

Prevalence and Risk Factors of Healing Endodontically Treated Teeth

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Abstract

This systematic review has described aims, objectives and research problems along with the research questions. However, methodology is presenting study design, PICO framework to address research questions. On the latter half of the systematic review eligibility criteria of selecting articles and keywords used for selecting articles have been presented. Data extraction process, selection of articles, and a variety of resources used are mentioned to complete the study.

Keywords: Calcium Hydroxide; Calcium Silicate; Ni-Ti Rotary System

Introduction

The teeth healing and cure process can be complex in a variety of ways, and it can cause trouble to the patient. However, research has come up with so much evidence to treat teeth issues in an effective manner. Rene and Raj (2016) have investigated the periapical healing of the teeth after root canal treatment. It is a fact that when a patient has dental caries, the changes do undergo in the periapical tissues. In this research, it is found that when the pulp is involved with the extensive bacterial invasion, then the hot response of the body comes with apical periodontitis. The need for a root canal is observed when removal of the pulp is done, or when there is non-vital pulp. This process is done because the root canal has to make microorganisms to make the healing process better and favorable. This research has found that when periapical healing is done after the root canal process is done; this process can take around 3 months up to 4 years. This time period will always be dependent on different control factors [9].

Another study was conducted in 2017, and the purpose of the research was to analyze the periapical and apexification healing process of immature teeth with the help of Mineral Trioxide Aggregate. When teeth root has the calcified barriers having an apical development, the method to induce the process is called apexification. For the experiment of this study, 7 to 12 years old children were selected for the study, and 14 permanent immature were used for the apexification. Different months' intervals were used to monitor the teeth of children with the help of radiographical and examination evaluation regarding the root development, as well as, periapical lesion healing. When the results of the study were compiled after 12 months, it was found that the teeth had shown asymptomatic symptoms. But the great thing about this result was that 100% results were obtained in all cases. So, it was concluded that both radiographical and clinical processes of Mineral trioxide showed a great level of success [1].

The comparative evaluation was done in another regarding the Periapical Healing to see the response of Calcium Hydroxide and Calcium Silicate. It is a fact that when root canal therapy is done, the periapical healing is affected by the root canal obturation effect due to the apical limit. The primary aim of this study was to do the comparison and evaluation of the periapical healing, looking at its response to the calcium-hydroxide (Apexit) and calcium-silicate based-sealers. 6 dogs were selected for this particular study to review the 72 upper premolars of the root canal. Four groups were made to assign teeth to these groups. The interval of 1 to 3 months was used to monitor and evaluate the progress of the teeth. When results were prepared after collecting and analyzing the data, it was found that four groups have not shown any substantial difference with regards to the mean percentage associated with the periapical inflammatory infiltrates, as well as the scoring of mineralization. So, it was proved that periapical tissues' healing was promoted with the use of Apexit and iRoot SP [13].

Magdy, Kamel and Rokaya (2021) conducted recent research to evaluate the periapical healing along with the post-operative pain Endodontic Treatment is done with the help of the Rotary Ni-Ti System. The study was concerned with the single or two visits made by the patient for endodontic treatment. The used method of treatment in this regard is the "TF Adaptive" Ni-Ti rotary system. The study selected 20 patients with the need for endodontic treatment. 2 groups were made by the selected participants of the study, and selection of these groups was made on the basis of visits made to the clinic. Different interval of hours was used for obturation, and different months' intervals were used for the periapical healing. So, when results were prepared, the study showed that there was no substantial difference in the 2 groups in terms of periapical healing of postoperative pain. So, it can be said that regardless of the single or 2 visits, the results remain the same for patients [6].

One more research study was published in 2017 investigating the factors associated with the periapical healing for teeth that are treated endodontically. It is an established fact through a lot of evidence that teeth tissue functions and integrity are helped by the process of tissue repair, however, it is obvious to face different conditions and factors during this process. The primary purpose of this research was to have a look at the therapeutic factors that are linked with the clinical protocol. It is imperative to mention here that this analysis is made during the treatment of root canal so that certain systematic conditions can be highlighted which are linked with the periapical healing process during the activity of endodontically treated teeth. After collecting and analyzing data, it was found that there are various factors to make an impact on the success ratio of the treatment of root canal, and one critical factor is the clinical protocols. The other critical factor in this regard was the systematic conditions such as patients having hypertension, as well as, diabetes mellitus. The wound healing can be inhabited by them. Moreover, if clinical protocols are not properly followed then issues can happen, and sanitization happens to be the most critical clinical process to follow. The research also found a few challenges during the process of healing such as pulp inflammation control or the infectious processes, etc. So, it is imperative to keep general as well as local clinical conditions in the context [4].

It is also critical for researchers to have a look at the periapical healing for patients having different other health conditions that can make an effect on the process of endodontic treatment. A study conducted in 2016 tried to cover this area of research by reviewing the periapical healing outcomes for patients having type 2 diabetes mellitus. It has been observed in earlier researches that diabetes mellitus is found in patients; they tend to have a higher ratio of apical periodontitis. So, it is a proven fact that other health conditions such as diabetes mellitus can have their own effects on the healing process of patients. For this particular study, 80 patients were selected who were dealing with the periapical disease. The entire selected sample population was divided into 2 groups. After conducting the experiment and evaluating the data, when results were prepared, it was evidently found that patients with type 2 diabetes were dealing with exacerbating and chronic lesions. It was also found that when patients did have poor control on their diabetes, then the success rate was lower than the other group, without any type-2 diabetes. So, it was hence proved that patients having diabetes will have a slow rate of healing and they will have even failure with regards to periapical lesions [10].

One of the pilot studies was conducted in 2016 to see the non-obturation endodontic treatment on the basis of the regeneration concept. The main part of this pilot study was the SealBio, which is said to be a non-surgical, as well as, innovative kind of endodontic treatment protocol that tends to use the regeneration concept. The purpose of this particular protocol is to deal with the teeth with periapical and pulp factors. So, eighteen patients were chosen for this study; who were having periapical and pulp disease. Every 6 months, the follow-up of the patients was taken properly to note down the changes and progress. After 6 months, the evaluation of the post-treatment CBCT was also done. After collecting the data from these eighteen patients, when results were compiled, the study proved that the novel treatment protocol of SealBio proved useful in terms of providing resolution to the periapical infection of the patients both radiographically and clinically. So, it was concluded that such kinds of protocols can be great highlighting the importance of shaping and cleaning [12].

Another study conducted in 2018 came up with an analysis of the Radiographic characteristics linked with the periapical healing at the time of post endodontic treatment. It is a fact to keep in mind in the context of this study that root canal treatment's radiographic control can be helpful in doing the evaluating the periapical lesions of the patients. The method selected for this study was based on the study design that was longitudinal, descriptive, and observational. For this study, the number of university student patients was 395. These selected participants have gone through the process of endodontic treatment 1 year ago. After the proper analysis of collected data, the results of the study showed that endodontic treatment tends to be higher when the frequency is measured before periapical healing. If any treatments got failed, it happened because there was a lack of control with regards to coronal restoration [5].

This chapter is aiming to analyze risk factors associated with the healing process of endodontically treated teeth among patients with different health conditions. In this regard aims and objectives of the study have been presented. Research problems and research questions are mentioned as well to solve the problem statement. Along with this, this study has evaluated the different kinds of obturation methods to improve the health condition of the patients.

Aim of the Study

The aim of this study is to analyze prevalence and risk factors of healing endodontically treated teeth in different health conditions.

Objectives of the Study

- To find out risk factors associated with the periodical healing endodontically treated teeth.
- To evaluate the periodical and specification healing process of immature teeth with the help of Mineral Trioxide Aggregate.
- To find out teeth healing and cure processes that can create complexity or trouble to patients.
- To evaluate the periodical healing along with the post-operative pain endodontic treatment.
- To evaluate principle healing for patients in different health conditions and makes effect on the process of endodontic treatment.

Research problem

Area of concern of this research is the risk factors associated with the principle of healing endodontically treated teeth. It is found that endodontically treated teeth (ETT) tend to exhibit greater level of brittleness and are more prone to fractures as compared to non-EET [3]. In this regard this research is aiming to evaluate the principle and specification healing process of immature teeth with the help of the

Mineral Trioxide Aggregate method (Olcay, Ataoglu and Belli, 2018). More to the context, problem related to the root canal and affected the overall wellness of the patients significantly [7].

Research questions

- Q1. What is the prevalence, periapical and apexification healing processes of immature teeth with the help of Mineral Trioxide Aggregate?
- Q2. What are the principal healing effects for patients in post-operative pain reduction in different health conditions and make an effect on the process of endodontic treatment?
- Q3. What are risk factors associated with the periapical healing endodontically treated teeth?

Methodology

Study design

This literature review will be presented the risk factors associated with the patients have endodontically treated teeth. The review was done in accordance with the guidelines of PRISMA (Preferred Reporting Items for Systematic Review and Meta-analysis). A complete review of all the articles is to be carried out using databases like: SCOPUS, PUBMED, EMBASE and WEB OF SCIENCE. The MESH terms (General controlled vocabulary) and keywords to be used were selected.

PICO framework for framing the research questions.

Population	Population who have received endodontic treatments and in the healing phase
Intervention	Mineral Trioxide Aggregation, Rotary Ni-Ti system, TF adaptive, analysis of radiographic characteristics linked with the principle healing process.
Comparisons	Root canal treatment, endodontic surgery, dental implants.
Outcomes	Primary outcome: Entire procedure will help to treat endodontic issues in patients. Along with that risk caused by lack of control in the treatment will also be evaluated. Secondary outcome: More to the context this research will help to find out principle healing factors that are impacting post-operative pain in patients with different health conditions.

Variety of resources used for this research: It is needed to mention that complete review of articles is carried out with the use of digital databases including, Google scholar, Pub med, Science direct, Scopus and Embase.

Eligibility criteria for this study: Articles related to the research problem presenting risk factors associated with the endodontically treated teeth. Peer review articles and related contents will be selected to evaluate risk factors associated with the healing process of immature teeth.

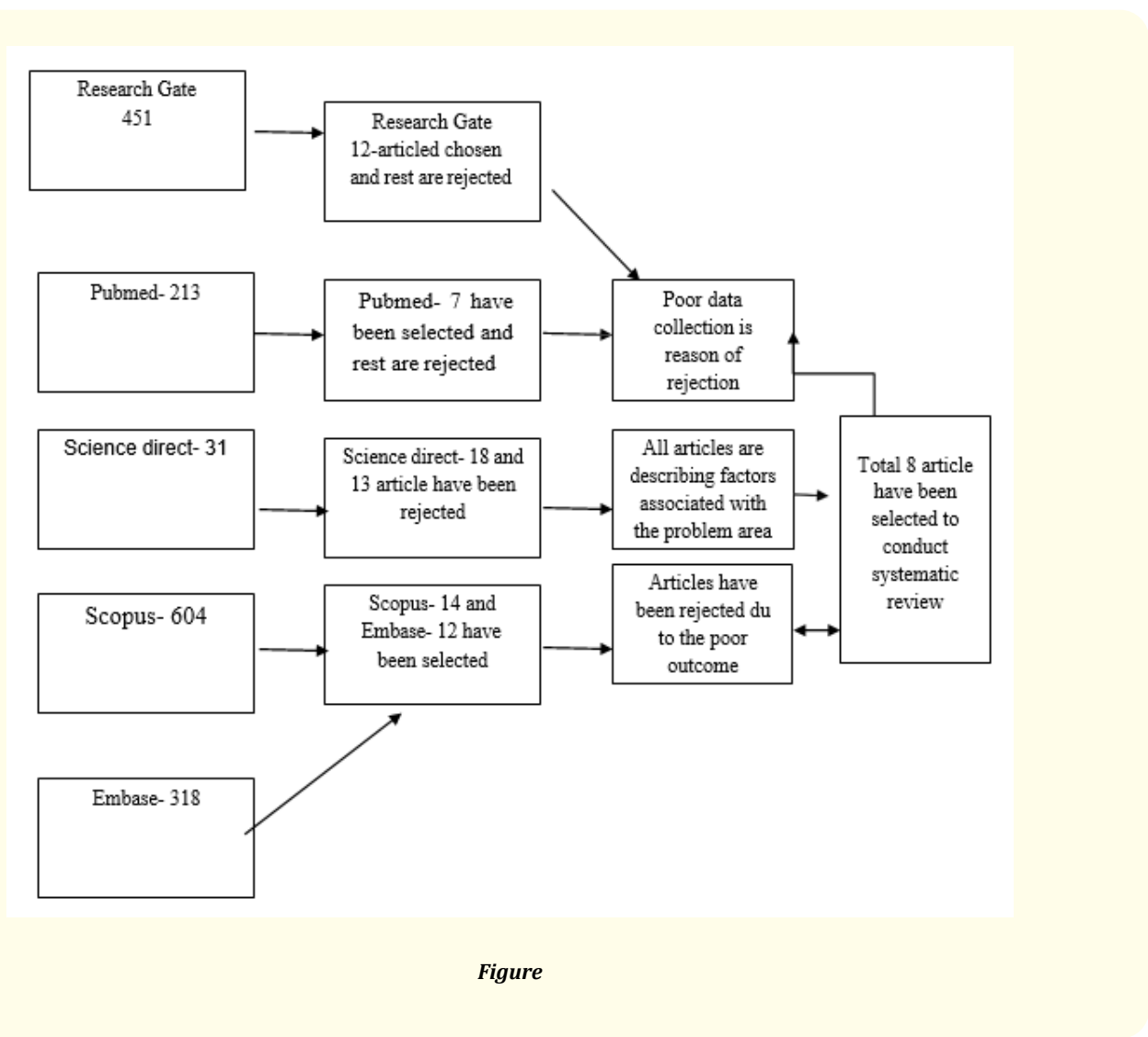
Inclusion and exclusion criteria: Studies were excluded which have a user root canal treatment process and endodontic surgery for the treatment. On the other hand, any consensual between authors has been resolved by using eligibility criteria (Sabeti., *et al.* 2018). All the references and selected articles have been reviewed manually which were acquired from an electronic database [11].

Keywords used for searching articles: Apexification and Periapical Healing, Factors affecting AND/OR Periapical Healing, Radiographic characteristics in the periapical healing post endodontic treatment, Evaluation of Postoperative Pain and Periapical Healing, Periapical Healing after root canal treatment, Periapical Healing in Response to a Calcium Silicate and Calcium Hydroxide Based Endodontic Sealers.

Extraction of data

Main findings of articles are helping to find out factors affecting endodontic treatment in patients with different health conditions. Critical reviews of authors have been considered to find out principal healing for patients in different health conditions and makes effect on the process of endodontic treatment [8]. All articles contain the name of authors, year of publication, type of the study and key findings along with the hazardous effects [8].

Selection of articles



Figure

Types of interventions and participants

Participants of those selected articles are from a variety of age groups who have issues related to endodontic treatments. Research of one of the selected articles conducted on children who are in the age group of the 7 to 12. On the other hand, it is also noted that 6 dogs have been selected to conduct the study and to review 72 upper premolars of the root canal. However, another study has selected 20 patients who have received endodontic treatments having 2 types of diabetes mellitus (Carvalho, *et al.* 2018). On the other hand, another study has selected 80 patients who were dealing with periapical diseases [2].

Conclusion

At the end of the systematic review it can be concluded that introduction to research problems have been presented which is helping to evaluate factors affecting endodontic treatments in patients with different health conditions. Research questions, aims and objectives have been mentioned which are addressing the issues and risk factors associated with the endodontic treatments. Types of interventions and types of participants are mentioned in the methodology section. Article selection criteria, inclusion and exclusion methods are presented as well to design the research methodology.

Therefore, it can be said that after successful completion of the study it will help to find out factors affecting endodontic treatments in patients. Along with that it is being expected that this study can help to evaluate principal healing for patients in different health conditions and make effect on the process of endodontic treatment.

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