

Post Operative Pain During and After Root Canal Treatment in a Government Hospital Setting in Nepal

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ABSTRACT

Background: Postoperative pain is a most common symptom of endodontic patients after root canal treatments (RCTs). The aim of this study was to evaluate Postoperative pain during and after root canal treatment (RCT) among patients at a government hospital of Nepal.

Methods: Maxillary and mandibular teeth with necrotic pulp or irreversibly inflamed pulp, with or without preoperative pain, were included in this study. Subject's age and gender, as well as pulp status and preoperative pain status, were recorded. Root canal treatment was done using a standard protocol. Visual analog scale (VAS) and facial rating scale were used to record the level of pain felt.

Results: A total of 400 patients were enrolled in the study. The VAS score for pain decreased from 6(4-8) recorded before RCT, to 0 (0-4) during and 0 (0-0) after RCT and the difference was statistically significant ($P < 0.001$). Similarly, in Facial rating scale, the scores decreased significantly from 2(2-5) before RCT to 0(0-0) during and 0(0-0) after RCT ($P < 0.001$). There was significant difference in facial rating scores during root canal treatment between males and females ($P = 0.014$).

Conclusions: Postoperative pain significantly decreases after the initiation of root canal treatment. No significant difference was found in VAS score between male and female whereas significant difference was found in facial rating scores during root canal treatment between males and females. These findings of facial rating score emphasize that biological and psychosocial factors make females more susceptible to experiencing pain.

Keywords: Facial rating scale; necrotic pulp; post-operative pain; RCT; visual analog score.

INTRODUCTION

Root canal procedures are believed to be the most painful dental treatment. Several studies have shown that root canal treatment (RCT) induces more frequent and severe postoperative pain than do other dental operative procedures.^{1,2} According to the literature, reported frequencies of PEP after root canal treatment range from 1.5 to 53%.³

Adequate knowledge of pain prevalence associated with pulpal or periradicular disease guides dentists to provide more evidence-based advice to patients.⁴ When patients are informed about expected post-endodontic pain (PEP), confidence of the patient towards their dentists increases and improves their attitude toward

future dental treatment.^{5,6}

Furthermore, data on expected pain could be used to reassure patients during treatment and healing.³ However, the present literature containing data on endodontic pain using both Visual analog score (VAS) and facial rating score is rather disparate. No such studies have been conducted in Nepal so far. So, this study aims to evaluate Postoperative pain during and after root canal treatment in the department of dentistry at Pokhara Academy of Health Sciences.

METHODS

This is a prospective Observational study conducted in the Department of Dentistry at Pokhara Academy of

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Health Sciences among patients undergoing RCT from December 2024 to June 2025 AD. Convenience sampling was done in the present study. The ethical clearance to conduct this study was obtained from Institutional Review Committee of Pokhara Academy of Health Sciences on 20th December 2024 AD (Ref No:62/081). A total of 400 patients aged 18 years or above undergoing root canal treatment were recruited from Pokhara Academy of Health Sciences. Informed consent (verbal consent) was obtained from patients before enrollment in the study. Maxillary and mandibular teeth with necrotic pulp or irreversibly inflamed pulp, with or without preoperative pain were included in this study. Others were the teeth with closed apices, no apical radiolucency, non-responsive to electric pulp test (EPT) and necrotic teeth with no bleeding during access opening were also included in the study. Also, teeth that neither responded positively to electric pulp test (EPT) nor bleed when opened were included.

Patients under 18 years of age, with history of systematic diseases and those under antibiotics in last one month or analgesics in last 24 hours, teeth with vertical or horizontal fracture, periodontally compromised teeth, teeth with internal and external resorption, teeth with open apex were excluded from the study. The sample size of the present study was 400.

Age and gender of subjects were recorded. A periapical X-ray was used to assess the periapical status of teeth. Patients were prepared in the usual manner. Local anesthesia with 2% lidocaine hydrochloride and 1:100,000 adrenaline (LIDO-A, India) was administered. After local anesthesia, isolation of teeth was done with rubber dam application. Caries removal and access cavity preparation was performed with round diamond burs under constant water cooling. Working lengths were measured with stainless steel K files (Dentsply, Maillefer, Tulsa, OK, USA) using an electronic apex locator (NSK, IPEX II, Japan) and a glide path was established using stainless steel K files. Teeth were biomechanically prepared with rotary files (4 % Orodeka, China) and obturated with resin based root canal sealer (Adseal, Metabiomed. CO. LTD, Korea). The access cavity was restored with a light-cured dental composite (Meta Biomad, Germany). Patients were given visual analog scale (VAS) evaluation sheet on which they ranked the highest level of pain they experienced before root canal treatment, 24hrs after biomechanical preparation and 24hrs after the obturation of teeth. VAS is a horizontal line, 10 cm in length.⁷ Wong-Baker Faces Pain Rating Scale was also used.⁸ Wong-Baker Faces Pain Rating Scale is a pain scale that was developed by Donna

Wong and Connie Baker. The scale shows a series of faces ranging from a happy face at 0, or “no hurt”, to a crying face at 10, which represents “hurts like the worst pain imaginable”. Data were entered in MicroSoft excel sheet and analyzed in SPSS (IBM corp, Armonk, N.Y) for Windows, version 24 (IBM, Inc., Chicago, IL, USA) software. For descriptive statistics, mean, standard deviation, median, interquartile range, frequency and percentage were calculated depending upon the nature of data. Friedman test was used for comparison of VAS scores and Facial rating scores before, during and after root canal treatment. Wilcoxon signed rank test was performed for further pairwise comparison between groups. Mann-whitney U test was done to compare pain scores between males and females.

RESULTS

The mean age was 37.42 ±12.17 years. Among 400 participants, males were 186 (46.5%) and females were 214 (53.5%). In both the rating scales, pain was found significantly higher before RCT than during and after RCT ($P < 0.001$, $P < 0.001$, respectively) Table 1.

Additionally, multiple comparisons of VAS scores and Facial rating scores were done before, during and after root canal treatment which revealed that the difference in pain score was statistically significant among all the time periods (Before RCT vs During RCT, before RCT vs after RCT and During RCT vs After RCT ($p < 0.001$), Table 2).

VAS scores and Facial rating scores was compared among males and females. There was no significant difference in between males and females when rated through VAS scores in all three-time periods. However, significant difference in facial rating scores was observed during root canal treatment between males and females ($p = 0.014$, Table 3).

Pain scores were recorded before, during and after root canal treatment (Table 4). Recording through VAS scale, pain was present among 385 (96.3%) before RCT, 196 (49.0%) during RCT, and 26 (6.5%) after RCT. When observed through facial rating scale, pain was present among 365 (91.3%) before RCT, 98 (24.5%) during RCT and 18 (4.5%) after RCT.

Table 1. Comparison of VAS scores and Facial rating scores before, during and after root canal treatment (n=400).

Scale used	Time of evaluation	Mean (SD)	Median (IQR)	Mean rank	P value*
VAS score	Before RCT	5.80 (2.62)	6 (4-8)	2.82	<0.001
	During RCT	2.01 (2.51)	0 (0-4)	1.88	
	After RCT	0.20 (0.96)	0 (0-0)	1.31	
Facial rating scale	Before RCT	3.33 (2.07)	2 (2-5)	2.83	<0.001
	During RCT	0.72 (1.40)	0 (0-0)	1.73	
	After RCT	0.10 (0.45)	0 (0-0)	1.44	

*Friedman test

*P value < 0.05

Table 2. Multiple comparison of VAS scores and Facial rating scores before, during and after root canal treatment (n=400).

Scale used	Time of evaluation	Median (IQR)	P value*
VAS score	Before RCT	6 (4-8)	<0.001
	During RCT	0 (0-4)	
	Before RCT	6 (4-8)	<0.001
	After RCT	0 (0-0)	
	During RCT	0 (0-4)	<0.001
	After RCT	0 (0-0)	
Facial rating scores	Before RCT	2 (2-5)	<0.001
	During RCT	0 (0-0)	
	Before RCT	2 (2-5)	<0.001
	After RCT	0 (0-0)	
	During RCT	0 (0-0)	<0.001
	After RCT	0 (0-0)	

*Wilcoxon signed rank test

*P value < 0.05

Table 3. Prevalence of pain scores before, during and after root canal treatment among males and females (n=400).

Scale used	Time of evaluation	Males (186)		Females (214)		P value*
		Mean rank	Median (IQR)	Mean rank	Median (IQR)	
VAS score	Before RCT	194.10	6 (4-8)	206.07	6 (4-8)	0.298
	During RCT	193.86	0 (0-4)	206.27	1 (0-4)	0.250
	After RCT	202.67	0 (0-0)	198.61	0 (0-0)	0.412
Facial rating scale	Before RCT	191.30	2 (2-4)	208.50	2 (2-6)	0.118
	During RCT	188.98	0 (0-0)	210.51	0 (0-2)	0.014
	After RCT	201.14	0 (0-0)	199.94	0 (0-0)	0.774

*Mann-Whitney U test

*P value < 0.05

Table 4. Pain scores before, during and after root canal treatment (n=400).

Scale used	Time of evaluation	Pain present	Pain not present
VAS score	Before RCT	385 (96.3)	15 (3.8)
	During RCT	196 (49.0)	204 (51.0)
	After RCT	26 (6.5)	374 (93.5)
Facial rating scale	Before RCT	365 (91.3)	35 (8.8)
	During RCT	98 (24.5)	302 (75.5)
	After RCT	18 (4.5)	382 (95.5)

DISCUSSION

This study aimed to meticulously evaluate post-operative pain during and after root canal treatment (RCT) among patients in the Department of Dentistry at Pokhara Academy of Health Sciences. Our primary finding demonstrates a statistically significant reduction in pain experienced during and after RCT compared to the pretreatment phase, challenging the pervasive notion of RCT as an inherently agonizing procedure. This critical insight underscores the effectiveness of contemporary endodontic protocols in pain management and holds significant implications for patient education and public perception of dental care.

In the present study, the mean age of the study participants undergoing root canal treatment was 37.42 ± 12.17 years. Among 400 participants, males were 186 (46.5%) and females were 214 (53.5%). Visual analogue score and facial rating score were used in present study to evaluate endodontic pain. A Visual Analogue Scale (VAS) is one of the pain rating scales used for the first time in 1921 by Hayes and Patterson.⁷ VAS compare pain severity between patients with similar conditions. On the other hand, the Wong-Baker Faces Pain Rating Scale is a pain scale that was developed by Donna Wong and Connie Bake. This pain scale is especially appropriate for patients who do not know how to count, and those who may have impaired brain function.

VAS and Facial rating score before, during and after root canal treatment were compared. In both the rating scales, there was statistically highly significant difference in pain before RCT than during and after RCT ($P < 0.001$, $P < 0.001$, respectively). This confirms efficacy of root canal treatment in resolving pain. These results are in agreement with several studies that show significant reduction in pain from initial appointment.^{9,10} This may be due to proper cleaning, irrigation and obturation of root canals after initiation of root canal treatment.¹¹

VAS scores and Facial rating scores among males and

females were compared. No significant difference was found in VAS scores in between males and females when rated through VAS scores in all three-time periods (pre-operative, during treatment and after treatment). These results are in contrast with study¹² that show no differences in pain reduction between males and females for the tested analgesics taken immediately following initial endodontic therapy in teeth with irreversible pulpitis whereas other studies had pointed out differences in pain perceptions between men and women. Several Studies have found that women anticipate higher pain levels than men.^{13,14} However, significant difference in facial rating scores (FRS) was observed during root canal treatment between males and females ($p = 0.014$). Females have higher pain perceptions than males.¹⁵ This variation in scores may be attributed to the distinct nature of the two pain assessment tools. The VAS measures the subjective intensity of pain through self-reported numerical scale, whereas the FRS reflects observable facial expressions, which may be influenced by gender-related differences in emotional expressivity, coping strategies, or social conditioning. Previous literature suggests that females often exhibit more expressive responses to pain, even when the perceived intensity is comparable. Therefore, the difference in FRS but not in VAS may indicate a greater behavioural expression of discomfort rather than a true difference in pain perception. Further studies incorporating both self-report and behavioral measures are needed to clarify these finding our data, utilizing both the Visual Analogue Scale (VAS) and the Wong-Baker Faces Pain Rating Scale, consistently revealed a dramatic decrease in pain levels from pretreatment to both during and after RCT. Pretreatment pain was prevalent, reported by 96.3% (VAS) and 91.3% (facial rating scale) of participants, underscoring the severity of presenting symptoms his marked contrast ($P < 0.001$ for both scales) with the significantly lower pain reported during and after the procedure (e.g., mean VAS dropping from 5.80 to 2.01 during, and 0.20 after) is a cornerstone finding.

There are various limitations in the present study. Pain perception is highly subjective and may be influenced by individual pain threshold. Pain intensity ratings are based

on recall, which is subject to potential bias as a result of selective recall of past events. This is single center study. Further studies should include multicenter sample to enhance generalizability.

CONCLUSIONS

Post treatment root canal associated pain prevalence decreases after initiation of treatment. Pain is the most common reason for dental anxiety. Post-operative pain following root canal treatment is a common concern for patients and clinician. Dentists should be aware of the pain and efforts should be made to prevent or treat it. Patients should also be informed about the possibility of pain after endodontic treatment. Further research should be conducted to optimize pain control protocols and to improve post-operative experiences for patients.

CONFLICT OF INTEREST

Authors declare there are no any conflicts of Interest.

REFERENCES

- Levin L, Amit A, Ashkenazi M. Post-operative pain and use of analgesic agents following various dental procedures. *Am J Dent.* 2006 Aug;19(4):245-7. PMID: 16939032
- Ashkenazi M, Blumer S, Eli I. Post-operative pain and use of analgesic agents in children following intrasulcular anaesthesia and various operative procedures. *Br Dent J.* 2007 Mar ;202(5): E13. doi: <https://doi.org/10.1038/bdj.2007.81>
- Gotler M, Bar-Gil B, Ashkenazi M .Postoperative Pain after Root Canal Treatment: A Prospective Cohort Study. *Int J Dent.*2012 Mar ;2012. Doi: [10.1155/2012/310467](https://doi.org/10.1155/2012/310467)
- Niharika Jain , Abhishek Gupta , Meena N .An Insight Into Neurophysiology of Pulpal Pain: Facts and Hypotheses.*Korean J Pain* 2013 Oct ;26(4):347-55. doi:<https://doi.org/10.3344/kjp.2013.26.4.347>
- Van Wijk AJ, Hoogstraten J. Reducing fear of pain associated with endodontic therapy. *Int Endod J.* 2006 May;39(5):384-8. doi:<https://doi.org/10.1111/j.1365-2591.2006.01090.x>
- Van Wijk AJ, Duyx MP, Hoogstraten J. The effect of written information on pain experience during periodontal probing. *Journal of Clinical Periodontology.* 2004 Apr;31(4):273-81. doi: <https://doi.org/10.1111/j.1600-051x.2004.00480.x>
- Couper M, Tourangeau R, Conrad F. Evaluating the effectiveness of visual analog scales: A web experiment. *Soc Sci Comput Rev* 2006.May;24:227-45.doi: <https://doi.org/10.1177/0894439305281503>
- Emrah Akgun, Nalan Kozaci, Mustafa Avc . Measurement of the pain levels of patients with extremity traumas and assessment of the attitudes of emergency physicians to pain management.*Annals of Medical Research.* 2018 Dec;25(4)553-8. doi: <https://doi.org/10.5455/annalsmedres.2018.06.104>
- Sathorn C, Parashos P, Messer H. The prevalence of postoperative pain and flare-up in single- and multiple-visit endodontic treatment: a systematic review. *Int Endod J.* 2007 Oct 23;41(2):91-9. doi: [10.1111/j.1365-2591.2007.01316.x](https://doi.org/10.1111/j.1365-2591.2007.01316.x).
- Ali SG, Mulay S, Al Sadan AA, ALShehri MA, AlAteeq K, AlAnazi MW. Prevalence of and factors Affecting post-obturation pain following Single and Multiple visit root canal treatment in Indian population: A prospective, randomized clinical trial. *Contemp Clin Dent.* 2012 Oct;3(4):459-63. doi: [10.4103/0976-237X.107440](https://doi.org/10.4103/0976-237X.107440)
- Jaclyn G Pak, Shane N White. Pain prevalence and severity before, during, and after root canal treatment: a systematic review. *J Endod* 2011. Apr;37(4):429-38. doi: <https://doi.org/10.1016/j.joen.2010.12.016>
- Elzaki WM, Ziada HM, Abubakr NH, Ibrahim YE. Gender and arch effects on the use of non-opioid analgesics for post endodontic pain reduction.*Aus Endod Jour* .2017. Oct ; 44(3):215-24. doi: <https://doi.org/10.1111/aej.12218>
- Akgun E, Kozaci N, Avci M. Measurement of the pain levels of patients with extremity traumas and assessment of the attitudes of emergency physicians to pain management. *Ann.Med.Res.* 2018 Dec;25(4)553-8. doi: <https://doi.org/10.5455/annalsmedres.2018.06.104>
- Unruh AM, Ritchie J, Merskey H. Does gender affect appraisal of pain and pain coping strategies? *ClinJPain*1999;15: 31-40. doi: <https://doi.org/10.1097/00002508-199903000-00006>
- Fillingim RB, Maixner W, Kincaid S, Silva S. Sex differences on temporal summation but not sensory-discriminative processing of thermal pain. *Pain* 1998;75:121-27. doi: [https://doi.org/10.1016/S0304-3959\(97\)00214-5](https://doi.org/10.1016/S0304-3959(97)00214-5)