

Clinical Undergraduate Endodontic Teaching in King Saud University: Student's Experience, Perception, and Self-Confidence Levels

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Abstract

Aim: To investigate King Saud University undergraduate dental students' clinical experiences, their perceptions of the current endodontic practice, and their self-rated confidence levels in a range of expected competencies.

Materials and methods: Surveys' forms were distributed to the 125 fourth-year and 120 fifth-year dental students (Male and female) enrolled in the Faculty of Dentistry in 2017-2018, at King Saud University. An 8-question survey was distributed manually and electronically. The first section covered demographic details, while the remainder of the questionnaire assessed the students' experiences regarding nonsurgical root canal treatment, including difficulties faced in their clinical training in this field, their self-rated levels of confidence in carrying out various endodontic tasks and their career intentions about endodontic practice once graduated. Levels of confidence with respect to a range of basic endodontic treatment were explored using Likert scale. Chi-square test and proportional t-test were used for individual and multi response analysis ($p < 0.05$).

Results: The overall response rate was 63%. Molar teeth listed as the most difficult teeth to treat. Fear of doing mishaps, anatomical variations, patients' factors, access cavity preparation, root morphology, and pulpal factors were the main difficulties faced by the undergraduate students. Half of the students found endodontics 'difficult' or 'more difficult' comparable with other branches. Percentage of students who would not consider specializing in endodontics was 25.3% among the fourth-year students, and 50% among the fifth-year students. Students' perception on some suggestions to improve clinical undergraduate endodontic learning was mainly improving the student-instructor relationship, the introduction of new techniques, and more clinical and preclinical training. Comparable results were found between the two educational level groups where they felt confident in most of the basic endodontic clinical procedures, without statistical significant difference between them. However, relatively lower confidence levels were noted in both groups regarding finding all canals in multi rooted teeth.

Conclusions: Fourth-year and fifth-year undergraduate dental students displayed confidence in carrying out basic endodontic skills but reported lower confidence and more difficulty in less experienced and more complicated procedures.

Keywords: Clinical endodontics; Competency; Education; Self-confidence; Student's perception; Undergraduate endodontics

Introduction

Undergraduate endodontic teaching has been improved in recent years, influenced by the advancement in knowledge, techniques, materials as well as educational approaches [1]. However, many dental students still consider endodontics to be complicated and stressful [2]. Some they are lacking confidence in managing specific procedures that are expected to be done by a newly graduated dentist, such as accurate diagnosis of endodontic cases, proper endodontic treatment plan, root canal treatment of uncomplicated single and multi-rooted teeth, and identifying and managing emergency cases [3].

Dental students at King Saud University, Riyadh, begin both their pre-clinical and didactic endodontic teaching in the third year of

their 6-year Bachelor of Dental Surgery (BDS) degree. Teaching in this discipline consists of thirteen theoretical lectures and one three-hour pre-clinical session weekly during which they prepare and root canal fill four extracted single-rooted teeth and four extracted multi-rooted teeth. Besides, they need to complete access cavity projects on eight extracted teeth (Two anteriors, two premolars, and four molars). Instruction is given on electronic apex locator applications and rotary files usage. In the fourth year study (BDS4), another twelve lectures are given and one three-hour clinical session weekly focused on preparing single and multi-rooted canals either with hand or rotary files (Two anteriors, two premolars, two molars, and one retreatment case). No formal endodontic teaching occurs in the fifth year (BDS5), and there was no endodontic requirement. Treatments are carried

out as part of comprehensive patient care under the supervision of a specialist.

Student's perception of their learning and educational experiences is essential and should be taken into consideration, as they can provide valuable feedback and suggestions that can improve the learning environment [2,4].

This survey aims to investigate King Saud University undergraduate dental students' clinical experiences, their perceptions of the current endodontic practice and their self-rated confidence levels in a range of expected competencies.

Materials and Methods

The study protocol was approved by the ethics committee at King Saud University, College of Medicine (IRB Project No. E-18-3144). Surveys' forms were distributed to the 125 fourth-year and 120 fifth-year dental students (Male and female) enrolled in the Faculty of Dentistry in 2017-2018, at King Saud University, in the final month of the academic year to allow for a maximum clinical endodontic experience. A participant information sheet was provided which gave a brief description of the study and informed participants that returning a completed questionnaire would imply consent. Participation was voluntary with students able to decline participation. The form was paper-based, and electronic-based (Google forms, Google LLC, Mountain View, CA, United States) that distributed online through WhatsApp (WhatsApp Inc, Menlo Park, CA, United States).

Questionnaire

An 8-question survey was a modification of the survey used by Murray in his study [5]. It was developed in English using a multiple-choice and Likert-scale format, and an opportunity for the students to provide open-ended feedback. The first section covered demographic details, while the remainder of the questionnaire assessed the students' experiences regarding nonsurgical root canal treatment (RCT), including difficulties faced in their clinical training in this field, their self-rated levels of confidence in carrying out various endodontic tasks and their career intentions about endodontic practice once graduated. Where questions explored levels of confidence, participants classified their perceived level over a 5-point scale as 'very confident', 'confident', 'neutral', 'not confident', 'Not at all confident'.

A pilot test of 5 questionnaires was performed against a checklist to determine content clarity, language development, and validity.

Statistical analysis

Data were entered into an electronic database and analyzed using SPSS (Statistical Package for the Social Sciences version 20 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used. For differential statistics, Chi-square test and proportional t-test were used for individual and multiresponse analysis. Level of statistical significance set at $P < 0.05$.

Results

The overall response rate was 63%, with 90 of the 125 fourth-year students (BDS4) and 65 of the 120 fifth-year students (BDS5) returning questionnaires. Of the total respondents, 108 (70%) were female, while 47 (30%) were male.

According to the students' experience, molar teeth (Maxillary and mandibular first and second molars) listed as the most difficult teeth to treat, a finding consistent in both year groups (Figure 1a,1b). Reasons for difficulty were many and varied (Figure 2). Fear of doing mishaps (59.5%), patients' factors (43%) such as absences, delays, psychological

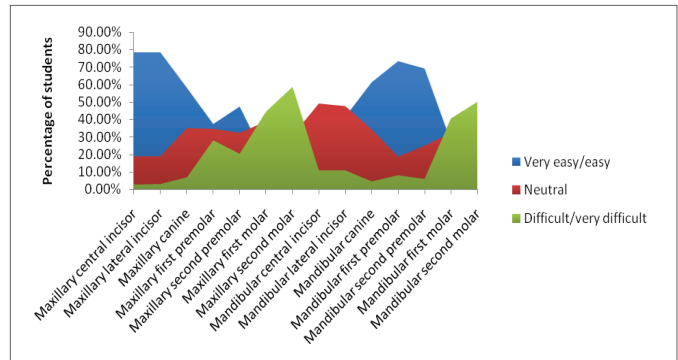


Figure 1a: Difficulty of teeth treated by fourth-year students (BDS4).

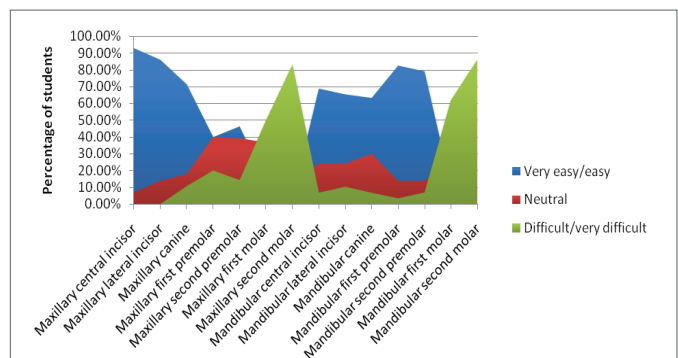


Figure 1b: Difficulty of teeth treated by fifth-year students (BDS5).

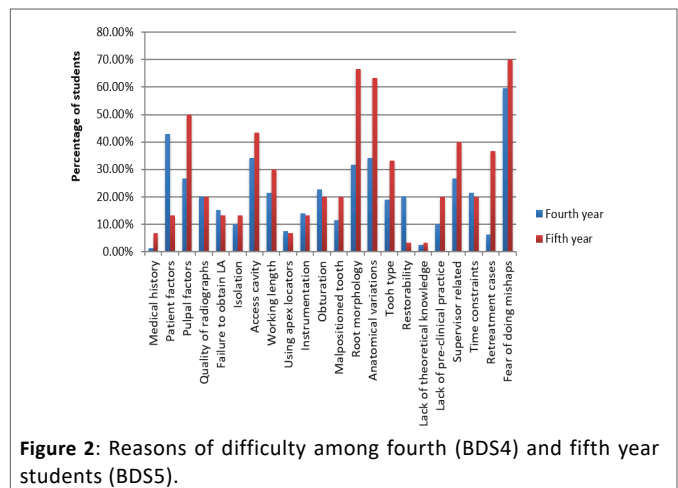


Figure 2: Reasons of difficulty among fourth (BDS4) and fifth year students (BDS5).

problems, and lack of the appropriate case, access cavity preparation (34.2%), and anatomical variations (34.2%) were the main reasons given by the fourth-year students. Fifth-year students appeared to experience the same major difficulties as fourth-year students which were fear of doing mishaps (70%) and anatomical variations (63.3%), in addition to root morphology (66.7%), and pulpal factors (50%) such as inflamed pulps, pulp extirpation, and pulpal calcification. Some other reasons were mentioned by the students such as the lack of assistants, shortage of supplies, limited techniques used, old instruments, lack of knowledge about new instruments and devices that will make the treatment more comfortable.

Regarding the students' perceptions of endodontics as compared with other branches of clinical dentistry, half of the students found

endodontics either okay or comparable with other branches and the other half felt it was 'difficult' or 'more difficult'. None of the fifth year students consider it an easier specialty (Figure 3). There was no statistically significant difference between the two groups of students.

There was a significant increase in the percentage of students who would not consider specializing in endodontics when comparing the fourth-year and fifth-year groups. While 25.3% of the fourth-year participants answered with a definite 'no', this was significantly higher among the more senior students (50%) ($p=0.048$) (Figure 4).

While 60% of fifth-year students felt that more preclinical training would be significantly helpful to improve clinical undergraduate endodontic training, only 29.1% of fourth-year students would have liked more preclinical training ($p=0.003$). Moreover, 83.3% of fifth-year students felt that improving student-instructor relationship would also be significantly helpful to improve clinical undergraduate endodontic training, and 54.4% of fourth-year students agreed with that ($p=0.005$). None of them agreed that increasing the number of requirements would improve the clinical undergraduate endodontic training (Figure 5).

Confidence levels regarding both the individual steps in carrying out a nonsurgical root canal treatment and a list of basic endodontic procedures were explored (Table 1). Comparable results were found between the two educational level groups where they felt confident in most of the basic endodontic clinical procedures, without statistical significant difference between them. However, relatively lower confidence levels were noted in both groups regarding finding all canals in multirooted teeth.

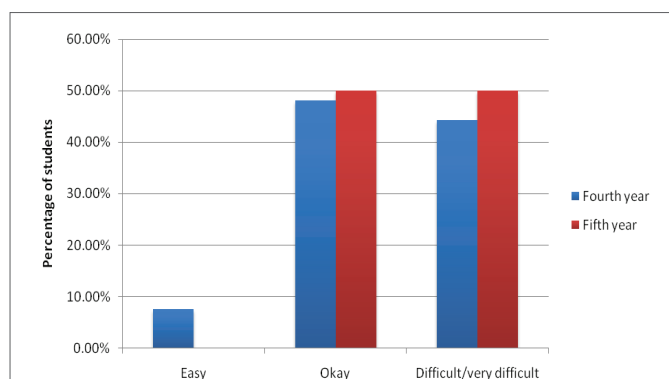


Figure 3: Fourth (BDS4) and fifth-year (BDS5) students' perception of endodontics, in term of difficulty, compared to other dental specialties.

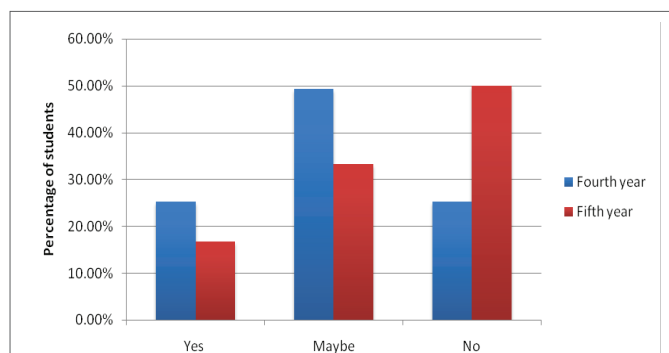


Figure 4: Fourth (BDS4) and fifth-year (BDS5) students' consideration of endodontics as a future specialty.

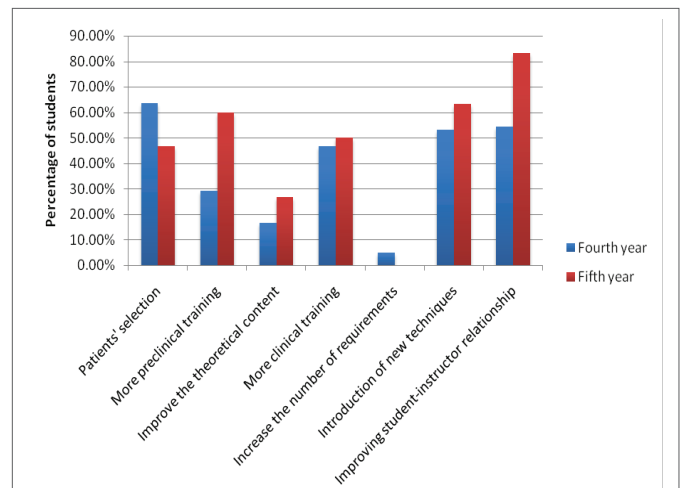


Figure 5: Fourth (BDS4) and fifth-year (BDS5) students' perception on some suggestions to improve clinical undergraduate endodontic learning.

Discussion

Student's perception of their learning and educational experiences is essential and should be taken into consideration, as they can provide valuable feedback and suggestions that can improve the learning environment [2,4]. Moreover, it is important to obtain periodic evaluations and feedback so that mistakes can be corrected and improvement can be achieved [2].

Endodontics learning is considered complex, challenging, and stressful for many undergraduate dental students [2]. Several studies evaluated the student's perceptions toward undergraduate endodontic learning [5-10]. In our study, half of the students found endodontics 'difficult' or 'more difficult' as compared with other branches of clinical dentistry. According to the students' experience, molars listed as the most difficult teeth to treat, a finding consistent with other studies [5,6,9,11]. For those students in both groups who experienced difficulties carrying RCTs, fear of doing mishaps was the major reason. This fear could be explained by the limited experience that the undergraduate dental students had clinically, or insufficient didactic teaching [11]. Also, the management of complex cases, such as repair of perforations and removal of a separated instrument, was not focused during their undergraduate clinical studies and all cases should be referred either to postgraduate students or specialist to be managed. Moreover, the Profile and Competences described by the Association for Dental Education in Europe indicates the acquisition of adequate competence by the undergraduate to perform endodontic treatment on uncomplicated single and uncomplicated multirooted teeth [12]. Anatomical variations, root morphology, and pulpal factors such as inflamed pulp and pulpal calcification were the main reasons given by the fifth-year students. Possibly the result of treating more complex cases than the fourth-year students. Patients' factors such as absences, delays, and lack of the appropriate case preparation were among the main reasons given by the fourth year students. This result could be explained by the way of treating the patients in the fourth year as an individual case care and not as a comprehensive patient care, which makes the patients less committed to their appointments. These results were consistent with previous studies [2,5].

In this study, confidence levels were comparable between the two educational groups, but it varied according to the clinical steps of

Table 1: Fourth-year and fifth-year dental students' self-rated levels of confidence with respect to a range of basic endodontic treatment by percentage of respondents.

| | Very confident | | Confident | | Neutral | | Not very confident | | Not at all confident | |
|--|----------------|--------|-----------|--------|---------|--------|--------------------|--------|----------------------|-------|
| | BDS4 | BDS5 | BDS4 | BDS5 | BDS4 | BDS5 | BDS4 | BDS5 | BDS4 | BDS5 |
| Understanding the concepts of healthy and diseased pulps | 53.20% | 63.30% | 32.90% | 33.30% | 11.40% | 3.30% | 2.50% | 0% | 0% | 0% |
| Correct diagnosis of cases needing endodontic treatment | 54.40% | 53.30% | 32.90% | 43.30% | 12.70% | 3.30% | 0% | 0% | 0% | 0% |
| Obtaining proper LA for endodontic treatment | 43% | 30% | 38% | 56.70% | 13.90% | 13.30% | 5.10% | 0% | 0% | 0% |
| Placing rubber dam | 68.40% | 63.30% | 25.30% | 33.30% | 6.30% | 3.30% | 0% | 0% | 0% | 0% |
| Choosing the appropriate clamp | 64.60% | 63.30% | 26.60% | 26.70% | 8.90% | 10% | 0% | 0% | 0% | 0% |
| Complete deroofing | 27.80% | 33.30% | 29.10% | 36.70% | 26.60% | 23.30% | 16.50% | 6.70% | 0% | 0% |
| Pulp extirpation (All teeth types) | 26.60% | 23.30% | 35.40% | 43.30% | 26.60% | 20% | 8.90% | 13.30% | 2.50% | 0% |
| Finding all canals in multirooted teeth | 8.90% | 6.70% | 25.30% | 13.30% | 32.90% | 36.70% | 26.60% | 40% | 6.30% | 3.30% |
| Determining working length | 22.80% | 16.70% | 43% | 56.70% | 25.30% | 20% | 6.30% | 6.70% | 2.50% | 0% |
| Using apex locator | 39.20% | 50% | 35.40% | 40% | 17.70% | 10% | 6.30% | 0% | 1.30% | 0% |
| Cleaning and shaping of the canals | 34.20% | 40% | 38% | 43.30% | 21.50% | 16.70% | 3.80% | 0% | 2.50% | 0% |
| Using rotary files | 31.60% | 43.30% | 35.40% | 40% | 20.30% | 16.70% | 10.10% | 0% | 2.50% | 0% |
| Obturing the canals | 45.60% | 46.70% | 27.80% | 36.70% | 7.60% | 16.70% | 16.50% | 0% | 2.50% | 0% |
| Retreating single-rooted teeth | 38% | 53.30% | 36.70% | 36.70% | 19% | 10% | 3.80% | 0% | 2.50% | 0% |
| Placing inter-appointment dressing | 35.40% | 26.70% | 27.80% | 30% | 20.30% | 13.30% | 11.40% | 26.70% | 5.10% | 3.30% |
| Managing inter-appointment flare-ups | 11.40% | 20% | 31.60% | 36.70% | 34.20% | 23.30% | 15.20% | 20% | 7.60% | 0% |
| Assess the quality of a root filling postoperatively and determining the correct recall period for the patient | 26.60% | 30% | 38% | 33.30% | 29.10% | 26.70% | 3.80% | 10% | 2.50% | 0% |
| Know when to refer patients for more complicated endodontic treatment | 29.10% | 36.70% | 32.90% | 33.30% | 32.90% | 23.30% | 5.10% | 6.70% | 0% | 0% |

nonsurgical root canal treatment. Both groups reported relatively good confidence in understanding the concepts of healthy and diseased pulps, correct diagnosis of cases needing endodontic treatment, obtaining proper local anesthesia, placing rubber dam, choosing the appropriate clamp, retreating single rooted teeth, assessing the quality of a root filling postoperatively, and know when to refer patients for more complicated cases. These results were expected since the didactic teaching in endodontics started in the third year and completed by the end of the first semester of the fourth year. Therefore, an adequate level of confidence might be expected with regard to theoretical knowledge. Moreover, dental students are taught the skill of using rubber dam at the beginning of their second year, and its use is mandatory during the fourth and fifth year. Furthermore, undergraduate students started obtaining proper local anesthesia at the beginning of the third year. However, the lower confidence levels were noticed with the individual endodontic steps starting from complete deroofing till obturating the canals. This result might be the result of the limited clinical experience that the students had in clinical endodontics, and the variations in root canal anatomy that was considered a difficulty by the majority of dental students. The lowest confidence levels were noticed in finding all canals in multirooted teeth, placing inter-appointment dressing, and managing inter-appointment flare-ups. It was more noticed among the fifth-year students, which might be due to the result of treating more complex cases during that year, and they are not closely supervised

as they were in the fourth year. Tanalp et al. explained that students might miss-communicate with the patients regarding the possibility of inter-appointment pain and how to deal with it, which might end up by an adverse reaction from the patients that might affect the student's confidence in managing such cases [9]. Murray et al. mentioned in his study that lack of clinical exposure in the undergraduate curriculum reduces the confidence that develops with clinical practice [13]. These results were consistent with previous studies [6-10,14].

Students' perception on some suggestions to improve clinical undergraduate endodontic learning, in both groups, was mainly improving the student-instructor relationship, the introduction of new techniques, and more clinical training. This result was consistent with previous studies where students indicated teachers' attitude as an essential factor of learning [2,6]. Effective clinical teachers characterized by showing empathy, providing help and guidance, being informative, interactive, and giving constructive feedback [15]. Rotary instrumentation is part of the requirements of the fourth year where half of the required teeth have to be instrumented using rotary files. At the fifth year, the students have the freedom to choose between rotary or hand instrumentation. Several studies showed that introducing NiTi rotary instruments into undergraduate training might improve the quality of treatment and endodontic teaching [2,16,17]. Due to the condensed schedule of the undergraduate students, the clinical credit hours could not be increased. Chambers indicated that practice by

itself is a necessary condition for learning [18], it is generally approved that repetition of clinical procedures is essential to accomplish clinical competence [3].

It was curious to know how many students would consider specializing in endodontics. There was a significant increase in the percentage of students who would not consider specializing in endodontics among fifth-year groups compared to fourth-year students. This result was in contrast with previous studies that showed that endodontics was among the dental specialties that were most preferred and interested in [19,20].

Conclusion

Fourth-year and fifth-year undergraduate dental students in King Saud University displayed confidence in carrying out basic endodontic skills but reported lower confidence and more difficulty in less experienced and more complicated procedures. That could affect their consideration in not specializing in endodontics.

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