Incidence of Post Instrumentation Pain Following Endodontic Treatment Among Patients Attending College of Dentistry-Hawler Medical University.

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Background and objective: The background of this study revolves around endodontic treatment, which is a therapeutic approach involving the chemical and mechanical disinfection of root canals, followed by the establishment of a secure three-dimensional seal. The primary objective of this research is to investigate and understand the underlying factors that contribute to flare up experienced by patients undergoing endodontic treatment.

Method: A total of fifty-two patients were considered participants and were included for history taking, clinical examination, radiographic assessment, and data analysis after receiving Root Canal Treatment (RCT) for different types of teeth (incisors, canine, and premolar) by different students (operators) and different supervising seniors (trainers). During this time, the operator performed RCT on various patients, and the participants were followed up after they completed root canal obturation. Statistical analysis was done by SPSS program, chi square and fisher's exact test were used to determine the correlation between variables.

Result: The level of significance used in this research is ≤ (0.05), and the result is significant when (p≤0.05). The main findings were that the frequency and distribution of post instrumentation pain was (30.8%). According to our data we found out the highest incidence of flare up in HMU was related to pulp remnant and periapical pathosis.

Conclusion: There are several factors which are related to the prevalence of post obturation flare-up such as over instrumentation, pulp remnant, periapical condition, presence of patient medical history and perforation . According to these factors the dentist should be aware of the possibility of flare-up occurrence, however, it must be borne in mind that theories about these factors cannot be completely conclusive.

Keywords: Endodontic Treatment, Flare up, Postoperative pain.

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INTRODUCTION

Dentists consistently prioritize the preservation of natural teeth, and when faced with tooth disorders, endodontic therapy is commonly employed as a treatment modality. Endodontic treatment encompasses a chemo-mechanical approach that involves the disinfection of root canals, followed by three-dimensional hermetic obturation. Its purpose is to eliminate the causative agents of pulpal and peri-radicular diseases while promoting the recovery of peri-radicular tissues.[1] Despite the advancements in modern root canal procedures and the utilization of new rotary systems, the occurrence of inter-appointment flare up remains a significant challenge encountered by dentists. Flare-up is characterized by the onset of postoperative pain shortly after root canal therapeutic procedures, often accompanied by episodes of pain and/or swelling, necessitating prompt unscheduled treatment.

Reports indicate that the incidence of flare-up after endodontic treatment ranges from 1.4% to 16%, with some cases even reaching 50%.[1,2,3,4] Various factors, including the research protocol, criteria for pain and swelling evaluation, and the expertise of the dentist, contribute to this variation in rates.[5,6] The comparison of flare-up incidence among studies remains challenging due to the absence of a standardized benchmark and the existence of varying definitions as highlighted by Iqbal et al.[5,6] To effectively address the risk of flare-up, the implementation of preventive strategies is crucial. However, understanding the etiology of this distressing phenomenon is of paramount importance. Flare-up is widely recognized as a multifactorial occurrence associated with microbial, mechanical, chemical, host, and treatment-related factors, as well as endodontic Infection.[2,7] The objective of this study is to investigate the specific causes contributing to flare -up among patients undergoing endodontic treatment at the College of Dentistry-HMU.

MATERIALS AND METHODS

Study design. A cross-sectional study was carried out to investigate the incidence of postoperative pain after RCT, this study was carried out between October 2022 and January 2023 on patients attending teaching hospital of HMU/College of Dentistry in Erbil government, Kurdistan region, Iraq.

Sample size. Total number of (52) patients, of different age groups, and who underwent root canal treatment by different students (Operator) and different supervisors(Senior) for anterior teeth and premolars had been considered as participants and were included for evaluation and radiographic assessment and data analysis.

Data collection. The authors contacted employees in the conservative dentistry department to obtain endodontic case sheets and post-operative radiographs for data collection.The patients were asked to determine the presence of pain, the severity of pain if present (no visual or numeric pain scales were used, because the researchers were only in touch with patients by call and other information in case sheets such as age, gender, tooth number, date of Performing the RCT, oral hygiene of patients, and preoperative status of teeth like the degree of pain before root canal treatment were collected for data analysis. Researchers checked and examined previously taken PA digital radiographs by students, for under or over obturation, any missed canal, any periapical pathosis if present. Structured questionnaire was used to record data on (name, age, gender, contact number, date of RCT that was done, preoperative pain, postoperative pain and its severity and oral hygiene), and some other additional information and radiological appearance of the tooth to determine (Over-instrumentation, periapical statues, missed canal and procedural accident).

Inclusion and exclusion criteria. Inclusion criteria: Including maxillary or mandibular anterior teeth and premolars, patients with age above 12 years old, both genders, treated only by students of HMU-College of Dentistry.

Exclusion criteria: RCT for maxillary and mandibular molars, teeth that needed root canal retreatment patients that received treatment by general or specialized dentists, or received treatment outside of HMU-College of Dentistry were excluded from this study.

Ethical consideration. Several ethical considerations were diligently taken into account during the course of this study. The primary and foremost ethical consideration prioritized in this research is the utmost respect for the study participants. This is imperative as the participants, who are patients in this context, form the cornerstone for various ethical principles. In accordance with this ethical consideration, it is crucial to acknowledge and uphold the participants' fundamental rights as human beings, thereby deserving significant respect. Verbal consent was sought from the patients, and their autonomy was highly valued, whereby researchers respected their decisions if they declined to answer or provide consent. It is essential to recognize that participants are more than mere sources of necessary information; they are individuals deserving privacy, confidentiality, and anonymity. Hence, these ethical aspects were carefully considered throughout the research process.

RESULTS

Thirty-six cases (69.2%) had no flare up after treatment that was done for them in HMU/ College of Dentistry while 16 cases (30.8%) had flare up. (Table 1) shows the significance of flare up and according to the test that we did for our data we found out that the pulp remnant and periapical pathosis were the most significant one in which (<0.05) was statistically significant, While perforation had no relation and the over instrumentation also was significant.

At (Figure 1) it shows a summary for flare up that caused by over instrumentation and showing the over and optimal degree of over instrumentation among patients had flare up and patients that not.

At Figure 2 it show a summary for flare up due to perforation. At Figure 3 it show a summary for flare up due to pulp remnant. At Figure 4 it show a summary for flare up due to periapical pathosis.

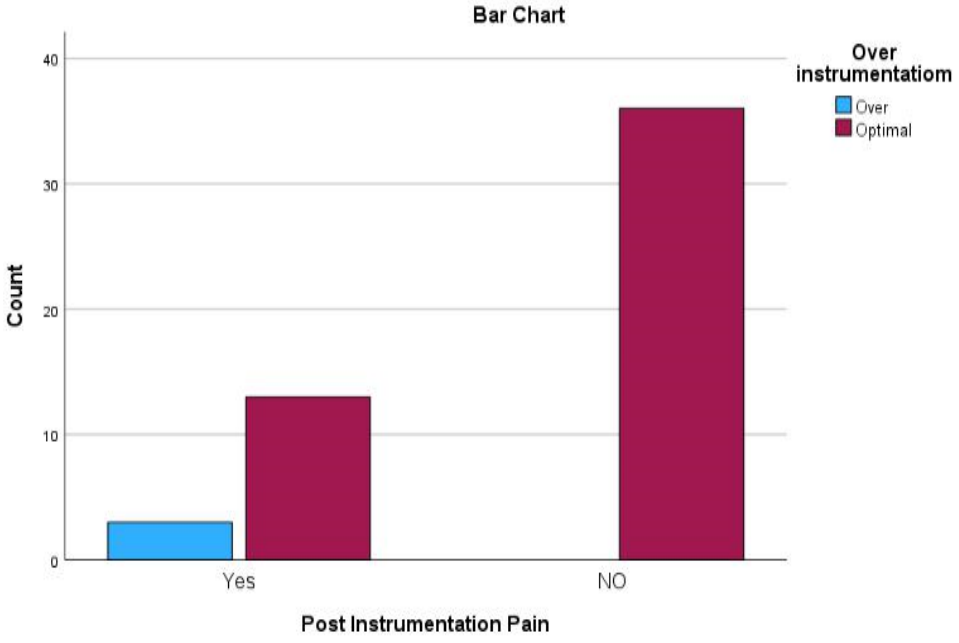

Figure 1. Showing flare up due to over instrumentation.

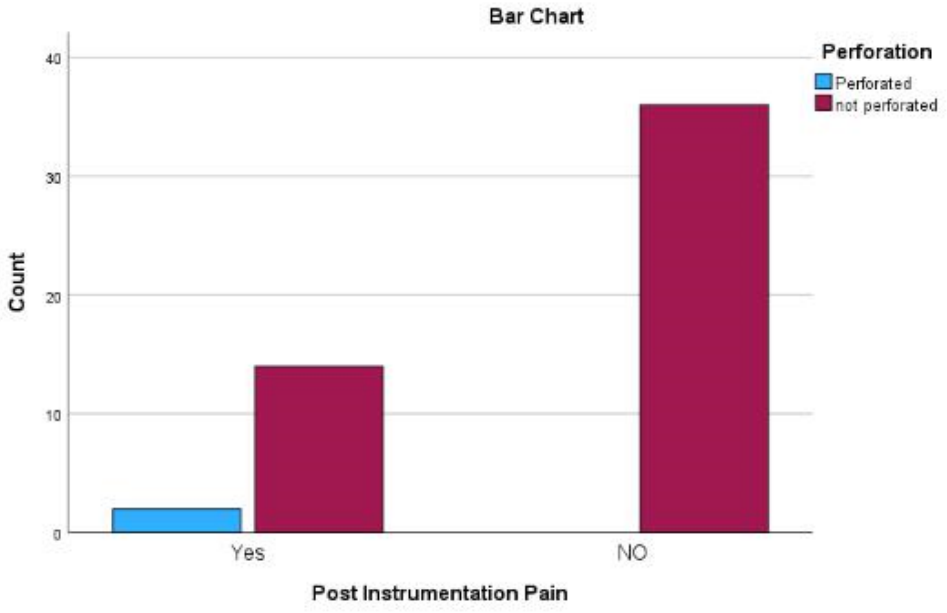

Figure 2: Showing flare up due to perforation.

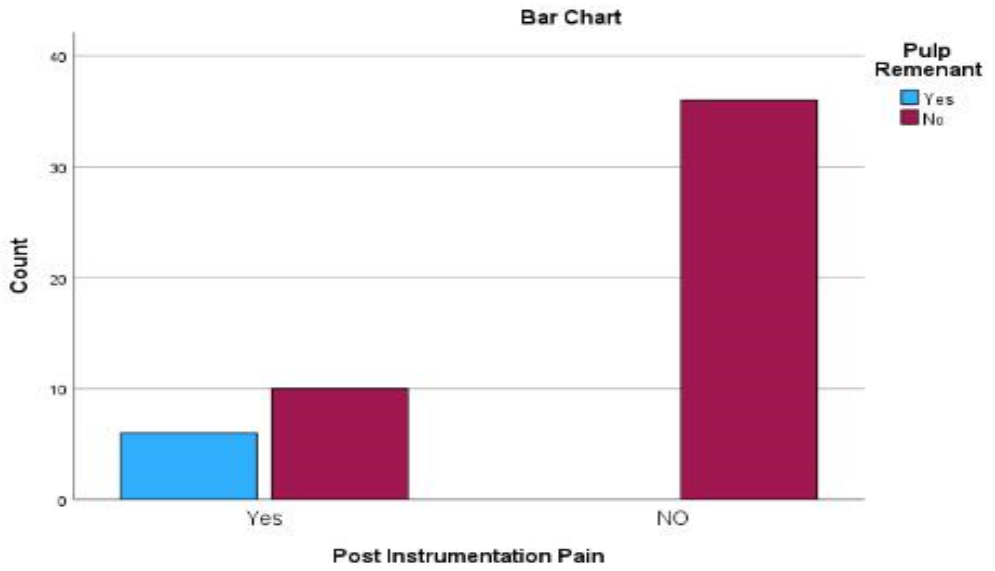

Figure 3: Showing flare up due to pulp remnant

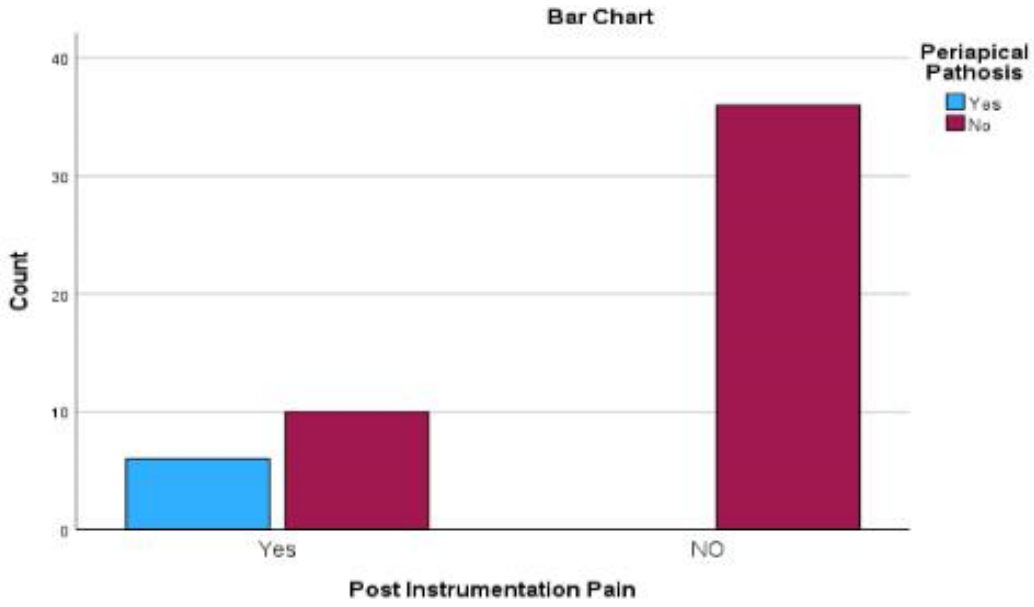

Figure 4: Showing flare up due to periapical pathosis

Table 1: Descriptive statistics done by fisher's exact test and chi square test of Postoperative flare up.

Causes of flare up	Case no. present	Case no. abscent	df	P value
Perforation	1	51	1	0.09
Over instrumentation	3	49	1	0.025
Pulp remnant	6	46	1	<0.001
Periapical Pathosis	6	46	1	<0.001

DISCUSSION

An endodontic flare-up is a complication of endodontic treatment which is defined as an acute exacerbation of asymptomatic pulpal or periapical pathosis after the initiation or continuation of root canal treatment. The flare-up is a true complication where, within a few hours to a few days, after the endodontic procedure a patient has a significant increase in pain or swelling or a combination of the two, where the patient must come in for an unscheduled visit, for emergency treatment. This study showed a low incidence of flare-up following endodontic treatment in HMU.

Flare-up is multifaceted, thus precisely identifying the components that can induce flare-up is critical.[8] The subjectivity involved in this judgment, as well as the inherent difficulty in quantifying pain, are two of the key impediments to an accurate evaluation of postoperative pain discovered in clinical trials conducted for this purpose. From the results of the present study, it was found that the severity of the patient's preoperative complaint and signs and symptoms has a direct association with the incidence of flare-up. Flare-up is more common in cases with a periapical lesion which had a higher risk of developing pain compared to those with no periapical involvement. This is consistent with studies carried out by other studies,[11]patients were evaluated based on a verbal report after the second visit, and patients who experienced pain were considered as a flare-up. The data collection method used in our clinic at HMU was verbal history taking and clinical evaluation. The research was conducted from 52 clinical cases all done in multiple visits within a period of one week, so to avoid confounding, the aim was to concentrate more on the factors such as over instrumentation, pulp remnant, periapical pathosis, perforation, age, and gender. Postoperative pain was found to be 30.8% of the cases in this study; the findings of this study are consistent with those of other previous studies that found that the incidence of pain after endodontic therapy has been reported to range from 1.9 percent to 58 percent in their studies.[9]In our study, we found out 23% of patients had flared up due to periapical pathosis and pulp remnant and 5.7% due to instrumentation, and 1.92% due to perforation. Furthermore, these investigations have shown that root canal therapy performed according to good biological principles and utilizing scientifically based techniques results in a low incidence of flare-up. Also according to the age in our study, we found 6 patients out of 21 patients had flare up at the age of (40 years old).

However, in some studies[10] no significant relationship was found between age and increasing pain that may result from the incidence of the flare-up due to a missed canal or the operator's poor skill during instrumentation as we found 11.5% out of 52 patients had pulp remnant. Incomplete cleaning and shaping may disrupt the microbial community's equilibrium by leaving some inhibited species behind, which can subsequently lead to association between the initial diagnosis and flare-up. One of the most common causes of postoperative pain is the apical ejection of infectious material into the periradicular tissues.[11] If the microorganisms are apically extruded during chemo-mechanical preparation, the host will be confronted with a greater number of irritants. Consequently, there will be a transient disruption in this balance, iatrogenic over - instrumentation causes the apical foramen to enlarge and may also cause perforation that results in a periapical lesion that potentially allows more exudate and blood into the root canal .[12] This will increase the availability of nutrients to the remaining bacteria in the root canal, which will then grow and exacerbate a chronic periradicular lesion, and results match with our collected results where 11.5% of cases were found to have Larger periapical lesions after endodontic treatment completed.[12] Exacerbations as a result of over-instrumentation are more likely to develop as a result of mechanical injury to the periradicular tissues (the greater the lesion, the higher the tissue damage), which is frequently accompanied by apical extrusion of a significant amount of infected debris. Forcing bacteria and their products into periradicular tissues can cause an acute inflammatory response, the strength of which is dependent on the number and/or virulence of the microorganisms. This could have a

role in increased pain perception following the initial session. Also, pulp remnants affect an essential part of the overall endodontic treatment. Several factors are related to the prevalence of post-obturation flare-up such as over instrumentation, pulp remnant, periapical condition, presence of patient medical history, and perforation and according to these factors the dentist should be aware of the possibility of flare-up occurrence, however, it must be borne in mind that theories about these factors cannot overgrow and, if these microorganisms are pathogenic, cause additional harm to the peri -radicular tissues, leading to flare-up.[13] According to the present study; a high percentage of patients used anti - inflammatory and that was linked with a reduced risk of flare-up; that's consistency with other studies, that found cases of discomfort disappeared as a result of anti-inflammatory y medication, it may be inferred that anti-inflammatory medications can readily control the majority of postoperative pain.[14]To lessen the risk of a flare-up, some patients are given an anti-inflammatory as a preventative measure. Multiple factors that have been found to affect postoperative pain were not taken into account in this research like using endo rotary and different types of intracanal filling materials. More research is required to identify other risk factors that can affect the occurrence of flare-up after beginning endodontic therapy, such as the patient's medical state, the involvement of bacteria, irrigants, and medicaments and techniques used during treatment.

CONCLUSION

The occurrence of mild pain and discomfort following endodontic treatment is common even when the treatment rendered is of the highest standard. The clinician has to explain it to the patient. Prompt and effective treatment of flare-up is an essential part of the overall endodontic treatment. There are several factors that are related to the prevalence of post-obturation flare-up such as over-instrumentation, pulp remnant, periapical condition, presence of patient medical history, and perforation and according to these factors the dentist should be aware of the possibility of flare-up occurrence, however, it must be borne in mind that theories about these factors cannot be completely conclusive. According to our data, we found out the highest incidence of flare -up in HMU was related to pulp remnant and periapical pathosis, so we need more skill from our operators (students) to reduce the incidence of flare-up.

Conflict of interests

The author reported no conflict of interests.

REFERENCES

1. Udoye, C., & Aguwa, E. Flare-up incidence and related factors in adults. Journal of Dental Research and Review 2010;2(2), 19-22.
2. Azim, A.A., Azim, K.A., Abbott, P.V.,. Afr J Tradit Complement Altern Med 2017; 14 (2): 206-216.
3. Ehrmann, H., Messer, G. The relationship of intracanal medicaments to postoperative pain in endodontics. Journal of Dental Reaseach and Review 2003;36(12):868-875.
4. Onay, M., Ungor, A. The evaluation of endodontic flare-up and their relationship to various risk factors. BMC Oral Health 2015;15, 142.
5. Iqbal and Kohli,. Incidence and factors related to flareups in a graduate endodontic programme. Int Endod J 2009; 42: 99-104.
6. M.Gotler, B. Bar-Gil,M Ashkenazi.Postoperative pain after root canal treatment: a prospective cohort study. Int J Dent 2012;12:310467.
7. Gondim, Frank C., Setzer, Carla Bertelli Dos Carmo, Syngcuk Kim. Postoperative pain after the application of two different irrigation devices in a prospective randomized clinical trial 2010; 36(8): 1295-1301.
8. Nair, M., Rahul, J., Devadathan, A. and Mathew, J.Incidence of Endodontic Flare up and Its Related Factors: A Retrospective Study. Journal of International Society of Preventive & Community Dentistry 2017;7(4), pp.175–179.
9. Abou El Nasr, H. and Gawdat, S. Debris Extrusion From Severely Curved Root Canals After Instrumentation With Waveone Gold Or Oneshape Single Files. Egyptian Dental Journal 2017; 63(4), pp.2887-2893.
10. Pai, V., Nair, S., Sindhu, S. and Nadig, R. Endodontic Flare Ups – An Overview 2022; Johcd.net.
11. Wittgow Jr, W.C. and Sabiston Jr, C.B. Microorganisms from pulpal chambers of intact teeth with necrotic pulps. Journal of

Endodontics 1975; 1(5): pp.168-171.
12. Chaves de paz v, Fusobacterium nucleatum in endodontic flare-up. Oral Surgary, Oral Medicine, Oral Pathology, Oral radiology and endodontics 2002; 93:83-179.
13. Mittal, R., Endodontic flare-up: An overview. J Oral Health Comm Dent 2010;4(3), pp.67- 71.
14. Torabinejad M, Kettering J, McGraw J, et al. Factors associated with endodontic interappointment emergencies of teeth with necrotic