



Knowledge of Root Canal Treatment and Its Association with Patients' Demographics – A Cross-Sectional Insight

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Authors' contributions

This work was carried out in collaboration among all authors. Authors MZI and SR designed the study, performed the initial statistical analyses and wrote the protocol. Authors FIA and MSI wrote the first draft of the manuscript. Authors MZI and SR managed refined analyses. Authors FIA and MSI revised the manuscript. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2020/v32i630440

Editor(s):

- (1) Dr. Jongwha Chang, University of Texas, USA.
- (2) Dr. Rafik Karaman, Al-Quds University, Palestine.

Reviewers:

- (1) Josué Martos, Federal University of Pelotas, Brazil.
- (2) Mona Ionaş, University Lucian Blaga of Sibiu, Romania.
- (3) Anahita Punj, University of Health Sciences, India.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/56390>

Original Research Article

Received 20 February 2020

Accepted 27 April 2020

Published 27 April 2020

ABSTRACT

Introduction: Endodontics is the division of dentistry that mainly dealt with the physiology, pathophysiology, pathology and morphology of human dental tissues. The study determined the knowledge among patients who underwent root canal treatment (RCT).

Methods: A cross-sectional study was carried among RCT patients visiting various dental clinics. A validated self-administered questionnaire including information related to knowledge about RCT was used to collect required data. Statistical Package for Social Science (SPSS) Version 22.0 was used to analyze the data.

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Results: Regarding the RCT knowledge, it was revealed that patients with previous RCT history were having better knowledge than patients without RCT history or those who were planning to undergo for RCT procedure ($p < 0.001$). Differences between smoking status and RCT knowledge were also statistically significant ($p = 0.048$).

Conclusion: In conclusion, moderate knowledge was observed among patients who underwent RCT or those who were planning to perform RCT.

Keywords: Knowledge; root canal treatment; RCT; dentists; dental clinics.

1. INTRODUCTION

The oral health of most of the population can be affected by the presence of periodontal diseases and dental caries. The condition or severity varies based on their demographic as well as their own ways to maintain and ensure oral hygiene [1]. Oral diseases are common in population but it is unlikely to cause death [2]. When someone experiences toothache, irreversible damage or fracture of the tooth, patients usually prefer to save their original tooth instead of removing it and replace with a new one. So, there is an increasing demand for RCT from dental patients [3]. RCT is a treatment carried out when there is a need to shape and clean the dental pulp spaces and filling the spaces with inert material [4]. It is done to reduce pain and save the tooth from inflammation or infection. In most cases, infection or inflammation at the roots of teeth often causes pain [5,6].

The knowledge of RCT can be obtained from different sources such as dental clinic staff, mass media, family members and friends [6,7,8]. Patients may have poor knowledge of RCT due to the absence of RCT history. Patients may not receive any information about RCT during their primary and secondary education period. However, there are also patients with RCT history but not receiving adequate information from their dentist. Patients may also have poor knowledge levels due to low understanding and awareness levels [5,9].

Teeth decay or dental caries is a microbiologic disease caused by demineralization of the teeth and often results in gum swelling and painful feeling that affects daily life activities such as difficulty in eating of fibrous or solid food. It can also further lead to teeth loss. Early detection or management is crucial to prevent unwanted effects [9]. Teeth loss caused by dental diseases can easily be prevented by undergoing RCT [10]. In gum diseases like gingivitis gums are infected and jawbone destroyed which often leads to teeth-fall. Smoking individuals (in any form like cigarettes, smokeless tobacco or even cigars)

are always at a higher risk of pulling gums away from teeth and create in-between pockets. Such situations among smokers become even worse when food particles start to trap in these pockets and make teeth treatments like RCT less effective [11-14].

In this treatment, a dental-operating microscope (DOM), an important medical instrument is used to help in identifying the location of the root canal and removing unwanted materials or canal obstructions. It reduces the possibility of dentists from making procedural errors greatly. With the use of DOM, a significant increase in locating and negotiating canals by dentists are shown and proved in previous studies [4,15]. The root canal procedure can be labeled as failed if there is an untreated canal found after the treatment is done which may further fear other people [4]. Provision of proper knowledge and awareness about RCT is a must and crucial for the general public to get maximum benefits of it and to avoid permanent teeth loss due to teeth decay which usually happens due to an infection caused by bacteria. This project was especially aimed to determine the knowledge (the exact awareness level) among patients who underwent RCT or planning for it i.e. (without RCT).

2. MATERIALS AND METHODS

This study used a self-administered instrument to assess the current level of knowledge among patients on RCT visiting different dental clinics in Pakistan. Only registered dentists' clinics were accessed to recruit the patients. The RCT knowledge was evaluated among patients with RCT or without RCT history. The inclusion criteria were the patients for RCT with or without RCT history visiting the clinics, patients with the age of ≥ 18 years and those who gave written consent to participate in the study. The exclusion criteria were the patients who did not give consent to participate in the study and those with age below 18 years.

The sample size based on the total patients visiting the clinics for six months was set at 170

which calculated based on Raosoft software with margin of error 5% and confidence level 95%. The questionnaire consisted of 5 knowledge-based questions. The knowledge-based questions were developed after an extensive literature review. Multiple-choice questions were prepared in order to determine the level of knowledge of patients regarding the RCT. The study instrument was distributed and collected. A closed-ended questionnaire was prepared to ease the participants to answer. The advantages of closed-ended questions are that the thinking process of participants was greatly reduced and the data obtained could be analyzed more easily compared to the open-ended type questions [16-18].

During SPSS analysis, one mark was given each time when the participant chose a correct answer and zero marks for a wrong answer. The level of knowledge was determined based on the total scores attained by the participants from the whole cohort. The total scores were then converted into a percentage to ease the final data analysis. Bloom's cut off point was used

during the assessment of the results [19]. According to that 0-5 correct answers showed poor knowledge, 6-8 correct answers showed a moderate level of knowledge and 9-10 correct answers represented good knowledge. The p-value of less than 0.05 showed the presence of statistical significance.

3. RESULTS

The demographic information included age, gender, marital status, smoking status, and RCT history. Based on the data collected the results of this study are shown in Table 1.

Table 2 represents the total questions asked from the study participants. There were five different questions were asked from the study participants regarding their overall knowledge about RCT.

The demographic information of patients and their responses regarding the first question were given in Table 3. The correct answer was given by 121 (71.2%) patients.

Table 1. Demographic information of the respondents (n=170)

Variables	N	%
Age (in years)		
18-30	85	50.0
31-40	17	10.0
41-50	38	22.4
> 50	30	17.6
Gender		
Male	51	30.0
Female	119	70.0
Marital status		
Single	79	46.5
Married	90	52.9
Others (divorced, widowed)	1	0.6
Smoking status		
Yes	3	1.8
No	163	95.9
Ex. Smoker (< 6 months)	1	0.6
Ex. Smoker (> 6 months)	3	1.8
RCT history		
With RCT history	57	33.5
Without RCT history	113	66.5

Table 2. Knowledge questions regarding RCT

No.	Knowledge questions
1	Teeth caries, gum diseases, and trauma can harm the teeth nerves.
2	Teeth decay is one of the main causes of inflammation inside the teeth.
3	The RCT means removing the teeth from the mouth.
4	In your information, RCT is always a painful procedure.
5	After RCT, teeth color will not remain natural.

Table 3. Study participants' response to question 1

Variables	Correct answer N (%)	Wrong answer N (%)
Age (in years)		
18-30	65 (76.5)	20 (23.5)
31-40	12 (70.6)	5 (29.4)
41-50	24 (63.2)	14 (36.8)
> 50	20 (66.7)	10 (33.3)
Gender		
Male	35 (68.6)	16 (31.4)
Female	86 (72.3)	33 (27.7)
Marital status		
Single	61 (77.2)	18 (22.8)
Married	59 (65.6)	31 (34.4)
Others (divorced, widowed)	1 (100.0)	0 (0.0)
Smoking status		
Yes	0 (0.0)	3 (100.0)
No	119 (73.0)	44 (27.0)
Ex. Smoker (< 6 months)	0 (0.0)	1 (100.0)
Ex. Smoker (> 6 months)	2 (66.7)	1 (33.3)
RCT history		
With RCT history	50 (87.7)	7 (12.3)
Without RCT history	71 (62.8)	42 (37.2)

Table 4. Study participants' response to question 2

Variables	Correct answer N (%)	Wrong answer N (%)
Age (in years)		
18-30	66 (77.6)	19 (23.4)
31-40	13 (76.5)	4 (23.5)
41-50	26 (68.4)	12 (31.6)
> 50	18 (60.0)	12 (40.0)
Gender		
Male	33 (64.7)	18 (35.3)
Female	90 (75.6)	29 (24.4)
Marital status		
Single	60 (75.9)	19 (24.1)
Married	62 (68.9)	28 (31.1)
Others (divorced, widowed)	1 (100.0)	0 (0.0)
Smoking status		
Yes	1 (33.3)	2 (66.7)
No	118 (72.4)	45 (27.6)
Ex. Smoker (< 6 months)	1 (100.0)	0 (0.0)
Ex. Smoker (> 6 months)	3 (100.0)	0 (0.0)
RCT history		
With RCT history	53 (93.0)	4 (7.0)
Without RCT history	70 (61.9)	43 (38.1)

The demographic information of patients and their responses regarding the second question were provided in Table 4. The correct answer was given by 123 (72.4%) patients.

The demographic information of patients and their responses regarding the third question were presented in Table 5. The wrong answer was presented by 160 (94.1%) patients.

The demographic information of patients and their responses regarding the fourth question were illustrated in Table 6. The correct answer was given by 93 (54.7 %) patients.

The demographic information of patients and their responses regarding the fifth question were demonstrated in Table 7. The correct answer was given by 61 (35.9%) patients.

Table 5. Study participants' response to question 3

Variables	Correct answer N (%)	Wrong answer N (%)
Age (in years)		
18-30	4 (4.7)	81 (95.3)
31-40	2 (11.8)	15 (88.2)
41-50	1 (2.6)	37 (97.4)
> 50	3 (10.0)	27 (90.0)
Gender		
Male	5 (9.8)	46 (90.2)
Female	5 (4.2)	114 (95.8)
Marital status		
Single	3 (3.8)	76 (96.2)
Married	6 (6.7)	84 (93.3)
Others (divorced, widowed)	1 (100.0)	0 (0.0)
Smoking status		
Yes	1 (33.3)	2 (66.7)
No	9 (5.5)	154 (94.5)
Ex. Smoker (< 6 months)	0 (0.0)	1 (100.0)
Ex. Smoker (> 6 months)	0 (0.0)	3 (100.0)
RCT history		
With RCT history	1 (1.8)	56 (98.2)
Without RCT history	9 (8.0)	104 (92.0)

Table 6. Study participants' response to question 4

Variables	Correct answer N (%)	Wrong answer N (%)
Age (in years)		
18-30	46 (54.1)	39 (45.9)
31-40	11 (64.7)	6 (35.3)
41-50	20 (52.6)	18 (47.4)
> 50	16 (53.3)	14 (46.7)
Gender		
Male	25 (49.0)	26 (51.0)
Female	68 (57.1)	51 (42.9)
Marital status		
Single	41 (51.9)	38 (48.1)
Married	51 (56.7)	39 (43.3)
Others (divorced, widowed)	1 (100.0)	0 (0.0)
Smoking status		
Yes	1 (33.3)	2 (66.7)
No	88 (54.0)	75 (46.0)
Ex. Smoker (< 6 months)	1 (100.0)	0 (0.0)
Ex. Smoker (> 6 months)	3 (100.0)	0 (0.0)
RCT history		
With RCT history	38 (66.7)	19 (33.3)
Without RCT history	55 (48.7)	58 (51.3)

4. DISCUSSION

The knowledge of RCT patients or those patients who are planning to undergo RCT could be affected because of different information they receive which could be from their friends, family member, media or their visit to the dental clinics [5]. This provides the basis for the comparison to be done among different patients regarding their current level of knowledge about RCT and its

association with their demographics [20]. Patients' knowledge regarding the RCT procedures and treatment is important as it will better guide the patients during treatment selection, decision, and compliance. Above all, the majority of the related healthcare providers especially dentists can understand where to improve or help the patients to increase their satisfaction with the RCT [8].

Table 7. Study participants' responses to question 5

Variables	Correct Answer N (%)	Wrong Answer N (%)
Age (in years)		
18-30	36 (42.4)	49 (57.6)
31-40	5 (29.4)	12 (70.6)
41-50	10 (26.3)	28 (73.7)
> 50	10 (33.3)	20 (66.7)
Gender		
Male	15 (29.4)	36 (70.6)
Female	46 (38.7)	73 (61.3)
Marital status		
Single	31 (39.2)	48 (60.8)
Married	30 (33.3)	60 (66.7)
Others (divorced, widowed)	0 (0.0)	1 (100.0)
Smoking status		
Yes	0 (0.0)	3 (100.0)
No	60 (36.8)	103 (63.2)
Ex. Smoker (< 6 months)	0 (0.0)	1 (100.0)
Ex. Smoker (> 6 months)	1 (33.3)	2 (66.7)
RCT history		
With RCT history	35 (61.4)	22 (38.6)
Without RCT history	26 (23.0)	87 (77.0)

From a previous study done in Poland by Janczarek et al. 2014 [8], patients' knowledge regarding RCT was increased distinctly by various means like published literature, counseling by the healthcare professionals, various educational materials, internet, and newspapers. The patients in the current study were given 5 comprehensive questions related to RCT. Based on their own knowledge about RCT, patients were asked to choose the best answer from the options provided. According to the findings of our study, patients that scored well in RCT knowledge showed that they had a high level of knowledge while patients that scored less in the knowledge questions showed that they had a low level of knowledge.

In this study, the patients were categorized into four groups with different age groups i.e. 18-30 years old, 31-40 years old, 41-50 years old and more than 50 years old. Patients in the age group ranging from 18-30 years old showed the highest percentage of good knowledge compared to other age groups. The *p-value* obtained from the result was found to be 0.836 but there was no significant association observed. However, the results were in contrast with another study where they found that age groups ranged from 18 to 24 years old and above 55 years old showed the lowest knowledge level regarding oral health [21]. The lower level of knowledge regarding oral health would further depress the patients regarding

RCT which is an easy and common dental treatment procedure and should be adopted by most of the patients.

In this study, statistical significance was shown between the smoking status and the knowledge level of patients. The relationship was found statistically significant between patients' smoking status and knowledge level as the *p-value* obtained was 0.048 and the effect size was 0.123. This result was supported by another study of Abu-Gharbieh et al. in 2019 as the knowledge level regarding oral health was seen to be highest in non-smokers. The knowledge level found to be lowest in heavy smokers as the least scores were obtained [21].

From a few previous studies, knowledge of patients regarding RCT needed to be improved in order to highlight the advantages of retaining their original teeth using RCT procedure rather than to let them decay [6,10]. However, the understanding of information regarding RCT was affected by patients' dental procedures-oriented anxiety, pain expectation, and gratuitous stress issues [6]. Dental fear was found to be a stronger reason for poor oral health compared to other factors such as patients' income, treatment cost, and insurance status. Dental anxiety was more commonly seen in female patients based on the previous study by Firat D et al. 2006 [22]. Previous studies of Habib AA et al. 2017 [7] and Doumani M et al. 2017 [23] also showed that

patients' knowledge and awareness on RCT were varied among their race and population. In our study findings, regarding the gender differences, there was no significant association seen as the p-value obtained from the result was 0.300.

In our study findings, the marital status of a patient has no relationship with their level of knowledge regarding RCT as there was no significance observed. The p-value obtained from the result was found to be 0.673. On the contrary, patients' knowledge regarding RCT was significantly affected by their RCT history. A statistically strong significant association was observed in RCT history on patients' knowledge level. The *p-value* was found to be < 0.001 and effect size was found to be 0.368. The knowledge of dental problem patients regarding RCT is very important as it will alter their decisions in opting for or not opting for RCT which will undeniably affect their attitudes towards RCT procedures. To improve their knowledge levels, experts such as dentists are mainly responsible for designing and implementing strategies that are bringing benefits to the public to maintain their oral hygiene and overall oral health [8,10].

5. CONCLUSION

This study provides insights into the relationship between demographic variables and RCT knowledge among current RCT patients or those who were planning to undergo RCT procedure. Patients' age, marital status, gender, smoking habits and previous RCT exposure associated with their overall knowledge of RCT.

6. LIMITATIONS OF THE STUDY

This study only was done in selected dental clinics so the results can not be projected to the entire country. A detailed follow-up study can be done to evaluate the RCT knowledge levels among its patients in Pakistan by considering some specific factors to predict detailed variables affecting their knowledge which will categorically affect their attitude and perceptions about RCT procedure.

CONSENT

Written consent to participate in the study was obtained from the participants before the start of the study.

ETHICAL APPROVAL

It is not applicable.

ACKNOWLEDGEMENT

The authors would like to thank the Deanship of Scientific Research at Prince Sattam bin Abdulaziz University, Alkharj, Saudi Arabia for the support in the publication of this manuscript. The authors would also like to express their sincere gratitude to all of the participants involved in this study in any capacity.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/56390>