

Evaluation on the perception of final year dental students on their confidence level regarding endodontic treatments: a cross sectional analysis

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Abstract

Endodontics procedures are difficult and complicated that most of the practitioners would encounter. Therefore, dental students should gain their confidence and competent during their training. This research aimed to study the perception of final year students on confidence level regarding endodontic treatments from all public universities and their opinions on the quality of endodontic education. A Google Form was used to disseminate an online questionnaire to all dental students from public universities across Malaysia. The survey included both scaled answer and open-ended questions. 184 responses out of 235 students, were obtained (response rate = 78%). Perception of competence and confidence were significantly greater amongst the students from research-based universities group ($P < 0.05$). 93.5% ($n=179$) of participants agree that they were confident to do endodontic procedure on anterior tooth, whilst on posterior tooth, only 75.5% ($n=139$) were confident. Only 6.5 percent of participants ($n = 12$) did not feel confident doing root canal treatment on single-rooted teeth, but 76.1 percent ($n = 140$) did not feel competent performing root canal treatment on multirooted teeth. Over 90% of the students rated the quality and the amount of time spent on endodontic education were adequate at their respective university as ≥ 5 on a Likert scale (1 = inadequate to 10 = adequate). In addition, when they were asked to give the suggestion on how to improve the quality of endodontic education, 10.9% of the students suggested to increase the number of practical session and to do regular discussion regarding endodontic cases. It is vital to improve undergraduate endodontic education in order to raise students' perceptions of their confidence and competence when doing root canal therapy.

Keywords: education, endodontics, root canal treatment, undergraduate dental students

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Introduction

Endodontics is a specialist field of dentistry that focuses on the preservation of healthy periapical tissues as well as the healing of

infected or inflammatory periapical tissues. Endodontic failures are on the rise, and their treatment necessitates a large number of clinical cases to be handled quickly in general dentistry (Gilmour *et al.*, 2017).

According to studies done in Sweden and United Kingdom, the number of people seeking endodontic treatment has risen dramatically during the last few decades (Skudutylte & Eriksen, 2006, Brennan & Spencer, 2003).

This could be linked to a growth in population life expectancy along with a growing desire to keep their natural teeth. Because of the increase in endodontic treatment needs, endodontics should be taught as a basic theoretical and clinical skill in the undergraduate dental curriculum. Future dental clinicians' knowledge and skills will be enhanced as a result. As a result, they will be able to provide safe endodontic treatment while also providing quality care to patients by performing accurate diagnosis, treatment planning, and skilled endodontic treatment execution (Rolland *et al.*, 2007, Cowpe *et al.*, 2009, Al-Kadhim *et al.*, 2017).

In order to provide teaching and clinical training in endodontics, Malaysian undergraduate dental colleges must design and conduct programmes in accordance with the Malaysian Qualification agency (MQA), which set the minimum clinical experience (MCE) and expected clinical experience (ECE) of complete root canal treatment on 3 anterior teeth, 1 molar and passing one competency test. Students must also gain the competences required to execute endodontic treatment independently after graduation in order to acquire the requisite abilities.

The European Society of Endodontology has issued guidelines for undergraduate endodontics education in light of this. The European Society of Endodontology stated that the consistency and quality of a student's performance during preclinical and clinical years is more important than the overall number of clinical cases performed (De Moor *et al.*, 2013). The quality of finished root canal procedures is the most important measure in evaluating a student's skill.

In addition, preclinical evaluations of students' root canal treatments will improve the quality of patient care in clinics (Ilgüy *et*

al., 2013). However, it is widely believed that the total number of cases completed by students throughout their graduating years has a significant impact on general competency since it indicates their readiness to work independently on endodontic cases in the future (Chambers, 2012). Research into the quality and outcome of endodontic treatments has found a significant prevalence of poorly executed endodontic procedures performed by students (Lynch & Bruke, 2006, Vukadinov *et al.*, 2014). The complexity of the root canal system, a lack of understanding of treatment goals, and poor clinical skills could all be contributing factors.

For undergraduate dental students and general practitioners alike, endodontics can be one of the most challenging and stressful fields. This difficulty is thought to be due to the recent expansion in the field of endodontics in terms of clinical management of pulp and periapical diseases, as well as the complex anatomical diversity and large number of developed instruments and materials used in treatment, as well as a lack of self-confidence that makes many students feel unprepared to deal with endodontic treatment procedures (Tanalap *et al.*, 2013). As all dental students complete their studies in the future, this degree of confidence is critical in assuring the quality of future general practitioners providing root canal therapy.

A recent study done by Almohaimede, 2018 have found a significant frequency of poorly performed RCTs with periradicular disease going unnoticed and untreated. This could be due to a variety of factors, including the difficulty of the technical procedures, a lack of understanding of the principles and goals of therapy, poor remuneration for the time spent, and insufficient undergraduate training (Almohaimede, 2018).

Davey *et al.* (2016) reported that the majority of dental students lack self-confidence in performing root canal treatment, mainly due to the lack of clinical experience. In dentistry, it is required to repeat clinical procedures in order to develop clinical competence (Chambers,

2012). It is not uncommon for recently graduated dentists to feel lacking in some clinical abilities, which is exacerbated by time constraints and practical opportunities in undergraduate courses. Keep in mind that this study looked at self-perceived confidence rather than competence (Murray & Chandler, 1999). However, while competence is more important in dentistry, the importance of confidence in acquiring competence should not be overlooked (Honey *et al.*, 2011). Therefore, teaching and number of practice in the clinic in undergraduate level can be very important to build confidence among students and ensuring the quality of root canal treatment procedure successfulness in the future.

The aim of this research is to study the perception final year students on their confidence level regarding root canal treatments from research based and non-research based public universities and their opinions on the quality of endodontic education.

Materials and Methods

Study design

A cross sectional study was conducted among Malaysian public university final year dental students' of 2020/2021 academic session who had performed at least one uncomplicated root canal treatment (with normal anatomy of pulp chamber and radicular pulp) throughout their clinical years. A questionnaire by Davey *et al.* (2014) was distributed among the students via Google form through their official university email. This study was conducted for 12 months starting from February 2020 until January 2021. An ethical approval was obtained from the Research Ethics Committee of Universiti Sains Islam Malaysia [USIM/REC/0720-129]. All participants agreed and consented for their participation in the study.

Questionnaire

Distributed questionnaires consist of 3 sections related to the student's general

perception and confidence level in performing endodontic treatments, and their opinions on the learning process of the endodontic procedures. The first section was divided into two questions regarding their self-competence and self-confidence in performing endodontic treatments based on the type of tooth either single canal tooth or multirooted tooth. Second section was about students' perception on their level of confidence on endodontics performance based on the stages of the procedure as shown in Table 2. The third section was about the students' opinion on the time spent and quality of endodontic education at their university. A Likert scale scoring of "1 = Not confident at all" to "10 = Extremely confident" was employed with a cut-off point of 5 was later used to categorize the group of students into "≥5 = confidence" or "<5 = non-confidence" for first and second section while "≥5 = adequate" and "<5 = inadequate" for analysis purposes.

Statistical analysis

Data were analysed using mean and standard deviation (SD), and frequency and percentage for descriptive analysis. Further analysis was performed using independent t-test for comparing mean between two groups on students' perception towards endodontic procedure. The significant level was set at $p < 0.05$. Data analysis was performed using IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.

Results

A total of 184 out of 235 final year dental students from all the public universities participated in the study (response rate 78%). Table 1 showed the distribution of participants from different universities who participated in this study. The highest participation was Universiti Sains Malaysia (87.0%) whilst the lowest was from Universiti Teknologi MARA (23.6%).

Majority of the participants felt competent to perform an uncomplicated non-surgical endodontics treatment for single-rooted

tooth (93.5%) however, felt incompetent for multi-rooted tooth (76.1%). On the other hand, majority of participant felt confident to perform uncomplicated non-surgical

endodontics treatment on anterior and posterior tooth with a percentage of 97.3% and 75.5% respectively as shown in Table 2.

Table 1. Distribution of final year students participated in the study (n=184)

University		N (%)
Research based	University of Malaya	35/49 (71.4)
	Universiti Kebangsaan Malaysia	31/57 (54.4)
	Universiti Sains Malaysia	40/46 (87.0)
Non-research based	Universiti Teknologi MARA	21/89 (23.6)
	Universiti Sains Islam Malaysia	20/35 (57.1)
	International Islamic University of Malaysia	37/59 (62.7)

Table 2. Students' perception on their level of competence and confidence in performing uncomplicated root canal treatment in clinical practice

Type of tooth	Student's perception	N	%
Single-rooted	Competent	172	93.5
	Incompetent	12	6.5
Multi-rooted	Competent	44	23.9
	Incompetent	140	76.1
Anterior tooth	Confident	179	97.3
	Not confident	5	2.7
Posterior tooth	Confident	139	75.5
	Not confident	45	24.5

Descriptively, majority of the students had mean score of more than 5 which showed of perceived confident between university in performing every stage of root canal treatment. Most of the stages of RCT showed a significant difference of score between research and non-research-based university with $p < 0.05$. The detailed of the result with the p-value are shown in Table 3.

Majority of the participants responded that the amount of time spend on endodontics education, the quality of lecture and the quality of laboratory practical for endodontic session were adequate with the percentage of 97.8%, 98.9% and 91.8% respectively, as shown in Figure 1.

Table 3. The comparison of mean score of student’s perceptions in endodontics procedural stage

Endodontic procedural	Type of university		p-value
	Research based Mean (SD)	Non-research based Mean (SD)	
• Determining restorability of a tooth which is endodontically involved	7.11 (1.46)	6.81 (1.28)	.142
• Knowing when to refer patients for more complicated endodontic treatment that is beyond your capabilities	7.88 (1.57)	7.06 (1.43)	.000
• Providing analgesia to allow you to carry out root canal treatment	8.61 (1.16)	8.19 (1.27)	.021
• Isolating the tooth	8.59 (1.17)	8.13 (1.19)	.009
• Preparing the access cavity	7.60 (1.20)	7.46 (1.21)	.430
• Determining working length of each canal using an electronic apex locator and working length radiograph	7.51 (1.33)	7.08 (1.31)	.030
• Selecting appropriate irritant and irrigating the root canal system	8.17 (1.24)	7.56 (1.34)	.002
• Cleaning and shaping root canal system	7.55 (1.45)	6.99 (1.44)	.010
• Placing an interappointment dressing	8.22 (1.37)	7.47 (1.42)	.000
• Filling root canal systems	7.30 (1.35)	6.81 (1.41)	.017
• Understanding and appropriately managing the risks associated with uncomplicated non-surgical root canal treatment	7.24 (1.51)	6.36 (1.28)	.000
• Taking pre-operative, intra-operative and post-operative radiographs	7.57 (1.41)	7.65 (1.43)	.679
• Interpreting pre-operative, intra-operative and post-operative radiographs	8.09 (1.27)	7.53 (1.15)	.002
• Giving post-operative instructions to patients following root canal treatment	8.21 (1.29)	7.68 (1.26)	.006
• Assessing quality of a root filling post-operatively	7.98 (1.35)	7.36 (1.20)	.001
• Determining correct recall period for the patient	7.75 (1.38)	6.95 (1.41)	.000
• Knowing how to restore a tooth following root canal treatment	7.79 (1.38)	7.01 (1.42)	.000
• Knowing when a post is required to be placed in a root canal to allow tooth restoration	7.29 (1.49)	6.40 (1.53)	.000
• Knowing how to place a post in a root canal and using it to retain a restoration	6.66 (1.78)	5.81 (1.72)	.001

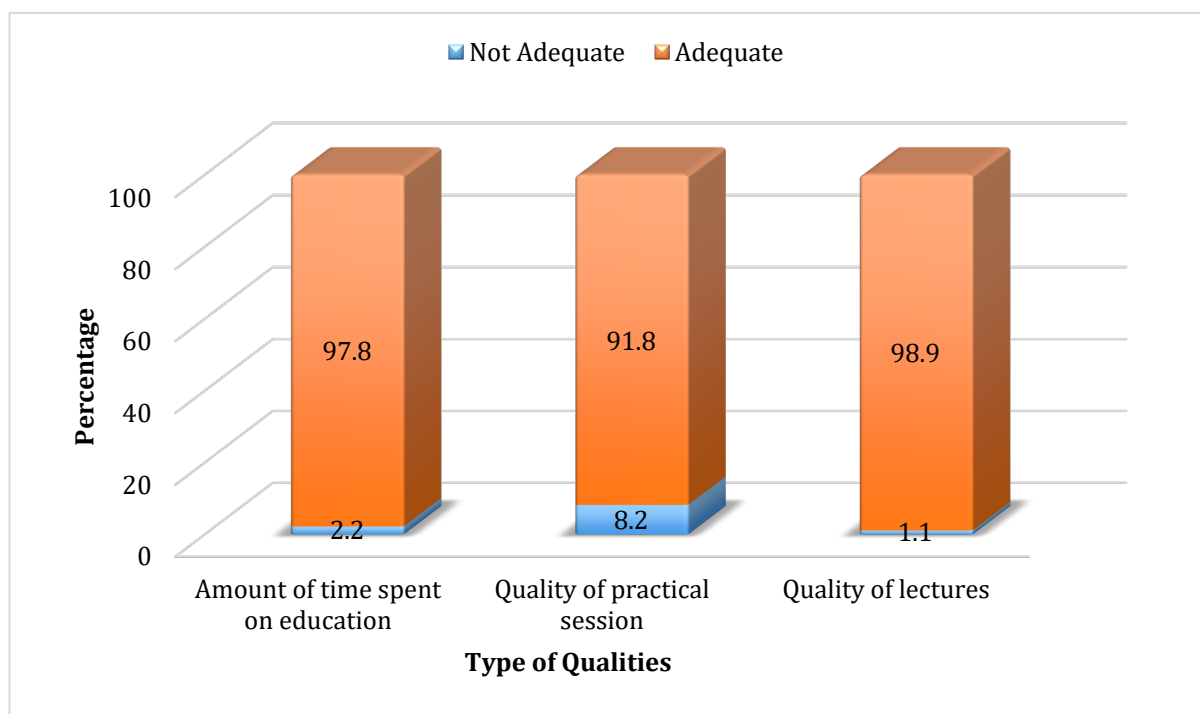


Figure 1. Students’ opinion on the time spent and quality of endodontic education at their university

Discussion

The goal of this study was to explore more about final-year dental students’ perceptions of root canal treatment confidence and competence, as well as their perceptions of the quality of endodontic education at their university and to compare between research based and non research based public university, the rational of dividing public universities to research based and non research based, as research based universities are well established and enjoying more senior and experienced academic members as compare to non research based universities.

The evaluation of students perception toward their competence is a vital step for the quality validation of graduating dental students. The competency-based curriculum recognizes essential components for dental practice and provides a sequence of defined learning outcomes that helps students to graduate as a qualified beginner. A recent study suggested that competency-based

education may enhance the academic performance and metacognitive capability of students (Fan *et al.*, 2015). The improved metacognition of students allows them to perform their self-assessment, which is of significant importance for practical clinical learning (Martinez, 2006). Therefore, it is imperative for students to gain insight into their cognitive processes and develop adequate skills for conducting self-evaluation of their respective competence and confidence levels. The current study is aimed to explore the undergraduate dental students’ self-perceived confidence level while performing various stages of endodontic treatment.

Majority of the participants, around 93.5% felt competent to do root canal treatment on single rooted tooth. The results of this study was higher than other study conduct in Saudi Arabia by (Alrahabi, 2017) which showed 78% of final year dental student were confident in performing root canal treatment on anterior teeth.

However, the level of students confidence towards performing root canal treatment on multi-rooted tooth which only 23.9% of them who feel competent, These findings were consistent with the outcomes reported by (Alrahabi, 2017, Almohaimede, 2018, Ayhan *et al.*, 2016). Most of the students felt not competent enough to perform root canal treatment on multi-rooted tooth regardless whether the students from research based or non research based universities.

Apart from that, as for performing root canal treatment based on the location of the tooth, 97.3% of the final year students feel confident when performing uncomplicated, non-surgical root canal treatment on anterior tooth.

A majority of participants (97.8%) ranked the amount of time spent on endodontic education as adequate, our findings were higher as compared by other study done by (Puryer *et al.*, 2016), who reported 72% of students were satisfied with the time spent in endodontic education. Alrahabi, 2017 and Almohaimede, 2018 reported adequacy level of 87% and 83% respectively which are comparable to our study.

Moreover, the quality of lecture and the quality of preclinical practical for endodontic session were adequate with the percentage of 98.9% and 91.8% respectively, these findings were comparable but higher with other studies (Javed *et al.*, 2021, Puryer *et al.*, 2016) who reported adequacy level of 78% and 75% respectively.

Nevertheless, according to the perception of confidence of the respondents related to every stage of non-surgical root canal treatment, briefly starting from how to determine the restorability of the tooth until knowing how to restore following the treatment, can be concluded that most of the final year dental students were confident in performing every stage of the root canal treatment even-though there was a significant difference ($P < 0.05$) in confidence level between the two main groups which are research based and non-research based university. However, there was only a slight

mean difference in the overall comparison. From here, it shows that the students have acknowledge the theory and practical clinically very well but somehow due to certain circumstances, final year dental students lacked of clinical sessions to practice as much as they could. This can be proven through their answers to the last two open questions in the survey, most of students have highlighted a few factors that might influence their confidence level. The responses stated that, due to the outbreak of pandemic Covid-19 around the globe, preclinical and clinical sessions were reduced and they were given limited of time to complete all the required procedures. In addition, the availability of patient that indicated for endodontic treatment especially molar cases were low and difficult to obtain and had been worse in the current pandemic situation.

A lack of clinical experience in the undergraduate curriculum, according to (Murray *et al.*, 1999), diminishes the confidence that emerges with clinical practise. Furthermore, an overly crowded curriculum will undermine self-confidence. Therefore, most of the suggestions on how to improve and overcome these factors, majority of responses suggested to increase the number of practical sessions of endodontic treatment and do regular discussion upon any cases related to root canal treatment procedures. It can be seen here that, most of the final year students seemed to have a great concern toward the clinical care education.

It's important to remember that a student's high level of confidence in a technique doesn't guarantee that they'll be able to execute it successfully. Although students may possess the necessary skills, their context and internal judgement of their abilities may not give them with the self-belief (confidence) to perform the surgery. Overconfident students may endanger patients by performing treatments above their skill level (Gilmour *et al.*, 2017). More clinical experience is likely to boost confidence and competence, especially if the clinical experience is structured (Choudhry *et al.*, 2005). Although gaining more RCT

clinical experience does not ensure competence, it is vital that undergraduate students obtain appropriate clinical exposure to endodontic treatments; otherwise, they are unlikely to achieve competence or confidence (Youngson *et al.*, 2007). However, improving student experience is not always straightforward, as constraints like as a shortage of suitable case for undergraduate level (Gilmour *et al.*, 2017). Students must develop comprehension and an accurate self-assessment of their own proficiency levels and associated confidence, regardless of their prior experience, so that, if necessary, additional training and clinical experience can be obtained after graduation. After convocation, Dental officers must be able to use portfolios, reflection, and plans for personal development to address their 'weak' areas through training (Gilmour *et al.*, 2017).

Limitation and Recommendation

Limitation

Participant feedback was low, and the reason behind that was due to communicating with other universities was via online platform (WhatsApp Messenger). There were no Physical meetings due to current pandemic (Covid-19 outbreak) situation. Therefore, if there is any problems or inquiries, we had difficulties to attend with the problems. We were only depended on each of the representatives from the involved universities to spread the questionnaires and ask their batchmates to answer all the questionnaires.

Recommendation

As for the recommendation, we suggest to expand the number of samples which can include the private dental schools in the study so that comparison of confidence level among dental students in public and private universities can be made and also their quality of education in each of the universities. Moreover to enhance participant feedback, a face to face communication with other universities

students to clarify the research objectives should be implemented. Further investigation on how different teaching methods, time spent teaching or the amount of clinical experience has an effect on student confidence

Conclusion

Perception of confidence and competence when performing uncomplicated root canal treatment were not obviously different between universities. However, many participants did not feel confident and competent, at some circumstances, indicating that there is scope to enhance endodontic education at their respective universities. Participants suggested that more different teaching techniques be included, as well as an increase in the number of preclinical and clinical sessions, and self-assessment.

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Conflict of Interest

The authors declare that they have no financial or other conflicts of interest in relation to this research and its publication.

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