. These results are significant ($p < 0.01$).

Overall Confidence in Completing Root Canal Treatment in a Clinical Setting

There was a significant difference between groups ($p < 0.01$) with respect to confidence levels in

completing anterior RCTs. All (100%) interns felt confident (scored > 5) in completing anterior RCTs, with 93% and 56% of 4th year and 3rd year students, respectively, feeling confident in completing an anterior RCT.

The null hypothesis being 'the distribution of posterior RCT confidence is the same across categories of year group' was rejected after carrying out the Kruskal-Wallis Test as $p < 0.01$. In general, students felt less confident in undertaking posterior RCTs compared to anterior RCTs. The majority (91%) of Year-5 students felt confident in performing posterior RCT, whilst 77% of Year-4 and only 17% of Year-3 students felt confident in performing posterior RCT.

level of Confidence When Performing Different Stages of Root Canal Treatment

Results show that there is a significant ($p < 0.01$) difference between how confident students in different year groups felt at carrying out the three main stages of RCT (access cavity, cleaning and shaping of root canal system, and final obturation). Almost three-quarters (73%) of 3rd Year students felt confident at carrying out the access cavity stage with even more (91%) 4th Year and almost all (97%) interns feeling confident. The results for 'cleaning and shaping the root canal system' show that 58% (3rd Year), 86% (4th Year), and 97% interns feel confident. Fifty-three per cent (3rd Year), 86% (4th Year), and 94% interns feel confident at 'final obturation'. Table 3 shows that there is an overall significant difference between the years in confidence in performing all stages of RCT (apart from the stages of taking pre-operative, intra-operative, and post-operative radiographs, meaning that there is almost similar confidence in this stage within the year groups). However, between 4th Year and interns, there was little significant difference in levels of confidence.(table 2).

Table 2: Students' level of confidence when performing uncomplicated RCT.

How Confident Do You Feel:	Mode Values of Confidence of 3rd year	Mode Values of Confidence of 4th year	Mode Values of Confidence of intern	Overall p value
At assessing the quality of a root filling post-operatively?	3	4	6	<0.01
Determining the working length of a canal?	5	5	7	<0.01
Cleaning and shaping the root canal system?	4	6	8	<0.01
Filling the root canal system?	5	7	8	<0.01
Taking pre-operative, intra-operative and post-operative radiographs?	5	6	9	<0.01
Giving post-operative instructions to patients?	4	5	8	<0.01
Knowing how to restore a tooth following root canal treatment?	5	6	9	<0.01

DISCUSSION

The main aim of this study was to explore the self-confidence of undergraduate dental students when accomplishment root canal treatment and their insight of the quality of their endodontic education. There was a over-all enhancement in student self-confidence when performing anterior and posterior RCTs as students progressed through the dental school. This was not surprising as the students increased clinical experience and received further knowledge-based and skills teaching as they progressed from 3rd year to interns, as reported in a study conducted at the University of Toronto [21]. This direct connotation between clinical skill and student confidence is demonstrated by 3rd year students (who have on average completed 0.18 RCTs) reporting 37% confidence overall, 4th students (average 1.63 completed RCTs) reporting 85% confidence, and interns (average 4.5 completed RCT's) reporting 95% overall confidence. It is encouraging that by the time the students started to reach the end of their clinical teaching during Year 5, every student felt confident in performing anterior RCTs, and 91% felt confident in performing posterior RCTs. The general self-confidence in finishing the specific stages of RCTs

were different between the year groups, again showing that confidence increased with student progression. However, for certain steps of RCT, there seemed to be little difference in confidence between the Year-4 and Year-5 students, signifying that, by the time students reach Year-4, they have a alike level of self-confidence to the Year-5 students. This may be credited to the timing of the study in relating to the undergraduate teaching.

The survey form was distributed shortly after the 4th year students had completed their second skills course, and so while not having the clinical experience of the interns, the theoretical knowledge would be fresh in their minds. It was unsurprising that the majority of 3rd year students had little confidence in aspects of post and core provision, as this aspect of teaching is not carried out until students are in 4th year.

The results observing at student confidence in relation to the different stages of RCT within the diverse year groups used mode values so that the results could be effortlessly equated to the Cardiff study [18]. Although the mean does signify the central tendency better than the mode, for comparative reasons, the mode was most

appropriate. The Cardiff study found that 3rd year students generally scored 1 on the confidence scale for the majority of the stages, the majority of final year students scored 4, and interns scored 7 or 8 [18]. In comparison, Bristol students were indicating confidence scores of 7 (Year-3), 7 (Year-4), and 7 (interns) for the majority of stages. The explanations for this are unclear, although it does not seem linked to the amount of training received. Cardiff students seems to have more endodontic teaching (54 h total) equated to Bristol students (43 h total). These differing confidence levels may be related to the differing amounts of direct patient contact between the two schools. Cardiff students had, on average, completed 0, 0.31, and 2.81 RCTs in Years 3–5, respectively, compared to 0.18, 1.63, and 4.5 average completed RCTs for Bristol students in Years 3–5, respectively. Additional study could be carried out to sightsee reasons for these reported confidence levels between the two schools. It is important to remember, however, that self-confidence (perception of competence) does always directly relate to capability [22]. A student reporting a high level of self-confidence with a technique does not necessarily mean that they will be capable at performing it. Overconfident students may put patients at risk by trying measures beyond their skill level, whilst although students may have the essential skills, context and their internal perception of their ability may not give them self-belief (confidence) to carry out the procedure [23]. Both confidence and competence is likely to grow with increased clinical experience, especially if this clinical knowledge is structured [24]. Although increased clinical experience of RCT does not necessarily mean that a student will become competent, it is essential that undergraduate students receive sufficient clinical exposure to endodontic treatments else they are unlikely to develop either competence or confidence [25]. However, increasing the level of student experience is not always easy with barriers such as a lack of appropriate patients and the constraints of an undergraduate teaching curriculum being ever-present [23]. Irrespective of the level of student experience, it is essential for students to develop insight and an accurate self-assessment of their own competence levels and associated confidence such that further training and clinical experience can be sought after graduation where needed. Upon graduation, dentists need the skill to be able to

target their ‘weak’ areas through training by using portfolios, reflection, and personal development plans [23].

As a large number of survey forms were returned without responses in the comments sections, it is difficult to determine if comments made are representative of the population. However, the comments were analysed to look for common themes. Many of the students commented on the good quality of teaching received during the clinical skills sessions, although the high student-to-staff ratio was regularly reported as being an aspect of teaching that could be improved. A higher number of staff devoted to these sessions would allow staff to spend more time with individual students where needed, and would also improve the overall student experience. Many of the responses received related to the equipment used during the practical teaching sessions, and it was found that students thought that the use of transparent ‘endo vu’ practice blocks and ‘Typodont’ teeth were useful learning aides. Most of these comments came from Year-3 students, and we speculate that this is because these resources allow students to receive good feedback on the quality of their work, making them popular during the earlier stages of their endodontic education. However, students from Years 4 and 5 commented that would have liked more opportunities to practice on real extracted teeth. This supports earlier findings as to why students feel endodontic education is of a lower standard than it could perhaps be [26]. Many students at the dental college thought that the amount of formal endodontic teaching received was sufficient, and that teaching was of a good standard, with lectures and practical sessions being of a sufficient standard. Despite these limitations, we feel that the methodology used and the 59% response rate provide a contemporary benchmark from which further studies could be conducted. Further research could be undertaken to expand the study to investigate confidence levels within undergraduate students at all the dental college in Bihar and to investigate if different teaching methods, time spent teaching, or the amount of clinical experience has an effect on student confidence.

CONCLUSIONS

Students' perception of their own confidence at performing RCTs was directly related to their progression as an undergraduate from 3rd Year to interns, and it is encouraging that the majority of students approaching graduation felt largely confident in carrying out RCTs in a clinical setting. Student confidence appears directly related to their amount of clinical experience. and in addition, it is essential that students develop good self-assessment of their clinical competence and associated confidence levels such that they can seek further post-graduate training where needed.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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