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Systematic Review of the Prognosis of Root Canal Therapy in Endodontics Patients

Mahmoud Abbas Eskndrani[1*], Majd Abbas Eskndrani[2]

[1]General Dentist, MOH, (Madinah Al-Munawwarah), KSA
[2]Dentist Inern, KAUFD, Jeddah, KSA

ABSTRACT

Objective: A growing number of researches on root canal therapy in endodontics patients have been undertaken; nevertheless, there is no clear consensus on the prognosis among those patients. The goal of this systematic review was to consolidate current data on the prognostic factors of root canal therapy in endodontics patients.

Methods: Authors began by recognizing the important examination proof that spots light on the prognostic factors of root canal therapy in endodontics patients. We led electronic writing look in the accompanying data sets: Ovid Medline (2011 to present), Ovid Medline Daily Update, Ovid Medline in-process, and other non-filed references, Ovid Embase (2011 to present), The Cochrane Library (latest issue), and Web of Science. Just examinations in the English language will be incorporated. The precise selection was acted in close collaboration with a clinical examination curator.

Results: The study included 11 research published between 2011 and 2022 that met the inclusion criteria: one was randomized trials, seven were retrospective cohort studies, and 3 were cross-sectional studies. The reported mean success rates ranged from 31% to 96% when rigorous criteria were used, or from 60% to 100% when flexible criteria were used, with significant variation in the estimates of pooled success rates. Aside from the radiographic success criterion, none of the other research features could account for this variation. In the papers examined, twenty-four parameters (patient and operational) were investigated in various combinations. The effect of preoperative pulpal and periapical state of the tooth on treatment results has received the greatest attention, although the influence of the treatment approach has received less attention.

Conclusion: When rigorous criteria were employed, the estimated weighted pooled success rates of treatments completed at least one year previous to evaluation were between 68 and 85 percent. Over the previous four (or five) decades, stated success rates have not increased. The quality of data for treatment parameters influencing primary root canal treatment results is poor; research designs varied significantly. It would be preferable to standardize features of research design, data recording, and outcome data presentation format in much-needed future outcome studies.

Key words: Root Canal therapy, Endodontics

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Corresponding author: Mahmoud Abbas Eskndrani

e-mail✉: Mahmoudeskk@gmail.com

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INTRODUCTION

Numerous result concentrates on nonsurgical root waterway treatment (NSRCT) have been directed in everyone, with various results. This distinction is impacted by an assortment of elements, including the result observed, the exploration configuration, follow-up time, and administrator skill and experience. NSRCT has a triumph rate going from 75 to 85 percent, contingent upon the severity of the models used [1]. The extent of mended teeth differs from 73 to 97 percent, while the level of working teeth goes from 88 to 97 percent [2].

Not many examinations have investigated endodontic contribution and NSRCT in kids' super durable teeth. A survey of all-encompassing radiographs and diagrams of 6-to 12-year-olds in a Turkish populace uncovered that 0.47 percent of long-lasting first molars were endodontically treated, though 4% required NSRCT

[3]. 4.28 percent of super durable first molars in 13- to 16-year-olds were endodontically treated, and 6.09 percent required NSRCT [3]. One more review saw patient outlines in a Saudi populace and found that 35.8 percent of long-lasting teeth in kids matured 6 to 18 were pulp ally involved [4].

There has been a surge in interest in developing clinical recommendations for optimum illness therapy based on well-conceived and implemented research. The randomized controlled trial (RCT) is ostensibly the gold standard for guiding clinical practice; nevertheless, neither medical nor dentistry treatment has been typically adequately supported by such data. As a result, there is a need to synthesize an objective overarching view based on existing facts. Depending on the quality and quantity of the data, systematic reviews can be of several types: traditional reviews; meta-analysis leading to an estimate of effect size; best evidence synthesis; and the hypothetico-deductive approach, in which the effort is directed at evaluating the evidence for and against a given theory, rather than simply averaging often incompatible data.

Writes about the NSRCT bringing about this more youthful populace's long-lasting teeth are scant [5]. With a mean age of 12-16 years at treatment time, the specialized nature of NSRCT was just magnificent in 42-61 percent of patients [6-8]. Endodontically treated teeth (ETT) radiographs uncovered practical periapical tissue in 48-75% of the teeth [6,8]. Moreover, after clinical and radiographic assessments, successful NSRCT was accounted for in 36-86% of teeth in 8-20-year-olds [5,9]. The huge disparity in the results of the earlier exploration may be owing to changes in plan and the standards used to evaluate the result. The objective of this study was to take a gander at the achievement paces of NSRCTs performed on long-lasting teeth. Information was acquired from research distributed somewhere in the range of 2011 and 2022 [10]. ETT disappointment indicators were likewise assessed. The invalid speculation expressed that age, orientation, protection type, tooth type, and jaw type have no impact on treatment results (endurance).

METHODS

Review question

This review seeks to evaluate and point out the prognostic factors of root canal therapy in endodontics patients. The specific review questions to be addressed are:

What are the prognostic factors of root canal therapy among endodontics patients?

What is the influence of some study characteristics on the estimated pooled success rate?

Searches

We began with recognizing the important examination proof that spots light on the prognostic factors of root canal therapy in endodontics patients. We led electronic writing look in the accompanying data sets: Ovid Medline (2011 to present), Ovid Medline Daily Update, Ovid Medline in-process, and other non-filed references, Ovid Embase (2011 to present), The Cochrane Library (latest issue), and Web of Science. Just examinations in the English language will be incorporated. The precise selection was acted in close collaboration with a clinical examination curator.

Also, the bibliographies of any qualified articles recognized were checked for extra references and reference looks were done for all included references utilizing ISI Web of Knowledge.

We considered "published" articles to be compositions that showed up in peer-reviewed journals. Articles present in grey literature were excluded from our review.

Types of studies to be included

We included articles covering how to coordinate different review plans in an orderly review of prognostic factors of root canal therapy in endodontics patients. We did exclude articles only depicting the prognostic factors of root canal therapy in endodontics patients.

We concentrated on the prognostic factors of root canal therapy in endodontics patients. We included articles depicting sample sizes and articles that planned to sum up their outcomes to the populace which the test was drawn from. Case series and case reports were excluded from our search. Studies from all areas all over the world were incorporated with a focus on studies from the Kingdom of Saudi Arabia.

Participants

The systematic review included examinations with tests of the general population who had a root canal therapy for endodontics.

Searching keywords

For every data set, looking through was led by utilizing a mix of the accompanying keywords: (root canal therapy OR endodontic OR dentistry OR prognosis OR Kingdom of Saudi Arabia OR systematic review).

We included examinations enrolling members in everyone as well as clinical settings. Studies were incorporated assuming they revealed prognostic factors of root canal therapy in endodontics patients. No comparator or control test size is required in the review to be incorporated.

Studies selection process

All list items were brought into an EndNote record. Two analysts evaluated titles and abstracts for their likely pertinence.

One reviewer freely screened titles and abstracts from the search and any articles that report prognostic factors of root canal therapy in endodontics patients. We gained the full text of articles that possibly meet the eligibility criteria.

There was no geographical limit on the included studies. Just published articles in the English language will be incorporated.

Outcomes

Primary outcome

To determine the prognostic factors of root canal therapy in endodontics patients.

Secondary outcome

To estimate the influence of study characteristics on success rates.

Information extraction, (choice and coding)

Information was extracted from the included articles utilizing an electronic information extraction structure on Microsoft Access programming. Two reviewers freely extracted information, utilizing a standard information extraction structure that was created by the survey creators with the end goal of the review. The extraction structure incorporated the accompanying data:

Publication subtleties: title, authors, journal name and year and city, of distribution, the country in which the review was led, sort of distribution, and wellspring of financing.

Study subtleties: concentrate on the plan (cross-sectional, cohort, case-control), settings (clinical or population-based), concentrate on transience (planned or review), patients' enlistment techniques (successive or non-continuous), the geographical area, year of information assortment and reaction rate, qualification (consideration and avoidance rules), name of appraisal tool(s), approval of evaluation tool(s). Study members' subtleties: number of people reviewed/examined, population qualities including mean age (SD), gender distribution, relationship status, and demographic data.

Data management

Descriptive statistics are employed and relevant data are extracted from eligible studies and presented in tables (Tables 1 and 2). We then presented a narrative synthesis of the summary of the prognostic factors of root canal therapy in endodontics patients.

RESULTS

A total of 493 studies were identified in the search, all of them were assessed for eligibility, and 34 articles were included in this review (Figure 1). Of the 34 articles, all of them were published journal articles. Studies that were published in peer-reviewed journals were eligible for screening. However, 44 studies were excluded at the beginning of screening because they were published

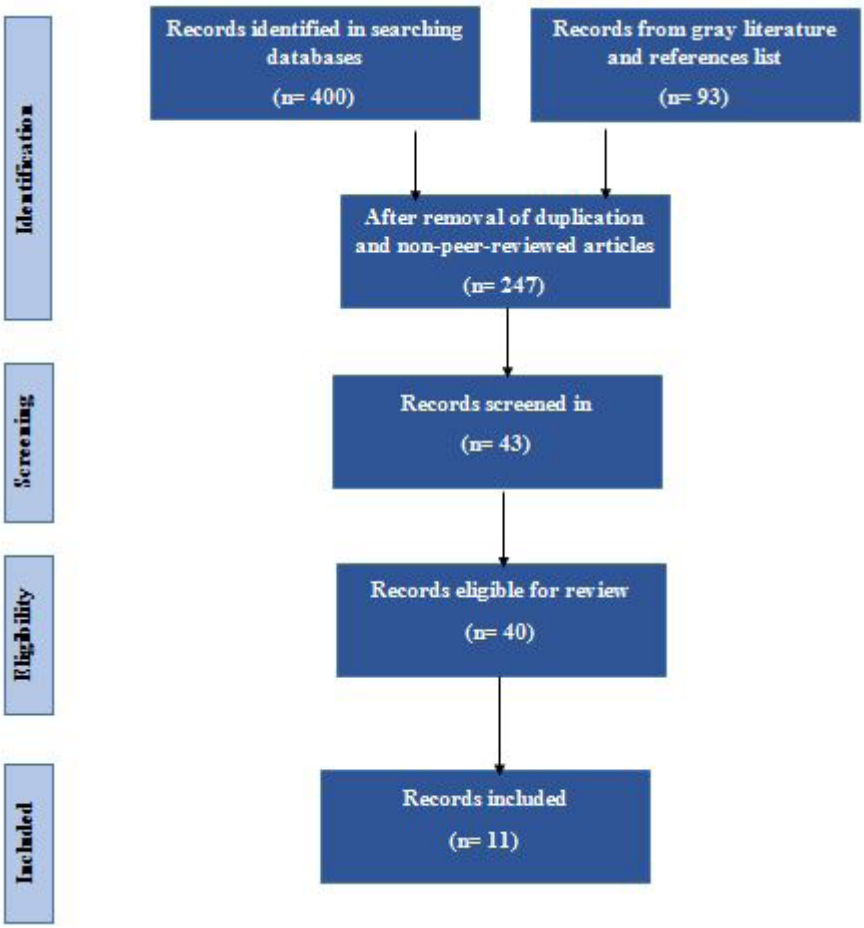

Figure 1: Flow chart of the selection process.

Table 1: Study characteristics.

Author (Year)	Location	Study design	Recall rate (28%)	Follow up after treatment	Unit of measure	Sample size	Assessment of success	Radiographic criteria of success	Statistical analysis
Khan, et al. [11]	KSA	Retrospective cohort	28	Yes	Teeth	155	C&R	L	Chi square
Mustafa, et al. [12]	KSA	Cross sectional design	22	Yes	Teeth	250	C&R	L	Anova
Haug, et al. [13]	Switzerland	Retrospective cohort	68	Yes	Root	257	Ra	S	Chi square
Abdulrab, et al. [14]	KSA	Cross sectional design	44	No	Teeth	469	Ra	L	Chi square
Ghargav, et al. [15]	India	Cross sectional design	30	No	Teeth	100	C&R	S	Chi square
Al-Anesi, et al. [16]	Yemen	RCT	74	Yes	Root	331	C&R	S	Chi square
Alranhabi, et al. [17]	KSA	Retrospective cohort	60	Yes	Root	259	Ra	L	Chi square
Jungnickel, et al. [18]	Denmark	Retrospective cohort	27	No	Teeth	80	C&R	L	Chi square
de Silva, et al. [19]	Brazil	Retrospective cohort	11	Yes	Root	511	C&R	L	Chi square
Hendi, et al. [20]	Iran	Retrospective cohort	23	Yes	Root	432	Ra	S	RID
Elemam, et al. [21]	Libya	Retrospective cohort	45	Yes	Root	128	Ra	S	Chi square

C&R: Clinical and Radiographic; Ra: Radiographic; L: Loose; S: Strict; RIDIT: Relative Incidence Distribution

Table 2: Clinical prognostic factors included in studies.

Author (Year)	Gender	Age	Health	Tooth type	Pulpal status	Periapical status	Lesion size	Rubber dam	Obstruction	Apical size	Irrigant	Medicament	Culture test	Visits of treatment
Khan, et al. [11]	√	√		√	√	√		√			√	√	√	√
Mustafa, et al. [12]	√	√			√	√	√	√			√	√	√	√
Haug, et al. [13]	√	√		√	√	√		√			√		√	√
Abdulrab, et al. [14]	√	√			√	√		√		√	√	√	√	√
Ghargav, et al. [15]	√	√	√		√	√		√	√		√	√	√	√
Al-Anesi, et al. [16]	√	√		√	√	√	√	√		√	√	√	√	√
Alranhabi, et al. [17]	√	√			√	√		√	√		√	√	√	√
Jungnickel, et al. [18]	√	√	√		√	√		√			√		√	√
de Silva, et al. [19]	√	√		√	√	√		√			√	√	√	√
Hendi, et al. [20]	√	√	√		√	√		√			√	√	√	√
Elemam, et al. [21]	√	√		√	√	√		√	√		√	√	√	√

in a non-English language. There were 179 studies were addressing primary root canal therapy without addressing the prognostic factors among participants. Furthermore, 54 studies were published in journals not listed in the databases we searched. The rest of the studies were not included due to the absence of stratified analysis. Among the screened 43 studies, only 40 studies met the criteria to be included in this review. Finally, 11 studies were included that authors could extract all required data from abstracts or full texts.

Because the radiographic success criteria had previously been shown to have a significant effect on the pooled success rates, additional meta-regression analyses were performed, separately on success rates based on strict or loose criteria, to investigate which of the other study characteristics could be responsible for the statistical heterogeneity. None had a statistically significant influence on the reported success rates or could account for the variability (Table 3) in predicting the pooled success rate of primary root canal therapy (Figures 2 and Figure 3).

DISCUSSION

A few investigations have found joins between ETT endurance and age. As indicated by these examinations, the disappointment rate increments with patient age. As per Iqbal, the most seasoned age bunch (41-50 years) had the most disappointments while the most youthful age bunch (21-30 years) had the least [22]. The predominance of calcified waterways in the more established age bunch, as well as uncooperative lead, unfortunate dental cleanliness care, and a low proficiency rate, were demonstrated as potential clarifications. The previously mentioned concentrate clinically and radiographically assessed 90 patients matured 21-50 who visited the office for bombed ETT during a 6-month time frame. ETT was considerably more liable to find actual success in more youthful patients, as per Kwak, et al. [23].

This was credited to more youthful patients having a diminished gamble of vertical root break and requiring less supportive systems than more established patients. Kwak, et al. included patients of different ages, with the most youthful being members younger than 20 [23]. Lee

Table 3: Results of meta-regression analysis to account for the source of heterogeneity.

Author (Year)	Unit of measure (root or tooth)		Qualification of operator		Criteria for success		Duration after treatments	
	I2	t2	I2	t2	I2	t2	I2	t2
Khan, et al. [11]	0.985	0.0247	0.941	0.0263	0.952	0.0251	0.952	0.0244
Mustafa, et al. [12]	0.983	0.0256	0.931	0.0214	0.852	0.0256	0.963	0.0251
Haug, et al. [13]	0.984	0.0244	0.956	0.0235	0.742	0.0213	0.974	0.0295
Abdulrab, et al. [14]	0.984	0.0253	0.974	0.0287	0.863	0.0207	0.914	0.0251
Ghargav, et al. [15]	0.979	0.0209	0.92	0.0298	0.874	0.0249	0.952	0.0257
Al-Anesi, et al. [16]	0.986	0.0254	0.974	0.0284	0.879	0.0295	0.925	0.0254
Alranhabi, et al. [17]	0.985	0.0228	0.978	0.022	0.863	0.0275	0.937	0.0215
Jungnickel, et al. [18]	0.986	0.0218	0.963	0.0211	0.852	0.0248	0.974	0.0298
de Silva, et al. [19]	0.973	0.0058	0.951	0.0269	0.825	0.0286	0.943	0.0258
Hendi, et al. [20]	0.971	0.0098	0.974	0.0.274	0.874	0.0277	0.932	0.0249
Elemam, et al. [21]	0.952	0.0096	0.925	0.0242	0.745	0.0248	0.912	0.0256

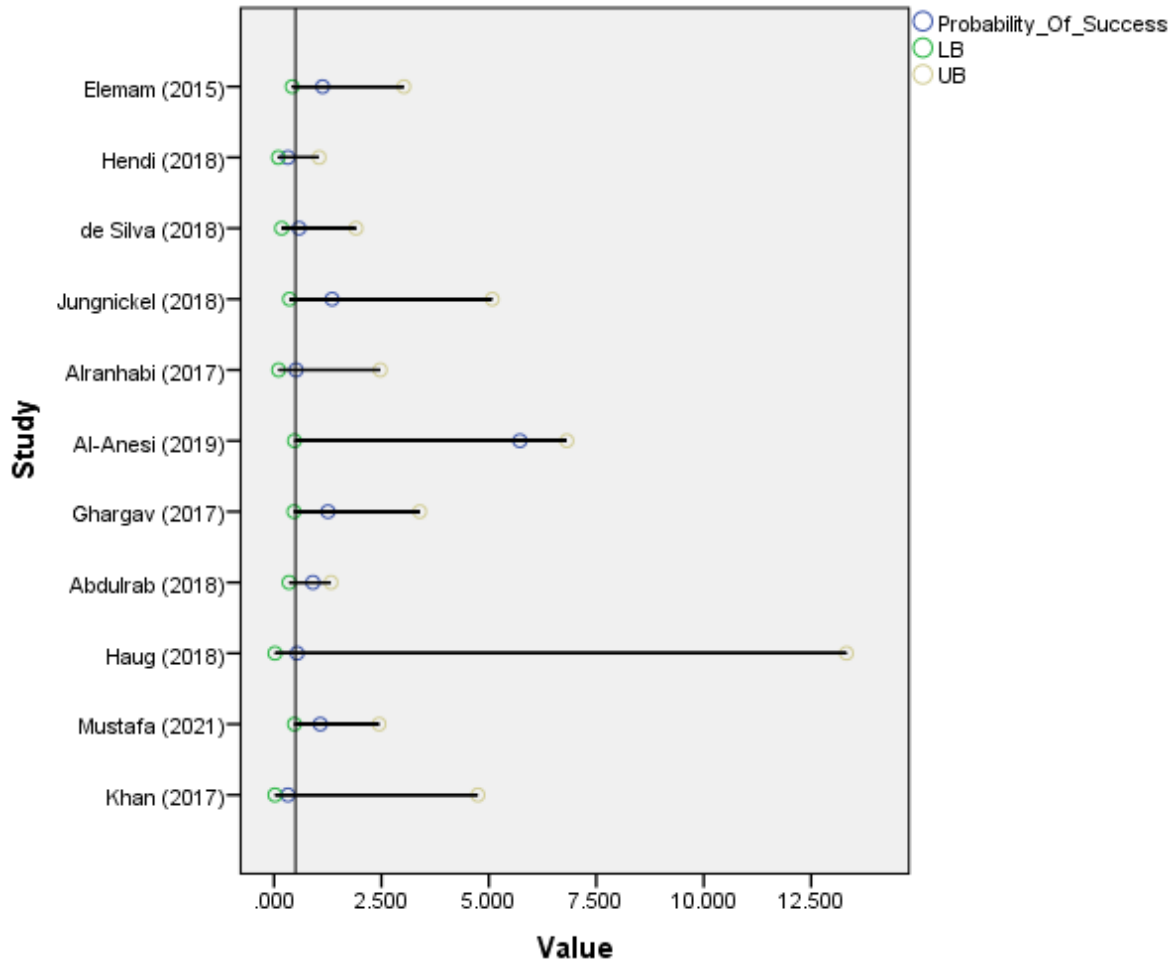

Figure 2: Probability of success based on strict radiographic criteria. UB: Upper Border; LB: Lower Border.

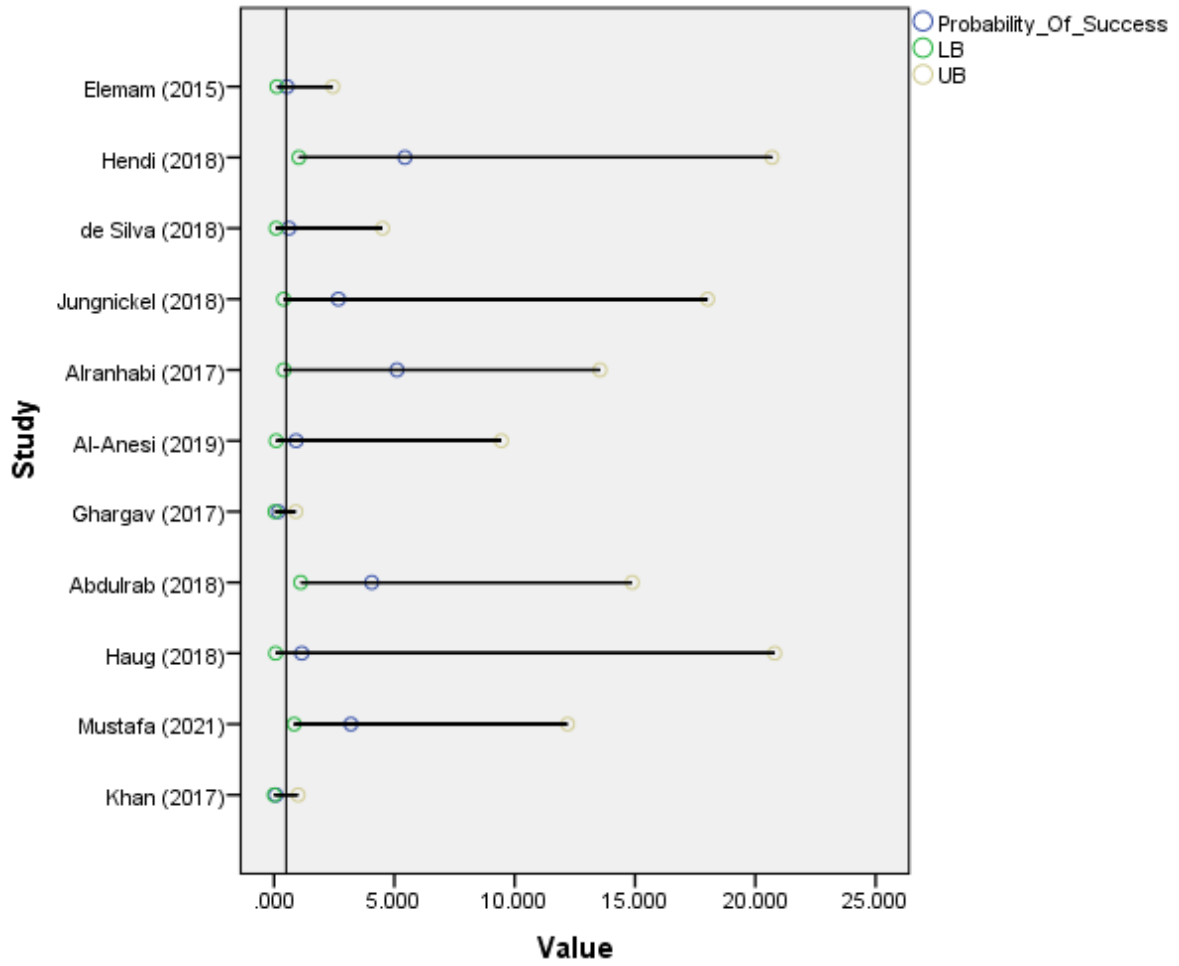

Figure 3: Probability of success based on loose radiographic criteria. UB: Upper Border; LB: Lower Border.

et al. likewise included patients of various ages, with the most youthful being members younger than 25. They found that older people had a much-diminished probability of holding their teeth [24]. Lazarski, et al. concentrated on patients going in age from 14 to 90 years of age and found that the probability of extraction ascends with patient age [25]. Caplan, et al. found that for like clockwork expansion in age, more established patients were bound to get ETT extractions [26]. The patients included were something like 21 years old at the hour of treatment.

NSRCT is a troublesome and tedious treatment that requests patient collaboration. More youthful individuals could have a more troublesome time enduring such a medical procedure. This, alongside the construction of more youthful super durable teeth, which have huge trenches and diminished dentinal dividers, as well as juvenile apices, may make sense of why less ETT get by in the more youthful age gatherings. Age can be utilized as an intermediary variable for other hidden qualities that might affect the consequence of NSRCTs, like patient consistency, pinnacle development, and dentinal divider thickness, which are all lower in more youthful patients. When pulpal treatment is fundamental at a more youthful age, involving essential mash treatment as a restorative choice might support the chances of tooth endurance. The AAE position proclamation on imperative mash treatment has recommended the utilization of less obtrusive strategies even in cases determined to have irreversible pulpitis and that pulpectomy ought not to be the main treatment choice [27].

Other examination, then again, tracked down no connection between ETT endurance and patient age. Dammaschke, et al. noticed an expansion in disappointment with age, even though it was not measurably huge [28]. Their concentrate only on elaborate grown-ups (18-74 years of age). Age at treatment has little effect on treatment results, as per Mareschi et al. furthermore, Swartz et al. [29,30]. Mareschi, et al. solely concentrated on grown-up patients [31], though Swartz saw all age gatherings, with the most youthful being under 10 years of age and the most seasoned being 70-79 years of age [30].

Cheung detailed that 44% of 251 ETT fizzled, with a 113-month middle endurance length [32]. As indicated by another examination, 52% of 608 ETT fizzled, with a middle endurance time of 111 months [33]. Their meaning of disappointment was equivalent to, the exemption that we avoided the presence of periapical radiolucency. Literature disappointment rate was in all probability lower because of the variety of disappointment models. In the systematic review, we didn't consider radiographic

status, though the other examination remembered asymptomatic teeth with periapical radiolucency for the disappointment classification. They would be bound to report disappointments if they had a more drawn-out follow-up period.

In the former examinations, the 5-year endurance likelihood was 60-65 percent [23,33]. It was found in the literature that 12-to 14-year-old gatherings had a tantamount 5-year endurance rate (64.8 percent), yet 6-11-year-old gatherings had a considerably lower 5-year endurance rate (28.8 percent) (46.4 percent). Literature long-term bunch (80%) had a higher 5-year endurance rate, which is equivalent to grown-up endodontics. The NSRCTs in the previously mentioned examinations were done in a showing medical clinic all through the 1980s and 1990s, and ordinary saline was used for the water system [23,33]. This could make sense of why literature more established age bunch had a higher endurance rate when current endodontics were applied.

We tracked down extraction as the most serious unfriendly event, trailed by retreatment and apical medical procedure. Altogether, 24 ETT (38.1%) were indicative; all were booked for extraction, retreatment, or apical medical procedure, except for two ETT, where the expected therapy was not noted. Most antagonistic occasions happened inside the initial three years following NSRCT, which was predictable with before studies [33,34]. Different examinations have found a 3-10.3 percent pace of negative results [25,34,35]. This exploration's information came from an immense protection data set. Literature's more prominent pace of revealed unfavorable occasions is no doubt inferable from patient and practice type varieties. Notwithstanding, in the long-term age range, the rate of troublesome occasions (10.6 percent) was similar to an earlier exploration [34]. The information for the exploration recorded above was gathered from modernized records of protection firms by searching for codes of uncommon episodes. In circumstance, be that as it may, we look at every patient's dental record and radiograph to check whether any of the surprising occasions were expected. The ideal treatment was not given to each ETT. For instance, just 33 of the 43 teeth booked for extraction had extraction records. Besides, just 12 of the 14 arranged withdraws were done. Just three of the four arranged apical activities were done.

Investigations utilized tooth maintenance to report the event of ETT without considering the presence of any side effects. As per these examinations, 83-97% of ETT was protected [2,28,32,25,35-39]. Literature exploration protected 91.7 percent of ETT, which is similar to prior examinations [25,34,37,38]. As indicated by other exploration, 93-97% of people had an asymptomatic ETT [40,41]. Not all bombed ETTs in exploration were suggestive. A few teeth were pulled for orthodontic purposes or on the grounds that they couldn't be reestablished. Others were removed because of an inappropriately fixed rebuilding when a patient got back to demand a long-lasting reclamation. On account of no healing radiolucency when the tooth was side-effect-free, the apical medical procedure was led.

CONCLUSION

When rigorous criteria were employed, the estimated weighted pooled success rates of treatments completed at least one year previous to evaluation were between 68 and 85 percent. Over the previous four (or five) decades, stated success rates have not increased. The quality of data for treatment parameters influencing primary root canal treatment results is poor; research designs varied significantly. It would be preferable to standardize features of research design, data recording, and outcome data presentation format in much-needed future outcome studies.

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