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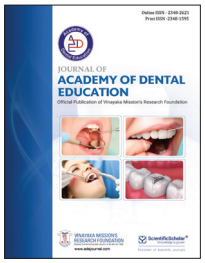

Original Article

Patient-related perceptions and experience measures of non-surgical endodontic treatment – A cross-sectional study

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ABSTRACT

Objectives: This study assessed the outpatients' perceptions of non-surgical root canal treatment (RCT) and compared them with their post-treatment experiences.

Material and Methods: Eighty participants were selected for this cross-sectional study based on inclusion and exclusion criteria. Two surveys were conducted from October 01, 2023, to November 30, 2023 (Pretreatment survey) – one conducted before the RCT includes a survey about the patient's past RCT experiences and demographics such as age, sex, and level of educational status. Multiple-choice questions were employed to determine patient concerns related to RCT, while modified visual analog scales (0–100) were used to assess pain and anxiety (Post-treatment survey) – done after the endodontic procedure with a root canal filling material. It outlines the patient's experience, any discomfort experienced during treatment, the significance of tooth retention, and Re-RCT.

Results: No difference was found in the demographic analysis. Out of the 80 participants, 33 participants (41.25%) presented with pretreatment anxiety, and 12 participants (15%) reported post-treatment. In the pretreatment survey, the primary concerns were pain and cost, which were reported at 27.55% and 10%, respectively. The post-treatment survey detailed that the time and the need for Re-RCT were the concerns, with reported rates of 11.25% and 10%, respectively. An absolute difference was found between anticipated and pre-operative pain and between experienced and pre-operative pain. However, no difference was found between anticipated and experienced pain 89% of the patients were willing to go for RCT again if needed.

Conclusion: Treatment success is the goal for any dental procedure performed, which might be perceived differently by the patient and dentist. Consideration of patient perceptions and experiences, along with the dentist's opinions, will help enhance endodontic treatment success.

Keywords: Anxiety, Cross-sectional study, Endodontic treatment, Measures, Knowledge and perceptions

INTRODUCTION

Dental anxiety is a global concern and has a prevalence of 2.5–20% in the population of various countries for different dental procedures, as per the literature.[1] It is a most common issue that dentists face in their clinical practice, particularly in endodontics. Despite the significant evolution in non-surgical root canal treatment (RCT), psychological barriers such as fear of pain

and anxiety dishearten the majority of the general population from going through the procedure.[2-4] According to the American Association of Endodontists, 67% of Americans' primary concern about endodontic treatment is the fear of pain.

Thus, the ability to effectively manage pain and anxiety is a vital component of patient care and is frequently used to measure a clinician's skill. A successful dental treatment is the ultimate goal for both the patient and the dentist. However, the definition of triumph may differ between the two parties due to their unique perspectives and criteria for assessing the outcome.[5]

The patient definition of *successful treatment* is not only satisfaction but also couples with the absence of pain associated with procedures and even after the completion of the treatment. For the dentist, it is often determined clinically and radiographically, with the primary goal of periapical health. However, for the patient who is generally unaware of the health of the periradicular tissues, the success is determined by the asymptomatic tooth. Hence, the residence of any amount of pain, even with an excellent periapical healing status, will lead to the dissatisfaction of the patient.

The misconception that dentists are the reason for the incidence or exacerbation of pain can be attenuated by the effective management of pain during RCT. Despite advancements in modern endodontic techniques and local anesthesia, some patients still experience discomfort during the procedure. Patients tend to anticipate more pain than they feel during RCT.[5] In addition, high levels of dental anxiety are associated with increased perceived pain.[6] Acknowledging the anticipated post-treatment pain and the role of medication in controlling it can assure the patients gain certainty in their dentists, increase their pain tolerance level, and revamp attitudes toward future dental visits.

To the best of our knowledge, no studies have been done in this geographic location detailing the direct comparisons of several factors and pain levels before, during, and after RCT that could impact treatment success. The study's null hypothesis stated that patient-centered factors do not affect the outcomes of endodontic treatment.

Therefore, this study aims to assess outpatient insight and RCT experiences and compare their post-treatment experiences.

MATERIAL AND METHODS

Ethical committee approval

The Institutional Ethical Committee (IEC/NDCH/2023/AUG-SEPT/P-56) approved this study.

Study design

This is a cross-sectional study.

Study population

This questionnaire-based study was conducted as part of an undergraduate project among 80 participants who visited the Department of Conservative Dentistry and Endodontics of Narayana Dental College and Hospital. All the participants were recruited based on the following criteria.

Inclusion criteria

- This study focused on individuals aged between 18 and 65 who need non-surgical endodontic treatment.

Exclusion criteria

- Patients with psychological conditions, swelling, systemic disorders, temporomandibular joint issues, inability to read English, and those who declined to sign the consent form were excluded from taking part in the study.

All the included participants were informed in detail about the pre-and post-treatment surveys, and informed consent was obtained. A pre-treatment survey regarding RCT was conducted before the first appointment. This survey comprises demographic questions (age, sex, and educational status) and the patient's past RCT experiences. Modified visual analog, a 10-point rating scale (0–100), was used to quantify the pain and anxiety levels, and the concerns regarding the RCT were identified using a multiple-choice questionnaire. The post-treatment survey was after the termination of the endodontic procedure. It details the patient's experience during treatment, the pain associated with treatment, their outlook regarding the importance of tooth retention, and feedback about having an RCT again. Post-treatment surveys were taken from only those participants who had completed the pretreatment survey.

Statistical analysis

The data collected from the participants were kept confidential and used only for research purposes. The data collected from the completed questionnaires were compiled, categorized, and subsequently analyzed using the Statistical Package for the Social Sciences software (SPSS for Windows version 26, Chicago, SPSS Inc.).

RESULTS

The demographic details and pulpal status are presented in Table 1. The patient's past experiences are shown in Table 2. The statistical analysis of pre-and post-treatment anxiety scores was analyzed by Wilcoxon signed-rank test with $P < 0.05$ represented in Table 3. There was a significant decrease in the anxiety values from before to after treatment.

Table 1: Demographic details and pulpal status.

Domain	Categories	Count (*n*)	Percentage
Sex	Male	40	50
	Female	40	50
Age (in years)	18–29	19	24
	30–39	16	20
	40–49	23	29
	50–59	14	17
	>60	8	10
Educational level	Primary education	30	37.5
	High school	26	32.5
	Bachelor's degree	24	30
Type of tooth	Upper incisors	5	6.25
	Lower incisors	-	0
	Canines	5	6.25
	Premolars	15	18.75
	Upper molars	20	25
	Lower molars	35	43.75
Pulpal and periapical condition	Asymptomatic irreversible pulpitis	34	42.5
	Symptomatic irreversible pulpitis	44	55
	Symptomatic apical periodontitis	2	2.5

Table 2: Patient's past experiences.

Past experience of RCT	Prior experience	31	39.75
	No experience	48	60
	Unsure	1	1.25
Number of visits	Single visit	23	28.75
	Multivisit	57	71.25
Retaining the tooth	Extremely important	42	52.5
	As important	37	46.25
	Not so important	1	1.25
Cost of treatment	Not an issue	27	33.75
	As expected	47	58.75
	Expensive	6	7.5
How happy are you to save the tooth?	Very happy	67	83.75
	Indifferent	10	12.5
	Rather extraction	3	3.75
Satisfied with the outcome	Yes	79	98.75
	No	1	1.25
Undergo for root canal again	Yes	71	88.75
	No	9	11.25

RCT: Root canal treatment

Table 3: Comparison of pre and post treatment anxiety scales.

Intervals	Mean	Standard deviation	Mean difference	P-value
Pre-treatment anxiety	22.9375	28.20869	16.81	0.000*
Post-treatment anxiety	6.1250	15.56154		

Wilcoxon signed-rank test $P<0.05$ *Significant

The statistical analysis of pre-operative pain, anticipated and experienced pain was analyzed using the Wilcoxon signed-rank test with $P < 0.05$ represented in Table 4. There was a significant difference between anticipated and pre-operative

Table 4: Comparison of pain scales.

	Anticipated (mean±SD)	Pre-operative (mean±SD)	Experienced (mean±SD)
Pain scores	29.84±28.8	33.57±38.66	6.44±13.75
Wilcoxon sign-rank test	Anticipated versus pre-operative		*P*=0.000*
	Anticipated versus experienced		*P*=0.687(NS)
	Pre-operative and experienced		*P*=0.000*

Wilcoxon sign-rank test $P<0.05$ *Significant. SD: Standard deviation

Table 5: Concerns associated with RCT.

Concerns associated with RCT	Pre-treatment (Number and % of total concerns) (*n*=80)	Post-treatment (Number and % of total concerns) (*n*=80)
No concern	41 (51.25)	56 (70)
Pain associated with treatment	22 (27.5)	3 (3.75)
Cost	8 (10)	1 (1.25)
Time	6 (7.5)	9 (11.25)
Needing future treatment or maintenance	2 (2.5)	8 (10)
Treatment failure	0	1 (1.25)
Others	1 (1.25)	2 (2.5)

RCT: Root canal treatment

pain and between pre-operative and experienced pain. However, no difference was found between anticipated and experienced pain.

Table 5 represents the concerns regarding RCT evaluated by the pre-and post-treatment surveys. Forty-one participants (51.25%) and 56 participants (70%) reported no pre- and post-treatment concerns, respectively. The major concern of the participants in the pretreatment survey was found to be the pain associated with treatment, which was around 27.5%, later decreased to 3.75% after treatment. Another concern is the cost; around 8 participants (10%) reported dissatisfaction regarding the cost of the treatment, which was decreased to 1 participant (1.25%).

The other major dissatisfaction of the participants is time seen in 6 participants (7.5%) preoperatively and 9 participants (11.25%) postoperatively. The need for future treatment or maintenance of the treated tooth is a major concern postoperatively for around 8 participants (10%). Some other minor concerns, such as treatment failures and discomfort while taking radiographs, were also reported before and after treatment.

DISCUSSION

Pain is the primary concern that causes the patient to seek dental care. RCT is the routine endodontic procedure that people usually go through because it helps alleviate pain and adjourns the loss of the tooth, as well as preserves esthetics, thereby improving the quality of life of the patients. However, the current status of endodontic treatment is challenging due to various factors, including root canal complexities, disease conditions, patient factors, and operator factors. Understanding the factors influencing patients' perceptions of endodontic treatment outcomes is crucial to improving treatment outcomes and patient's quality of life.[7] However, there is limited literature regarding the comparisons of various factors that affect the RCT success outcomes in both the dentist and patient perceptions. Hence, this questionnaire-based cross-sectional study was conducted with the aim of evaluating the patient-centered pre- and post-treatment experiences.

The decisions before the treatment and satisfaction after the treatment may be strongly influenced by several domains, including social, psychological, and behavioral, such as knowledge, awareness, beliefs, and attitudes.[8] Patients were often unaware of the underlying pathophysiology of their condition but were heavily influenced by the emotional toll of treatment, including fear, anxiety, pain, and financial concerns, which could affect the treatment outcomes.[9] Some patient-reported outcomes are quantifiable and can be used to gather meaningful data that help address the patient's needs and delivers appropriate care. Fear, phobia, and anxiety were the noteworthy findings that hamper the patient's regular dental visits for treatment since these factors influence the patient's behavior profoundly, their decision-making process, etc. The experience and recall of pain are more common when in fear.[10] Research has consistently shown that patients who are more anxious or

nervous tend to recall their pain experiences more vividly and anticipate similar pain in the future, ultimately leading to lower healthcare service utilization.[11-13] A recent study by Chandraweera *et al*. stated that the expected pain by the patients is often more significant than the pain they actually experience during the procedure.[14] A distinct stigma is seen surrounding patients who undergo non-surgical endodontic treatment. It is undeniable that RCT can elevate a patient's physiological and psychological stress levels. This increased pain-related anxiety and fear can lead to avoidance of RCT, ultimately resulting in tooth loss through extraction.[15]

Management of individuals with fear and anxiety and enhancing the treatment outcomes are best done by correcting it preoperatively. Rhudy and Meagher[16] stated that the prior information regarding the series of steps involved in the endodontic treatment, such as rubber dam isolation, radiographs, and local anesthesia, might reduce the anxiety levels associated with dental visits. Hence, insight should be provided for a better understanding of the endodontic treatment.[17,18] Many studies have brought about the necessity of furnishing such information.[19-22]

In the present study, a cross-sectional study of 80 participants assessed patient-centered outcomes affecting treatment success based on the selection criteria. All enrolled patients completed pre-treatment and post-treatment questionnaires without losing follow-up, eliminating attrition bias. In this study, the anxiety levels of patients undergoing non-surgical RCT were found to decrease significantly before and after the treatment. Anxiety levels were influenced by the patient's current condition and the clinician's expertise. The result exhibited that the treatment itself had a calming effect on patients, reducing their anxiety. Well-trained and qualified operators who performed the procedures were able to identify and address the concerns of anxious patients, thereby alleviating their fears about the treatment.

A systematic review by Khan *et al*. stated that, generally, a moderate level of anxiety is associated with non-surgical endodontic treatment, which also decreases by the time of treatment completion.[23] In addition, anxiety related to future RCT tends to decrease significantly after the treatment is completed.[21] Anticipated pain is significantly more prevalent in patients without past RCT experience. This is because previous experience with dental treatment and the environment helped the patients alleviate their fear and pain, and this is even supported by the literature in many studies.[24,25]

The study used a visual analog scale from 0 to 100 to assess the anticipated and experienced intraoperative pain during RCT. It has widespread use and is a reliable method in the endodontic literature. The results showed that the mean pain scores before pain treatment for those experiencing pain was 33.57 ± 38.66, corresponding to a moderately painful rating. The mean anticipated and experienced pain was 29.84 ± 28.8 and 6.44 ± 13.75, respectively. The percentage of patients who experienced pain during the treatment was 21.25%, which is consistent with other studies that reported experienced pain ranging from 12% to 60%. The mean post-treatment pain experienced by the patient was at a low pain score, indicating it was only slightly painful. These findings were consistent with earlier research findings by Locker and Liddell, which found that the real pain experienced during the procedure was often less than expected.[26] In addition, Jothish *et al*. noted that patients with extreme pre-operative pain often experienced rapid and dramatic post-operative relief among the Saudi population.[27]

Before the treatment, 48.75% of the patients were dissatisfied with certain factors, such as pain and cost. However, by the end of treatment, only 30% of the individuals reported major concerns regarding time and the need for future treatment. Cost was a significant factor in the decision-making process for dental treatment, with 58% of patients reporting that the cost of treatment was as expected. This may be due to their prior knowledge of dental treatments. Despite concerns about cost, 83% of participants were very happy to save their tooth after RCT, and 89% of them affirmed that they would go through the procedure again if necessary. These results correlate with those of a previous study by Jothish *et al*., in which the majority of patients expressed a preference for RCT over-extraction in the future.[27]

The study found that the satisfaction rates were high, ranging from 20% to 97% in various studies, which aligns with the results of this study, indicating a satisfaction rate of about 98%. The study had an equal distribution of gender, with male and female 50% eliminating the potential gender bias. The pain perception of patients was influenced by how clinicians managed and treated them during the root canal procedure; the treatments were performed by different trained postgraduate students in the present study.

The main limitation of this study was the sample size; as it is a part of a month's research, the sample size was small. Hence, conclusions are of restricted validity. Despite all these, findings imply that pain and fear were significant concerns for the patients. Another limitation of this study was that multiple operators had performed the treatment procedures, which may have influenced the patients' experiences, as clinician factors also play a significant role in patients' perceptions.

CONCLUSION

Patients exposed to the prior experience of RCT were less anxious, and with no experience, the anxiety levels gradually dropped by the end of the treatment. Before beginning the treatment, pain and cost factors stood at the top as the major concerns but changed to time and the need for retreatment after treatment. The majority of the participants were willing to go through the endodontic treatment procedures in the

future if needed. Only 2% of the patients were unsatisfied with the outcomes. Hence, within the limitations of the study, it can be summarized that considering patient perceptions and experiences along with the dentist's opinions will help in enhancing the endodontic treatment success.

Ethical approval

The research/study approved by the Institutional Review Board at Narayana Dental College and Hospital, number IEC/NDCH/2023/AUG-SEPT/P-56, dated 30th September 2024.

Declaration of patients consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript, and no images were manipulated using AI.

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