Cureus
Part of SPRINGER NATURE

Open Access Original Article

Oral Health-Related Quality of Life and Patient Satisfaction Following Non-surgical Endodontic Therapy With Different Root Canal Sealers: A Randomized Clinical Trial

Review began 09/05/2026
Review ended 10/29/2026
Published 11/03/2026

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DOI: 10.7759/cureus.119090

Souparna Madhavan [1], Haifa B [2], Lavanya Varma [3]

1. Department of Conservative Dentistry and Endodontics, Mahe Institute of Dental Sciences and Hospital, Mahe, IND 2. Department of Prosthetic Dental Sciences, College of Dentistry, Qassim University, Burayda, SAU 3. Department of Conservative Dentistry and Endodontics, Srinivas Insititute of Dental Sciences, Mangalore, IND

Corresponding author: Souparna Madhavan , souparnamadhavan92@gmail.com

Abstract

Background: Non-surgical endodontic therapy is primarily performed to eliminate pulpal infection, relieve pain, promote periapical healing, and preserve natural dentition. Patient-reported outcomes, including oral health-related quality of life (OHRQoL) and satisfaction, provide a broader assessment of treatment effectiveness than clinical or radiographic outcomes alone. Evidence remains limited on sustained patient-reported outcomes after root canal therapy (RCT) in Indian clinical settings, particularly when comparing different obturation sealers, as well as anxiety, satisfaction, and periapical healing. The objective of this study was to evaluate changes in OHRQoL and patient satisfaction following non-surgical endodontic therapy and compare outcomes among zinc oxide eugenol, Endomethasone N (Septodont Healthcare India Pvt. Ltd., Panvel, Maharashtra, India), and AH Plus (Dentsply Sirona Inc., Charlotte, North Carolina, United States) sealers.

Methods: This was a double-blind, three-arm randomized clinical trial that included 180 adults requiring RCT. Participants were equally allocated into three treatment groups. Baseline and follow-up assessments included Oral Health Impact Profile-14 (OHIP-14) scores, dental anxiety, patient satisfaction, and radiographic periapical outcomes over one year.

Results: OHRQoL improved progressively following non-surgical endodontic therapy, with sustained improvements across functional, pain-related, psychological, and social domains. The mean age was 34.76 ± 11.61 years in male and 32.42 ± 8.79 years in female participants. Significant intergroup differences were reported for 13 of 14 OHIP-14 items during early follow-up, whereas taste disturbance remained non-significant (p=0.139 on Days 1 and 7; p=0.060 on Day 15). At six months and one year, significant intergroup differences were reported for all 14 OHIP-14 items. Dental anxiety differed significantly among the three groups for anticipated treatment on the following day (p=0.012) and waiting-room anxiety (p=0.011), but not for tooth drilling (p=0.060), scaling and polishing (p=0.080), or local anesthetic injection (p=0.631). Patient satisfaction remained high across all groups. No significant intergroup differences were observed in periapical status (p=0.435), retreatment requirements (p=0.619), tooth retention (p=0.086), or perceived treatment cost (p=0.054).

Conclusion: Non-surgical endodontic therapy improved patient-centered outcomes, with no clinically dominant difference among the evaluated sealers.

Categories: Pain Management, Oral Medicine, Dentistry
Keywords: ah plus, endodontic therapy, oral health-related quality of life, patient satisfaction, root canal therapy

Introduction

Oral disease is associated with a wide range of impacts that go beyond the dentition and supporting tissues, making oral health-related quality of life (OHRQoL) an important patient-reported outcome for modern dental and medical research [1]. It can affect eating, talking, appearance, sleeping, mood, socializing, and daily life. In oral health, OHRQoL is a measure of how oral health problems affect an individual's functional capacity, psychological state, social integration, and health perception [2]. Dental pain, untreated caries, tooth loss, gingivitis, and dental-related fears and concerns are significant factors affecting well-being and can impact everyday life [2,3]. These are measured using a widely adopted instrument called the Oral Health Impact Profile-14 (OHIP-14), which covers functional, physical, psychological, and social areas of the patient's life [3,4].

Oral pain and OHRQoL are commonly associated with endodontic disease. Persistent pain, discomfort while eating, impaired sleep, and avoidance of daily activities may be signs of pulpitis, pulp necrosis, and apical periodontitis [4]. Non-surgical root canal therapy (RCT) is a conservative clinical procedure aimed at

eliminating the infection, reducing symptoms, creating periapical healing, and maintaining the natural tooth. Preservation of natural dentition is still important in terms of clinical relevance, as a decline in natural dentition has been linked to impaired oral function and decreased quality of life [3,4]. While traditional RCT is successful in providing good clinical results, it may differ in relation to diagnosis, canal anatomy, operator experience, irrigation protocol, obturation quality, coronal structure, and follow-up period [5,6]. Traditional measures of the success of endodontic treatment have focused primarily on clinician-centred endpoints such as the presence of a radiographic healing area, the absence of symptoms, and tooth survival. These outcomes are necessary but are not necessarily adequate to measure satisfaction with treatment, a patient's perception of recovery, or functional improvement [7].

Thus, the focus on patient-centred assessment has grown in recent years in endodontics. Pain relief, anxiety reduction, cost of treatment, communication, clinician's trust, and restoration of oral function are among the factors that affect the perceived value of root canal therapy [8]. There is some previous evidence that is available to suggest that non-surgical root canal treatment has a beneficial effect on improvement of OHRQoL and satisfaction, especially for those with pain, discomfort, or functional limitation [8,9]. Dental anxiety is an important challenge for endodontists and can result in avoidance of treatment or referral for extraction when the option of root canal treatment is available [10,11]. Previous dental experiences, dental education, socioeconomic status, and misconceptions about root canal therapy also influence pain expectations [10]. These are all critical factors in good communication, adequate pain management, and patient participation in treatment planning that are essential to the delivery of high-quality, patient-centered endodontic care.

Obturative materials can also have a bearing on endodontic outcome. Root canal sealers are used in conjunction with gutta-percha to seal the irregularities of the canal, to enhance sealing of gutta-percha to the canal walls, to prevent microleakage, and to promote long-term periapical healing [11,12]. The sealers used in clinical practice include resin-based sealers like Endomethasone N (Septodont Healthcare India Pvt. Ltd., Panvel, Maharashtra, India), AH Plus (Dentsply Sirona Inc., Charlotte, North Carolina, United States), and zinc oxide eugenol-based sealers, which are distinguished from each other by their handling properties, sealing ability, biocompatibility, and tissue response [13,14]. A few studies have focused on radiographic success, technical quality, and post-operative pain. There are limited studies to assess whether there is any measurable difference in patient-reported outcomes, including OHIP-14 scores, satisfaction, anxiety, and perceived functional recovery, in the longer-term follow-up period with various sealer materials [15,16]. The clinical consequences of untreated dental caries, including pulpal involvement, ulceration, fistula formation, and abscess development, have been described using the PUFA (Pulpal involvement, Ulceration, Fistula, and Abscess) index [17]. These complications highlight the importance of timely dental assessment and treatment, including the management of pulpal and periapical disease.

There is limited evidence from clinical studies conducted in India, especially when assessing OHRQoL and patient satisfaction along with dental anxiety, periapical status, and comparing sealer-based studies that follow non-surgical endodontic therapy. There are several investigations available, but few of these are longitudinal, and few give information on the long-term patient-perceived improvement. There is also a need to understand whether sealer selection is a significant factor in determining patient-centered outcomes or whether procedural quality, symptom relief, and the overall experience of the procedure play a more significant role in determining satisfaction.

This study aimed to evaluate changes in OHRQoL and patient satisfaction following non-surgical endodontic therapy in adults. It also aimed to compare dental anxiety, patient-reported outcomes, and clinical and radiographic periapical outcomes among patients treated with zinc oxide eugenol, Endomethasone N, and AH Plus root canal sealers over a one-year follow-up period.

Materials And Methods

This was a double-blind, three-arm randomized clinical trial conducted at Srinivas Institute of Dental Sciences, Mukka, Mangalore, India, between September 2021 and December 2022. Reporting was done in accordance with the Consolidated Standards Of Reporting Trials (CONSORT) 2025 guidelines. The study was approved by the Srinivas University Ethics Committee (approval number: SUEC 2020/009), and the trial was prospectively registered with the Clinical Trials Registry-India (registration number: CTRI/2021/09/036333). Before enrolment, all participants were informed of the study procedures, benefits, and follow-up requirements, and informed consent was obtained.

Study population

Eligibility Criteria

Patients were eligible if they were over the age of 18 with a single-rooted or multi-rooted tooth with a vital or necrotic pulp (either with or without apical periodontitis). Clinical and radiographic selection criteria included a positive cold test (if applicable), percussion sensitivity, widening of the periodontal ligament of 2 mm or more, or periapical radiolucency, full-mouth periodontal probing depths of 3 mm or less, including probing depths of 3 mm or less around the target tooth selected for RCT, and adequate restorability. Patients

were excluded if they had uncontrolled systemic disease, vertical root fracture, root resorption >1/3 of the root length, previous RCT in the selected tooth, pregnancy, allergy to local anesthetic agents or sealers, or failure to follow up for 12 months.

Sample Size

G*Power version 3.1.9 was used to determine the sample size. Based on an effect size of 0.31, a 5% level of significance, and 80% statistical power, the sample size was determined as 180 participants. After screening for eligibility, a total of 180 adult patients, aged between 18 and 55 years, who required non-surgical RCT were recruited from the outpatient department.

Randomization process

A total of 180 participants were randomly allocated in a 1:1:1 ratio to three treatment groups, with 60 participants in each group. Group 1 received zinc oxide eugenol, Group 2 received Endomethasone N, and Group 3 received AH Plus. Computer-generated random numbers with a block size of six and stratification by gender were used to randomize. Sequentially numbered and opaque, sealed envelopes were used to achieve allocation concealment. The trial was double-blinded, with the outcome assessor and statistician blinded to treatment allocation, while the operator remained unblinded because of the procedural requirements of sealer preparation and placement.

Study instruments and baseline assessment

A structured proforma was used to document baseline demographic information, including age, gender, occupation, education, and chief complaint. OHRQoL was assessed using the OHIP-14, originally developed and validated by Slade [18]. The OHIP-14 consists of 14 items distributed across seven domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Responses were recorded using a five-point Likert scale. Dental anxiety was assessed using the Modified Dental Anxiety Scale (MDAS), which evaluates anxiety across five dental situations: anticipation of dental treatment, waiting for treatment, tooth drilling, scaling and polishing, and local anesthetic injection [19]. Radiographic periapical status was assessed using the Periapical Index (PAI) described by Ørstavik et al. [20]. Patient satisfaction was assessed using a structured study questionnaire addressing dentist and supporting-staff attitude, emergency service accessibility, perceived treatment cost, confidence in the dentist, treatment quality, infection-control procedures, participation in treatment planning, communication, and provision of oral-health instructions (See Appendices). These assessments were used to evaluate patient-centered and clinical outcomes of endodontic therapy during follow-up.

Endodontic intervention protocol

All the endodontic treatments were carried out by a single calibrated endodontist who has 10 years of experience. The operator performed the entire protocol on 20 extracted teeth before patient recruitment to ensure uniformity of the protocol. All patients were isolated with a rubber dam and given local anaesthetic as per standard precautions for infection control. Access cavity preparation was done with a round bur and EndoAccess bur to create straight-line access. All files were finished using ProTaper Gold rotary nickel-titanium (NiTi) files (Dentsply Sirona Inc.) up to size F3 or F4 as per the canal anatomy. The irrigation was done with 5.25% sodium hypochlorite and 17% ethylenediaminetetraacetic acid (EDTA). Warm vertical compaction was used to obturate with the assigned sealer and gutta-percha.

Follow-up assessment

Post-treatment follow-up evaluations were scheduled on days 7, 15, 30, 60, 90, 120, 180, and 365. Follow-up assessments took place either verbally or in person, if possible and appropriate. The OHIP-14 questionnaire was used again to re-evaluate the OHRQoL at specific follow-up points, particularly at the 7-day, 15-day, 6-month, and 1-year follow-ups. Structured instruments were also used to record patient satisfaction and responses to anxiety. Radiographic evaluation was undertaken to determine periapical healing, root filling status, retreatment needs, and tooth retention. Most participants received post-endodontics in 14 days or less, either with composite or full coronal coverage.

Statistical analysis

Continuous variables were summarized as mean and standard deviation (SD), while categorical variables were summarized as frequency and percentage. Comparisons of continuous variables between two independent groups were performed using the independent-samples t-test, and comparisons among the three treatment groups were performed using one-way ANOVA. Categorical variables were compared using Pearson's chi-square test, with an exact test used when expected cell frequencies were small. The applicable test statistic, degrees of freedom, and p-value were reported for all inferential analyses. All tests were two-tailed, and $p<0.05$ was considered statistically significant. Statistical analysis was performed using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, New York, United States).

Results

A total of 180 patients, comprising 78 male and 102 female patients, receiving non-surgical endodontic therapy were analyzed and allocated to three groups, with 60 patients in each group. Group 1 (zinc oxide eugenol) included 30 male and 30 female patients, Group 2 (Endomethasone N) included 25 male and 35 female patients, and Group 3 (AH Plus) included 23 male and 37 female patients. Male participants had a mean age of 34.76 years (SD 11.61), while female participants had a mean age of 32.42 years (SD 8.79) (Table *1*).

Variable	Participant category	Mean	SD
Age, years	Male	34.76	11.61
	Female	32.42	8.79

TABLE 1: Age distribution of male and female participants

Dental anxiety across sealer groups

In the anticipatory scenarios, dental anxiety differed significantly among the groups, whereas no significant differences were observed in the procedure-related scenarios. Anxiety related to receiving dental treatment on the following day differed significantly among the three groups (Pearson's chi-square test, $\chi^2(6)=16.392$, p=0.012). Waiting-room anxiety also differed significantly among the groups ($\chi^2(6)=16.505$, p=0.011). No significant intergroup differences were observed for tooth drilling ($\chi^2(6)=12.074$, p=0.060), scaling and polishing ($\chi^2(6)=11.290$, p=0.080), or local anesthetic injection ($\chi^2(6)=4.341$, p=0.631). These findings indicate that pre-procedural anxiety varied more across the treatment groups than procedure-specific anxiety. The comparison of dental anxiety responses among the three sealer groups is presented in Table *2*.

Anxiety scenario	Response category	Group 1 (zinc oxide eugenol), n (%)	Group 2 (Endomethasone N*), n (%)	Group 3 (AH Plus**), n (%)	Statistical test	Test statistic	p-value
Dental treatment tomorrow	Not anxious	16 (26.7)	20 (33.3)	30 (50.0)	Pearson's chi-square test	$\chi^2(6)=16.392$	0.012
	Slightly anxious	26 (43.3)	27 (45.0)	14 (23.3)	Pearson's chi-square test	$\chi^2(6)=16.392$	0.012
	Fairly anxious	13 (21.7)	7 (11.7)	5 (8.3)	Pearson's chi-square test	$\chi^2(6)=16.392$	0.012
	Very anxious	5 (8.3)	6 (10.0)	11 (18.3)	Pearson's chi-square test	$\chi^2(6)=16.392$	0.012
Waiting room	Not anxious	14 (23.3)	23 (38.3)	24 (40.0)	Pearson's chi-square test	$\chi^2(6)=16.505$	0.011
	Slightly anxious	25 (41.7)	25 (41.7)	15 (25.0)	Pearson's chi-square test	$\chi^2(6)=16.505$	0.011
	Fairly anxious	15 (25.0)	5 (8.3)	7 (11.7)	Pearson's chi-square test	$\chi^2(6)=16.505$	0.011
	Very anxious	6 (10.0)	7 (11.7)	14 (23.3)	Pearson's chi-square test	$\chi^2(6)=16.505$	0.011
Tooth drilling	Not anxious	13 (21.7)	9 (15.0)	15 (25.0)	Pearson's chi-square test	$\chi^2(6)=12.074$	0.060
	Slightly anxious	24 (40.0)	28 (46.7)	19 (31.7)	Pearson's chi-square test	$\chi^2(6)=12.074$	0.060
	Fairly anxious	16 (26.7)	16 (26.7)	9 (15.0)	Pearson's chi-square test	$\chi^2(6)=12.074$	0.060
	Very anxious	7 (11.7)	7 (11.7)	17 (28.3)	Pearson's chi-square test	$\chi^2(6)=12.074$	0.060

Scaling and polishing	Not anxious	24 (40.0)	29 (48.3)	22 (36.7)	Pearson's chi-square test	$\chi^2(6)=11.290$	0.080
	Slightly anxious	18 (30.0)	18 (30.0)	19 (31.7)	Pearson's chi-square test	$\chi^2(6)=11.290$	0.080
	Fairly anxious	13 (21.7)	12 (20.0)	8 (13.3)	Pearson's chi-square test	$\chi^2(6)=11.290$	0.080
	Very anxious	5 (8.3)	1 (1.7)	11 (18.3)	Pearson's chi-square test	$\chi^2(6)=11.290$	0.080
Local anesthetic injection	Not anxious	12 (20.0)	11 (18.3)	14 (23.3)	Pearson's chi-square test	$\chi^2(6)=4.341$	0.631
	Slightly anxious	18 (30.0)	19 (31.7)	17 (28.3)	Pearson's chi-square test	$\chi^2(6)=4.341$	0.631
	Fairly anxious	19 (31.7)	16 (26.7)	11 (18.3)	Pearson's chi-square test	$\chi^2(6)=4.341$	0.631
	Very anxious	11 (18.3)	14 (23.3)	18 (30.0)	Pearson's chi-square test	$\chi^2(6)=4.341$	0.631

TABLE 2: Anxiety responses among the three sealer groups

Each treatment group included 60 participants. The test statistic and p-value are repeated across the response-category rows because they apply to the complete four-category comparison for each anxiety scenario.

*Septodont Healthcare India Pvt. Ltd., Panvel, Maharashtra, India; **Dentsply Sirona Inc., Charlotte, North Carolina, United States

Periapical healing and radiographic outcomes

Completed root filling was recorded in 13 participants (21.7%) in Group 1, 10 (16.7%) in Group 2, and five (8.3%) in Group 3. The intergroup difference was not statistically significant (Pearson's chi-square test, $\chi^2(2)=4.145$, $p=0.126$). Retreatment was required in seven participants (11.7%), four (6.7%), and five (8.3%) in Groups 1, 2, and 3, respectively, with no significant difference among the groups ($\chi^2(2)=0.960$, $p=0.619$). Periapical status was also comparable among the three groups ($\chi^2(8)=7.984$, $p=0.435$). Normal periapical structure was observed in 30 participants (50.0%) in Group 1, 27 (45.0%) in Group 2, and 22 (36.7%) in Group 3, while severe apical periodontitis with exacerbating features was identified in three (5.0%), four (6.7%), and one (1.7%) participant, respectively. Tooth retention was recorded in 54 participants (90.0%) in Group 1, 59 (98.3%) in Group 2, and 58 (96.7%) in Group 3, without a significant intergroup difference ($\chi^2(2)=4.912$, $p=0.086$). Table *3* summarizes the root-filling status, retreatment requirement, periapical index findings, and tooth-retention outcomes among the three groups.

Outcome	Response	Group 1 (zinc oxide eugenol), n (%)	Group 2 (Endomethasone N*), n (%)	Group 3 (AH Plus**), n (%)	Statistical test	Test statistic	p-value
Root filling completed	No	47 (78.3)	50 (83.3)	55 (91.7)	Pearson's chi-square test	$\chi^2(2)=4.145$	0.126
	Yes	13 (21.7)	10 (16.7)	5 (8.3)	Pearson's chi-square test	$\chi^2(2)=4.145$	0.126
Retreatment required	No	53 (88.3)	56 (93.3)	55 (91.7)	Pearson's chi-square test	$\chi^2(2)=0.960$	0.619
	Yes	7 (11.7)	4 (6.7)	5 (8.3)	Pearson's chi-square test	$\chi^2(2)=0.960$	0.619
Periapical status	Normal periapical structure	30 (50.0)	27 (45.0)	22 (36.7)	Pearson's chi-square test	$\chi^2(8)=7.984$	0.435
	Small changes in bone structure	14 (23.3)	16 (26.7)	24 (40.0)	Pearson's chi-square test	$\chi^2(8)=7.984$	0.435
	Bone changes with minor mineral loss	2 (3.3)	3 (5.0)	5 (8.3)	Pearson's chi-square test	$\chi^2(8)=7.984$	0.435
	Well-defined apical radiolucency	11 (18.3)	10 (16.7)	8 (13.3)	Pearson's chi-square test	$\chi^2(8)=7.984$	0.435
	Severe apical periodontitis	3 (5.0)	4 (6.7)	1 (1.7)	Pearson's chi-square test	$\chi^2(8)=7.984$	0.435
Tooth status	Present on current radiograph	54 (90.0)	59 (98.3)	58 (96.7)	Pearson's chi-square test	$\chi^2(2)=4.912$	0.086
	Missing on current radiograph	6 (10.0)	1 (1.7)	2 (3.3)	Pearson's chi-square test	$\chi^2(2)=4.912$	0.086

TABLE 3: Radiographic and periapical outcomes

*Septodont Healthcare India Pvt. Ltd., Panvel, Maharashtra, India; **Dentsply Sirona Inc., Charlotte, North Carolina, United States

Patient satisfaction outcomes

All participants in each treatment group reported satisfactory dentist and supporting-staff attitudes, emergency accessibility, confidence in the dentist's ability, treatment quality, infection-control procedures, involvement in treatment planning, adequate communication, and receipt of oral-health instructions. Treatment was perceived as expensive by 10 participants (16.7%) in Group 1, eight (13.3%) in Group 2, and 18 (30.0%) in Group 3. This intergroup difference was not statistically significant (Pearson's chi-square test, $\chi^2(2)=5.833$, $p=0.054$). These findings indicate consistently high patient satisfaction across all three sealer groups. Table *4* presents the patient-satisfaction responses for each treatment group.

Satisfaction item	Response	Group 1, n (%)	Group 2, n (%)	Group 3, n (%)	Statistical test	Test statistic	p-value
Dentist's attitude	Satisfactory	60 (100.0)	60 (100.0)	60 (100.0)	Not applicable	Not applicable	Not applicable
	Not satisfactory	0 (0.0)	0 (0.0)	0 (0.0)	Not applicable	Not applicable	Not applicable
Supporting staff attitude	Satisfactory	60 (100.0)	60 (100.0)	60 (100.0)	Not applicable	Not applicable	Not applicable
	Not satisfactory	0 (0.0)	0 (0.0)	0 (0.0)	Not applicable	Not applicable	Not applicable
Emergency service accessible	Yes	60 (100.0)	60 (100.0)	60 (100.0)	Not applicable	Not applicable	Not applicable
	No	0 (0.0)	0 (0.0)	0 (0.0)	Not applicable	Not applicable	Not applicable
Treatment perceived as expensive	Yes	10 (16.7)	8 (13.3)	18 (30.0)	Pearson's chi-square test	$\chi^2(2)=5.833$	0.054
	No	50 (83.3)	52 (86.7)	42 (70.0)	Pearson's chi-square test	$\chi^2(2)=5.833$	0.054
Confidence in dentist's ability	Yes	60 (100.0)	60 (100.0)	60 (100.0)	Not applicable	Not applicable	Not applicable
	No	0 (0.0)	0 (0.0)	0 (0.0)	Not applicable	Not applicable	Not applicable
Treatment quality	Satisfactory	60 (100.0)	60 (100.0)	60 (100.0)	Not applicable	Not applicable	Not applicable
	Not satisfactory	0 (0.0)	0 (0.0)	0 (0.0)	Not applicable	Not applicable	Not applicable
Infection-control procedures	Satisfactory	60 (100.0)	60 (100.0)	60 (100.0)	Not applicable	Not applicable	Not applicable
	Not satisfactory	0 (0.0)	0 (0.0)	0 (0.0)	Not applicable	Not applicable	Not applicable
Involved in treatment planning	Yes	60 (100.0)	60 (100.0)	60 (100.0)	Not applicable	Not applicable	Not applicable
	No	0 (0.0)	0 (0.0)	0 (0.0)	Not applicable	Not applicable	Not applicable
Healthcare professional listened	Yes	60 (100.0)	60 (100.0)	60 (100.0)	Not applicable	Not applicable	Not applicable
	No	0 (0.0)	0 (0.0)	0 (0.0)	Not applicable	Not applicable	Not applicable
Oral-health instructions provided	Yes	60 (100.0)	60 (100.0)	60 (100.0)	Not applicable	Not applicable	Not applicable
	No	0 (0.0)	0 (0.0)	0 (0.0)	Not applicable	Not applicable	Not applicable

TABLE 4: Patient satisfaction among the three sealer groups

OHRQoL

OHIP-14 responses progressively shifted toward the "hardly ever" and "never" categories during follow-up. On Days 1 and 7, significant intergroup differences were identified for 13 of the 14 OHIP-14 items (92.9%),

while taste disturbance remained non-significant (p=0.139). On Day 15, 13 items (92.9%) showed significant intergroup differences, whereas taste disturbance remained non-significant (p=0.060). At six months and one year, significant intergroup differences were observed for all 14 items (100.0%), with sustained improvement across functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap domains. The follow-up OHIP-14 findings are summarized in Table 5.

Follow-up	Predominant response pattern	Significant items, n (%)	Non-significant items, n (%)	Key finding
Day 1	Occasionally or hardly ever	13 (92.9)	1 (7.1)	Taste disturbance was not significantly different among the groups
Day 7	Occasionally or hardly ever	13 (92.9)	1 (7.1)	Taste disturbance was not significantly different among the groups
Day 15	Hardly ever or never	13 (92.9)	1 (7.1)	Taste disturbance remained non-significant at p=0.060
Six months	Hardly ever or never	14 (100.0)	0 (0.0)	Significant intergroup differences were observed for all items
One year	Predominantly never	14 (100.0)	0 (0.0)	Significant intergroup differences were observed for all items

TABLE 5: Summary of OHIP-14 findings over follow-up

Percentages represent the proportion of 14 items showing significant or non-significant intergroup differences. A p-value <0.05 was considered statistically significant.

OHIP-14, Oral Health Impact Profile-14 [18]

Discussion

Non-surgical endodontic therapy was shown to have a significant effect on the improvement of OHRQoL, patient satisfaction, and perceived oral function in adults who needed RCT. The degree of improvement found in this study is consistent with endodontic therapy as more than an infection control and radiographic healing procedure. The patient experiences pain, chewing difficulties, mental discomfort, and insecurities in oral function during their daily life in the event of pulpal and/or periapical disease. These symptoms play an important role in post-treatment patient satisfaction and better outcomes [21,22].

Improvement in OHRQoL results in follow-up assessments indicates that a positive outcome of successful endodontic care is a long-term benefit in physical, psychological, and social aspects. At baseline, patients had symptoms of discomfort from pain, food intake issues, embarrassment, emotional strain, and disruption of routine activities. After treatment, the responses gradually shifted towards a decrease in oral health impacts, suggesting a recovery in terms of comfort and functional stability. The result is comparable with previous studies, which showed that oral pain was reduced, and masticatory function and quality of life improved with keeping the tooth in place rather than extracting it [23,24].

The patients' overall satisfaction was favorable in all the treatment groups, indicating high satisfaction with the overall treatment experience. Other factors besides the success of clinical treatment, such as the dentist's attitude, staff behavior, ease of access during an emergency, infection control, communication, and treatment planning, also affected satisfaction. The findings underscore the importance of patient-centred care in the field of endodontics. Feelings of respectful communication, adequate explanation, trust in the procedure, and reassurance are also important for a technically successful procedure [25,26].

The findings of the anxiety studies highlight the importance of anticipatory anxiety in endodontic treatment. There was a significant difference between anxiety-related situations and procedural situations, suggesting that expectancy may influence anxiety in a patient, but not necessarily the procedural experience. In line with the dental literature, the fear of RCT is not because of the discomfort of the procedure, but rather due to misconceptions, not-so-pleasant experiences with dentists, and the subjectively experienced discomfort during the procedure. Detailed preoperative counseling, understanding of anesthesia and pain management, and a patient-friendly clinician-patient conversation may, thus, reduce anxiety and enhance treatment acceptance [27,28].

Radiographic results and periapical results were comparable with no differences among the groups of

sealers, suggesting that the sealers tested in the present protocol were clinically acceptable in facilitating healing of the stable treatment protocol. In the short term, beyond the material selection, other factors may contribute to the patient-centred outcomes, without there being a superiority pattern. Shaping, disinfection of the canal, obturation technique, operator experience, coronal seal, and procedural protocols may have a greater influence on the clinical success and patient perception. This is similar to the principles of evidence-based endodontics, which also focus on the multifactorial nature of tooth healing and retention [23,24].

Comparison of sealer materials implies that for the patient, the relief of symptoms and restoration of function could be more important than the type of sealer used. The properties of sealers may differ both biologically and physically, but their influence on the quality of life may be more subtle when applied in a controlled clinical setting. Sealer selection should consider its physicochemical and biological properties, clinical performance, and patient-reported outcomes to support evidence-based and patient-centred endodontic treatment [26,28].

The clinical relevance of non-surgical endodontics is demonstrated by improvements (significant enhancements) in the pattern of physical pain, psychological discomfort, eating difficulty, social interaction, and overall satisfaction. Although the treatment aims to preserve tooth structure, its effectiveness and clinical suitability should be evaluated based on the available clinical evidence and the specific requirements of each case. These results are in line with the recent adoption of the use of patient-reported outcome measures (PROMs) in dental and medical decision-making. Along with assessing radiographic healing, measuring the quality of life, satisfaction, and anxiety levels in routine clinical practice may be a more complete measure of treatment success. This study supports the success of non-surgical endodontics as a patient-focused approach to endodontic disease in adults in general. The results suggest that standardized RCT can positively affect OHRQoL, high satisfaction, decrease the perceived oral health burden, and attain comparable clinical results when using the most common sealer materials [28-30].

Limitations and future directions

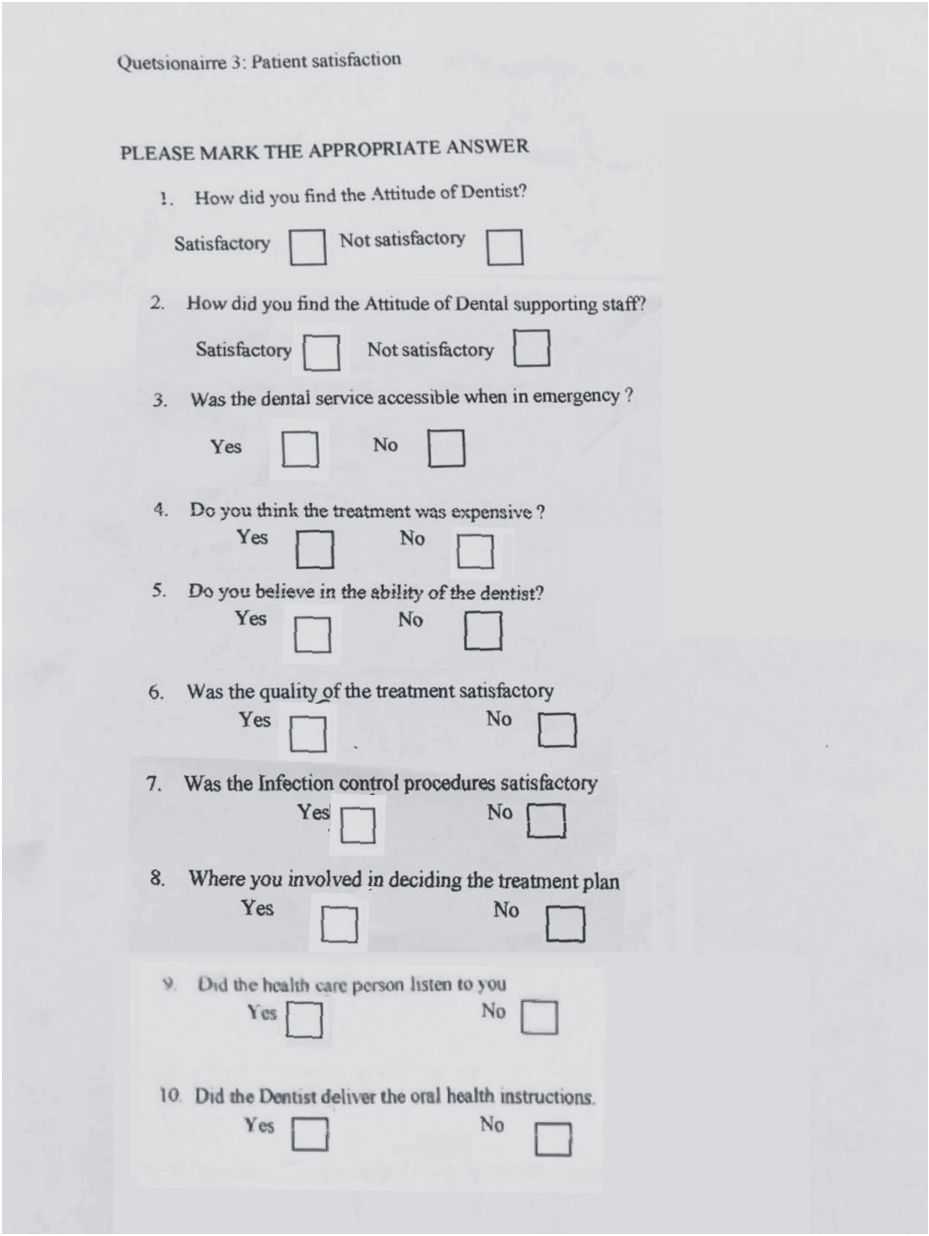
There are some limitations in this study that should be taken into consideration when interpreting the findings. While an adequate follow-up period was provided for short-term and intermediate patient-reported outcomes, it may not provide enough time to record the late failures from endodontic therapy or long-term patterns of periapical healing or differences among sealer materials. The study was conducted in one institutional setting, limiting the generalizability of the findings to other groups of patients with socioeconomic, geographic, and clinical variations. Some patient-reported outcomes were subjective and may be influenced by recall, expectations, anxiety, and past dental experiences. There was a standardized treatment, but it is likely that there may have been many variations in tooth type and canal morphology, disease status, and restorative requirements.

Multicentre studies with larger and more heterogeneous samples, extended follow-up periods, and reproducible parameters to examine the type of tooth, the quality of the restoration, postoperative pain, and psychological factors are recommended for future studies. Further comparative clinical studies incorporating clinical, radiographic, and patient-reported outcomes may provide stronger evidence to guide endodontic sealer selection and promote patient-centred endodontic practice.

Conclusions

Non-surgical endodontic treatment significantly improved OHRQoL, patient satisfaction, and perceived functional recovery in adults undergoing RCT. This study showed that the impact of endodontic therapy is not limited to symptom control and long-term retention of the tooth; there is a measurable impact on pain, comfort with chewing, psychological and social well-being, and patient satisfaction. Overall satisfaction was high in all treatment groups, and thus effective communication, confidence in the treatment, infection prevention, treatment availability, and treatment engagement were all seen as extremely important in the treatment decision. At follow-up, there were no differences among the three sealer materials (Zinc oxide eugenol, Endomethasone, and AH plus) in both clinical and patient-reported outcomes. This means that the selection of a sealer is less significant than the quality of treatment, preparation of the canal, disinfection, and obturation technique, and early restoration in terms of patients' perception of success. The use of patient-reported measures of endodontic effectiveness, like the OHIP-14, with clinical and radiographic outcomes, offers a holistic evaluation of endodontic effectiveness and can be used to guide a patient-centered approach to routine endodontic care and long-term oral health management.

Appendices


Quetsionairre 3: Patient satisfaction

PLEASE MARK THE APPROPRIATE ANSWER

1. How did you find the Attitude of Dentist?
   Satisfactory ☐ Not satisfactory ☐
2. How did you find the Attitude of Dental supporting staff?
   Satisfactory ☐ Not satisfactory ☐
3. Was the dental service accessible when in emergency ?
   Yes ☐ No ☐
4. Do you think the treatment was expensive ?
   Yes ☐ No ☐
5. Do you believe in the ability of the dentist?
   Yes ☐ No ☐
6. Was the quality of the treatment satisfactory
   Yes ☐ No ☐
7. Was the Infection control procedures satisfactory
   Yes ☐ No ☐
8. Where you involved in deciding the treatment plan
   Yes ☐ No ☐
9. Did the health care person listen to you
   Yes ☐ No ☐
10. Did the Dentist deliver the oral health instructions.
    Yes ☐ No ☐

FIGURE 1: Patient satisfaction questionnaire

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Souparna Madhavan , Haifa B, Lavanya Varma

Acquisition, analysis, or interpretation of data: Souparna Madhavan , Haifa B, Lavanya Varma

Drafting of the manuscript: Souparna Madhavan , Haifa B, Lavanya Varma

Critical review of the manuscript for important intellectual content: Souparna Madhavan , Haifa B, Lavanya Varma

Supervision: Souparna Madhavan , Lavanya Varma

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Srinivas University Ethics Committee issued approval SUEC 2020/009. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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