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Original Article

Patients' perceptions and experiences about the root canal treatment: An exploratory study among Saudi population

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ABSTRACT

Objectives: Root canal treatment (RCT) is one of the most popular treatments at dental setting and pain and anxiety is a great source of concern for dental patients and dentist. However, in Saudi Arabia the current literature containing data on endodontic pain with clear comparisons of pre-treatment and post-treatment is extremely rare. The aim of this study was to investigate the perception of Saudi population about RCT and its relation with pain and anxiety.

Material and Methods: A sample of 76 patients were selected for this questionnaire based survey. Participants were asked to provide their response toward the endodontic treatment before and after the treatment. Pre-validated questionnaires consisted of demographic data, questions on anxiety, pain, and concerned about RCT. Descriptive statistics, independent, and paired t-tests were used to compare between pre-test and post-test score. The level of statistical significance was set at 5%.

Results: In the present study, patient's anxiety score was assessed which was found to be significantly decreased from pre-treatment 31.47 ± 28.90 to post-treatment 23.28 ± 25.95. Likewise, mean anticipated and experience of pain score were also significantly reduced pre-treatment 41.07 ± 29.35 to post-treatment 21.90 ± 24.50.

Conclusion: Current study reported a significant difference in reduction of mean anxiety for RCT post-treatment. Moreover, there was significant difference found between anticipated pain and experienced pain for the treatment. Before the treatment significant number of patients was not concerned for RCT and majority of the patients were concerned for pain associated to RCT.

Keywords: Anxiety, Cost, Dental fear, Endodontic pain, Root canal treatment

INTRODUCTION

Root canal therapy is one of the most popular treatments at dental setting[1] and treatment for irreversible pulpitis has been generally acknowledged.[2] However, it is one of the dental procedures that cause maximum patient anxiety and pain compared to the other dental procedures.[3] Dental pain is a great source of anxiety and a significant problem for dentists.[4] Therefore, managing pain and anxiety are a difficult in the clinical practice of endodontics and are the key factor on which the clinician's ability is also measured.[1] The International association for the study of pain defines pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.[2] Whereas dental anxiety is defined as patient's

specific reaction toward stress related to the dental treatment in which the stimulus is unknown, vague, or not present at that moment. Around 2.5–20% of people suffer from high dental anxiety, based on study population under study and technique used for anxiety measurement.[5] In several countries around the world the constant existence of dental anxiety for various dental procedures has been reported.[6] Approximately 67–80% of Americans were rated extremely anxious about dental care and 5–14% of them were rated as severely anxious.[3,5] The prevalence of dental anxiety among Australians was recorded to be 14.9%, with 12.5%, and 12.6%, respectively, among young adults in Canada and teenagers in Russia. There is some sort of dental anxiety around 13.5% of the French population and 30% of the Chinese population. In KSA few studies on the prevalence of dental anxiety were performed. A research conducted in Riyadh in adolescent females to determine dental fear and anxiety found that 29% of participants had high rates of anxiety. Al-Shammary *et al*.[7] carried out a study in which 11.8% of the respondents surveyed viewed dental care as a painful process.[6]

Dental anxiety and fear appear to differ from treatment types. Periodontal or endodontic procedures have shown to be more anxiety than restorative or prophylactic procedures.[5,7,8] Recent research shows there are variations between men and women in experiences of pain. While most studies indicate women have greater sensitivity to pain than men, but there are discrepancies in the literature.[9] It was found that major concern of dentist is anticipated and experienced pain from root canal treatment (RCT). Before treatment, during treatment, and post-treatment pain is anticipated experienced recalled and shared by patients.[8] Various authors have suggested that social, psychological, and behavioral factors such as awareness, values, perceptions, desires, and behavior can affect the patients decision for dental care and their satisfaction after treatment.[7,10] Many of the variables analyzed in the past studies include the socioeconomic status of patients, educational level, quality of life and health background, aspirations, and past dental experiences objective or subjective. Any of these factors as well as misunderstandings regarding the treatment protocol are often cited as explanations for people to opt out of RCT.[11] which not only poses a risk to the patient's oral health but also poses serious medical conditions such as septicemia, sinusitis, and osteomyelitis.[12]

Despite technical advancements in dentistry, anxiety about dental care and the fear of dental pain remain widespread worldwide and are considered a major barrier to dental care.[12] Based on previously published data, educating patients about anticipated post-endodontic pain and prescribing medicines to manage it can increase patient trust in their dentists, raise pain thresholds and improve their attitude toward future dental care.[13] Janczarek *et al*.[14] in his study reported that there is an increase in patient knowledge and understanding of endodontic care[15] if pain risk factors that can be assessed before initiation of treatment could be identified, dentists may use this knowledge to preoperatively classify patients at elevated risk and adopt proactive measures to alleviate pain and mitigate patient discomfort.[16] However, the extant literature containing data on endodontic pain is rather disparate and primarily includes articles focusing on other topics, typically prognostic variables, treatment variables, or medications. Direct comparisons of pre-treatment, treatment, and post-treatment pain are extremely rare in Saudi Arabian context. Hence, the present research undertaken to assess the outpatient's perception and experience about RCT and compare their experience post-treatment.

MATERIAL AND METHODS

The present study was undertaken after the approval of institutional ethics committee at college of Dentistry, Qassim University (Ethical Committee clearance document number: ST/53/2018). Duration of study was decided to be 6 months to complete the enrolment of required number of participants.

Calculation of sample size

The sample size was calculated based on the previously published research on the same topic. Lowest outcome was taken for sample size calculation. Assuming that 49% and 17% of the pairs are positive at the first and the second observation, respectively, the correlation between paired observations is 5% and after applying continuity correction, the study would require a sample size of 38 pairs to achieve a power of 80% and a two sided significances of 5% for detecting a difference.[2]

Recruitment of study participants

Before the start of the study list of the patients scheduled for the RCT were drawn from the electronic database. A total of 150 participants over the period of 6 months were called telephonically and given the idea about the study and importance of their feedback. Out of 150 participants 105 agreed for the study which gave rise to 70% of response to the study. Rest of the participants refused due to lack of time and unwillingness for the study.

Screening and allocation

Out of 105 participants, 76 participants were selected depending on inclusion and exclusion criteria of the study. Participants who had swelling, systemic disease, TMJ problem, and mental illness sever pulpitis were excluded from the study

while participants above 18 years requiring non-surgical endodontic treatment were included in the study. A written consent was obtained from all the selected participants and then subjected to pre-test, endodontic procedure and finally asked to complete post-test form independently.

Study instrument

In the present study, participants were asked to provide their response toward the endodontic treatment before and after the treatment. To record the response, pre-validated pre-test and post-test questionnaire developed by Chandraweera *et al.* (2018)[3] were used as shown in Figures 1 and 2. These questionnaires consisted of demographic data of patient like age, sex, and educational status. Further questionnaire included specific information related to RCT. These questions were mainly targeted to measure patient's anxiety, concern about RCT, experience of pain which was recorded by Modified Visual Analog Scales (0–100%),[3] cost of treatment, and feedback on re-treatment. The questionnaire was self administered, and to get the valid response, questionnaire was translated into Arabic language by native speaker using forward and back translation method. Further reliability of questionnaire was checked by test retest method and necessary correction was made.

Data collection

In the present study, patients were to complete the two surveys with any help one before the RCT and one after procedure. All the data collection was done by independent clinical assistant who was kept blind throughout the study but trained and calibrated for the conduction of survey procedure by department of endodontic at college of dentistry, Qassim University.

Statistical analysis

The collected data were entered and analyzed with IBM SPSS Statistics 20.0 program (Armonk, NY, USA). Descriptive statistics, independent, and paired *t*-tests were used to compare between pre-test and post-test score. The level of statistical significance was set at 5%, and all of the statistical analyses involved two-tailed tests.

RESULTS

The present study was conducted among the group of cohort attended the college of dentistry. Out of 105 participants, 76 participants were selected depending on inclusion criteria and completed the pre- and post-treatment surveys. Table 1 demonstrates the demographic profile of the study participants, 43 (56.6) were males with mean age of 20.53 ± 10.98 while 33 (43.4) were females of 26.45 ± 7.27 age. All the participants irrespective of gender in the present study were educated with the highest level of education was university followed by secondary school, middle, and primary school.

In this study, participants were asked different sets of question before the start of RCT and at end of the treatment to know insight of patient towards RCT which is presented in Table 2.

Initially, the participants concern about RCT was recorded, patients with no concern for RCT before treatment 10 (6.6) were found significantly concerned about the RCT after post-treatment 40 (26.3). Similarly concern for pain associated treatment and cost of treatment was significantly decreased from pre-treatment (29 [19.1]; 10 [6.6]) to post-treatment (14 [9.2]; 2 [1.3]), respectively.

Further, patient's anxiety score was assessed which was found to be significantly decreased from pre-treatment 31.47 ± 28.90 to post-treatment 23.28 ± 25.95. Likewise, mean anticipated and experience of pain score were also significantly reduced pre-treatment 41.07 ± 29.35 to post-treatment 21.90 ± 24.50. It was found that patients with the previous history of RCT and currently suffering from pain, anticipated pain pre-treatment, and it was found slightly painful. However, patients who had previous experience about RCT showed the slightly high importance for keeping the tooth in mouth by treating rather than going for extraction.

After RCT, patients were asked various questions to record their change of attitude toward the RCT. The majority of patients reported improvement (75.93 ± 24.70) in their experience for RCT than previous experience. Moreover, patient found happy to keep their tooth rather than removed it. The majority of patients 65 (85.5) responded that they prefer the RCT rather than removal of tooth and 74 (97.4) were overall satisfied from RCT. Further comparison of pre- and post-treatment means anxiety score and anticipated pain and experience pain were compared with gender but there was no significant difference was found [Table 3].

DISCUSSION

This study was carried out at Dental clinics of Qassim University from September 2019 to March 2020. The study

Table 1: Demographic parameters under the study.

Variables	Gender	
	Male	Female
Mean age	20.53±10.98	26.45±7.27
Education		
Primary	1 (1.3)	2 (2.6)
Middle	3 (3.9)	5 (6.6)
Secondary	18 (23.7)	12 (15.8)
University	21 (27.6)	14 (18.4)
Total	43 (56.6)	33 (43.4)

Table 2: Study participants pre- and post-treatment score.

Variables	Pre-treatment	Post-treatment	*P*-value
Concern toward RCT			
No Concern	10 (6.6)	40 (26.3)*	0.000
Pain Associated with treatment	29 (19.1)	14 (9.2)*	
Cost	10 (6.6)	2 (1.3)	
Treatment duration	21 (13.8)	20 (13.2)	
Follow-up	5 (3.3)	0 (0.0)	
Unwanted treatment outcome	1 (0.7)	0 (0.0)	
Mean anxiety score	31.47±28.90	23.28±25.95	0.024
Mean anticipated and experience of pain	41.07±29.35	21.90±24.50	0.000
History of previous root canal treatment		--	--
Yes	35 (46.1)		
No	35 (46.1)		
I don't know	6 (7.9)		
Mean current pain status	24.26±31.47	--	--
Mean for Importance of tooth	75.34±29.07	--	--
Mean treatment duration	55.67±32.34	--	--
Mean expectation about treatment	--	75.93±24.70	--
Happiness about RCT	--	84.08±29.58	--
Preference about RCT in future	--		--
Yes		65 (85.5)	--
No		11 (14.5)	--
Satisfied with RCT	--		--
Yes		74 (97.4)	--
No		2 (2.6)	--

RCT: Root canal treatment

Table 3: Comparison of gender with mean anxiety, anticipated, and experienced pain.

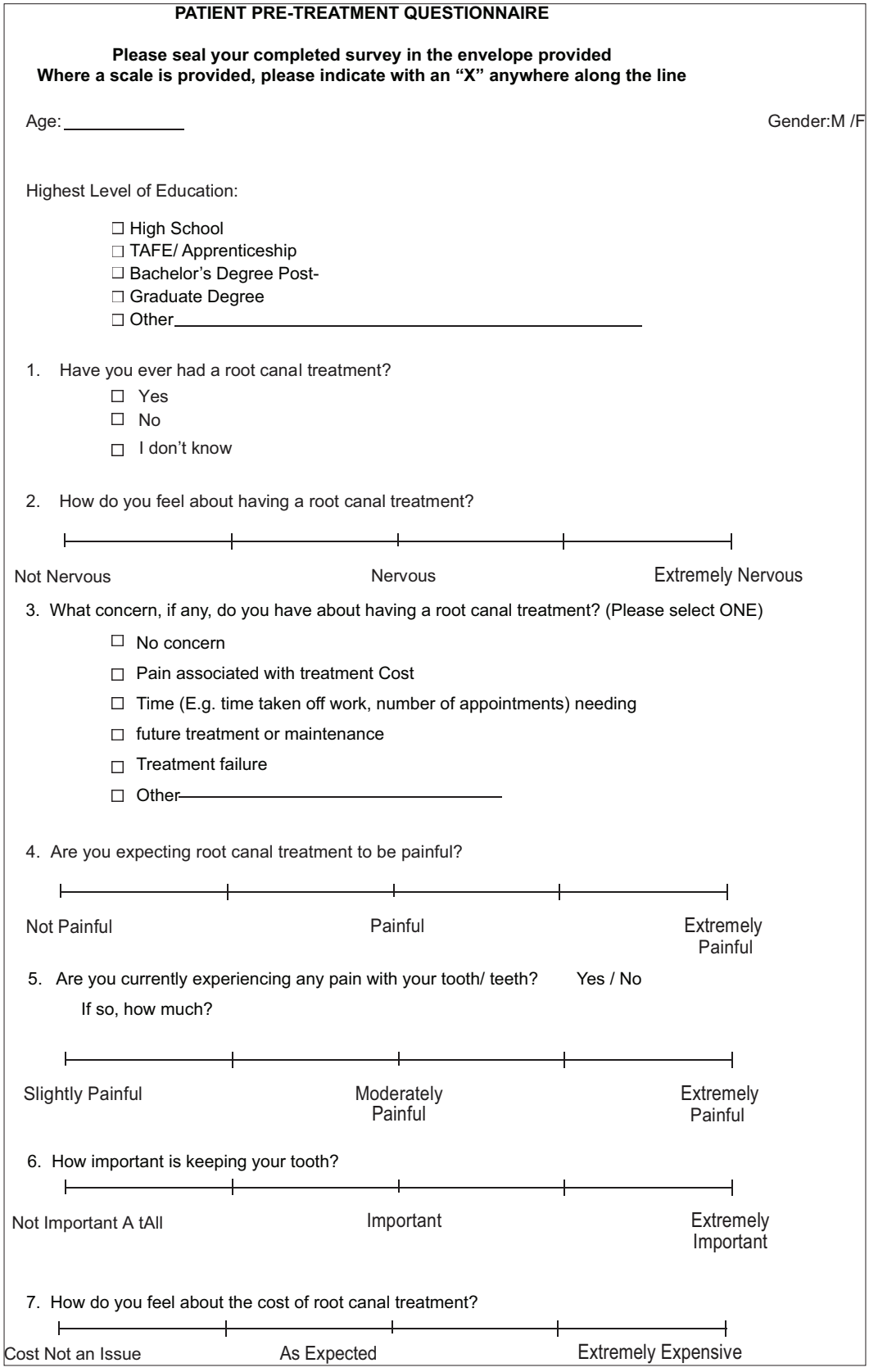
Time of procedure	Variables	Gender	N	Mean	Std. deviation	*t*-value	*P*-value
Pre-treatment	Mean anxiety	Male	43	31.21	26.077	−0.090	0.928
		Female	33	31.82	32.640		
	Mean anticipated pain	Male	43	38.40	29.709	−0.904	0.369
		Female	33	44.55	28.949		
Post-treatment	Mean pain experience	Male	43	18.07	21.430	−1.530	0.130
		Female	33	26.67	27.576		
	Mean anxiety	Male	43	23.23	26.624	0.017	0.987
		Female	33	23.33	25.454		

consisted of 76 patients who visited the clinic for RCT and fulfilled the inclusion criteria of study. RCT is most commonly performed and demanding procedure at dental clinic. It not only saves the tooth but undeniably improve the quality of life. Yet the decision to treat patient was highly subjective in nature and could be influenced by multiple factors such as community, employment, socioeconomic status, values, and practices.[11]

In addition, dental patients today are less tolerant of pain that induces procedures and RCT is one no exception to this. To maximize clinical success, pain during RCT must be controlled preoperatively through correct diagnosis and reduction of anxiety.[1] Since dental anxiety, fear of unknown variables is highly affects patient decision-making and based on the experience felt. Various literature studies have indicated that, in fact, the nervous or anxious patient is more likely to recall the pain and expect the same experience[16,17] which leads to less utilization of health services.[5]

Recent experimental research focused on directed pain stimuli showed that negative anticipation induces anxiety that can intensify the actual pain.[9] Rhudy and Meagher recommended to pre-treatment anxiety correction as a best practice.[18]

There are few studies in literature that analyze the pain experience before during and after treatment. The present study sought to provide further information to the patient



PATIENT PRE-TREATMENT QUESTIONNAIRE

Please seal your completed survey in the envelope provided
Where a scale is provided, please indicate with an "X" anywhere along the line

Age: _____ Gender:M /F

Highest Level of Education:

- ☐ High School
- ☐ TAFE/ Apprenticeship
- ☐ Bachelor's Degree Post-
- ☐ Graduate Degree
- ☐ Other_____

1. Have you ever had a root canal treatment?
   - ☐ Yes
   - ☐ No
   - ☐ I don't know

2. How do you feel about having a root canal treatment?

Not Nervous — Nervous — Extremely Nervous

3. What concern, if any, do you have about having a root canal treatment? (Please select ONE)
   - ☐ No concern
   - ☐ Pain associated with treatment Cost
   - ☐ Time (E.g. time taken off work, number of appointments) needing
   - ☐ future treatment or maintenance
   - ☐ Treatment failure
   - ☐ Other_____

4. Are you expecting root canal treatment to be painful?

Not Painful — Painful — Extremely Painful

5. Are you currently experiencing any pain with your tooth/ teeth? Yes / No
   If so, how much?

Slightly Painful — Moderately Painful — Extremely Painful

6. How important is keeping your tooth?

Not Important A tAll — Important — Extremely Important

7. How do you feel about the cost of root canal treatment?

Cost Not an Issue — As Expected — Extremely Expensive

Figure 1: The pre-treatment survey form.[3]

PATIENT POST-TREATMENT QUESTIONNAIRE

Please seal your completed survey in the envelope provided
Where a scale is provided, please indicate with an "X" anywhere along the line

1. Having had root canal treatment, was the experience better or worse than you expected?

Worse than Expected | As Expected | Better than Expected

2. What dissatisfaction, if any, do you have following root canal treatment? (Please select ONE)

- ☐ No concern
- ☐ Pain associated with treatment Cost
- ☐ Time (E.g. time taken off work, number of appointments) needing
- ☐ future treatment or maintenance
- ☐ Treatment failure
- ☐ Other _____

3. Did you experience any pain with your root canal treatment? Yes / No
If so, how much?

Not Painful | Painful | Extremely Painful

4. After having root canal treatment, how happy are you to have kept your tooth?

Very Happy | Indifferent | Rather Have Had Tooth Removed

5. Would you have root canal treatment again if it was needed?

- ☐ Yes
- ☐ No

6. If you had to have root canal treatment again, how would you feel about it?

Not Nervou | Nervous | Extremely Nervous

7. Overall, are you satisfied with the outcome of your root canal treatment?

- ☐ Yes
- ☐ No

Figure 2: The post-treatment survey form.[3]

and dental health-care provider to practice the endodontic treatment in better way.

Gender

Current study reported no correction of pain and anxiety with gender. Mean anticipated pain was found more among the females (44.55 ± 28.95) which correspond to 44%. Segura-Egea *et al.* reported similar percentage for woman (47%). While male mean anticipated pain in current study 38.40 ± 29.71 (38%) found lower than Segura-Egea *et al.*[19] and Martín-González *et al.*[1,5,12,13,16] One explanation for this pattern may be that males continue to conceal their fears because of their orthodox gender position [5] or because of social standards that they more bear pain than females.[19] Current study found no correlation with mean anxiety and pain perception with gender which in line with the Kanegane *et al.*[20] These results indicated that women had higher anticipated pain levels than did men, but women did not differ from men on anxiety and pain in RCT.

Age

Age found no correlation with pain the present study but there was decrease in anxiety post-treatment. Two studies in the literature have found the outcome level of anticipated and experienced significantly decreased with increasing age.[1,16]

Pain

Assessment of the anticipated and experienced intraoperative pain was carried out using a visual analog scale (VAS from 0 to 100), a valid and reliable method widely used in the endodontic literature.[1]

Mean anticipated and experience of pain score were also significantly reduced pre-treatment 41.07 ± 29.35 (41%) to post-treatment 21.90 ± 24.50 (22%) which correspond to slightly painful pain rating scale.

Locker *et al.*[21] agreed that real pain was found to be much less among patients during the procedure than was expected in most cases. Moreover, Jothish *et al.*[11] in Saudi cases with extreme preoperative pain, post-operative relief was so rapid and dramatic that most agreed they would prefer RCT to extraction in the future as well. A view held by many other studies, that, most of the participants told us that they would suggest RCT to their loved ones, too.[11]

Other explanation to the lower pain after RCT is vitality of tooth reported by Gotler *et al.* recorded greater pain in teeth with vital pulp than the necrotic teeth.[13]

Anxiety

Patient's anxiety score was assessed using nervousness recorded on 0–100-point scale ranging from not nervous, nervous to extremely nervous. Patient in the present study was slightly nervous pre-treatment 31.47 ± 28.90 (31%) and found to be significantly decreased to post-treatment 23.28 ± 25.95 (23%). Which found to be less compare to Wali *et al.* where he reported that 57 (26%) were highly anxious while Le Claire, *et al.*[21] in his study reported 18 (22%) subjects highly anxious.[5,22] The prevalence of dental anxiety differs with a number of potential patient characteristics, such as gender, age, education, and socioeconomic status. (Armfield 2006)[15,17] to maximize the clinical experience, dental practitioners should be well qualified to recognize these nervous patients so that their worst fears about RCT can be allayed.[11]

Concern about treatment

Patient's previous experience with the root canal treatment was explicitly designed to include information on the participants' attitude toward RCT.[11] Studies in the past had highlighted the need to provide more information about the advantages of retaining natural teeth. However, in the present study, 10 (6.6) of patients were not concerned about RCT before treatment but then turned to more concerned 40 (26.3). Similarly Chandraweera *et al.* reported, despite concern pre-treatment among some patients, all patients who completed the post-treatment survey stated that they would undergo RCT again if needed.[3]

Cost

It showed that increasing endodontic care costs decrease patient satisfaction.[7] In this study, concern about cost from pre-treatment 10 (6.6) has been significantly reduced post-treatment 2 (1.3) and found causing less impact on decision making for treatment. Which found Similar to Chandraweera *et al.*[3] where patients reported RCT to be more expensive than anticipated when questioned before treatment and this reduced to 44% after treatment. While Doumani *et al.*, 2017,[15] where 72% of respondents confirmed that cost does not affect their treatment decision; in fact, 67% mentioned that they would undergo the procedure at any cost. Several other studies[14,23,24] revealed that high treatment cost has significant negative impact on treatment decision. Whereas, Jothish *et al.* found score slightly lower 9.3% than present study and in his study major reason for avoiding treatment was cost.[11]

CONCLUSION

Current study reported a significant difference in reduction of mean anxiety for RCT post-treatment. Moreover, there was significant difference found between anticipated pain and experienced pain for the treatment. Before the treatment significant number of patients were not concerned for RCT

and majority of patients were concerned for pain associated to RCT. These both concerned were significantly reduced post-treatment. Overall patients showed positive response to RCT post-treatment and provided extremely satisfied inputs. Despite of all positive points the present study reported a few limitations. Although the cost of treatment was not concerned about patients, still further exploration regarding different socioeconomic status would have been done. Small sample size made many explorations undone hence it is recommended to perform further research by involving larger sample size.

Declaration of patient consent

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

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Nil.

Conflicts of interest

There are no conflicts of interest.

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