Journal of Coastal Life Medicine
www.jclmm.com
ISSN: 2309-5288(Print)/2309-6152(Online)
Volume 10 No.1 (2022), Page No. 175 – 183
Article History: Received: 02 January 2022, Revised: 10 February 2022, Accepted: 21 February 2022, Publication: 31 March 2022

Choice of Irrigants in Primary Teeth Pulpectomy

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ABSTRACT

Background: The complete removal of microorganisms from the infected root canals of deciduous teeth is a complicated task. The probability of a favorable outcome with root canal treatment is significantly high only if the infection is eradicated effectively before the obturation of the root canals. Instrumentation and irrigation help in the process of elimination and biomechanical preparation of the root canal. The aim of this study is to find the choice of irrigants preferred for primary teeth pulpectomy

Materials and Methods: The data was collected from Digital Information Archiving Software (DIAS) of Saveetha Dental College. The study data was collected from November 2020 to January 2021 . The data included patients who had undergone a primary teeth pulpectomy. The collected data was entered and tabulated in excel and SPSS package software was used to analyse the data. The level of statistical significance in the study was considered to be $p<0.05$.

Results: The most commonly used irrigant of choice for primary teeth pulpectomy was combination of saline and EDTA for single visit pulpectomy and saline for multi visit pulpectomy.

Conclusion: The knowledge of preference of root canal irrigants can increase the success of the pulp therapy along with the healing of the periapical tissues.

Keywords: EDTA, Irrigants, Innovative, Primary Teeth, Pulpectomy, Saline

INTRODUCTION:

The premature loss of primary teeth can have detrimental effects in the permanent dentition. It can cause undesirable drifting and can cause unwanted space in the dental arch or can cause loss of space in the dental arch(1,2). But the presence of the primary teeth limits the space and prevents the development of malocclusion due to space(3). Early loss of primary teeth can cause dental malocclusions like midline shifts or spacing in the dental arches or even crowding of the teeth(4).

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It can cause over eruption of the antagonist teeth, tipping of the adjacent teeth, speech problems and can cause masticatory impairment which can lead to nutritional deficit problems(5–7). The main goal of pulp therapy is to retain the primary tooth as a functional component in the dental arch(8).

Pulpectomy of primary teeth is considered conservative treatment than extraction. It ensures a normal shedding of the primary teeth or for long term survival instances in retention(9,10). However, the morphology of the primary teeth presents itself with several complications for an efficient pulpectomy. Its close proximity with developing tooth bud presents itself as an endodontic challenge. The morphology of the primary teeth is quite bizarre with tortuous root canals which have been made for physiological resorption(11). The deciduous teeth have peculiar internal geometry, they also have several attributes like horizontal anastomoses and furcational connections(12).

It has been well recognised that bacteria are the one of the primary etiological factors in causing pulpal and periapical lesions(13,14). In a deciduous root canal of the tooth, the highest number of infection with microorganisms can be found in the main or the central canal of the root(15). Many studies which focus on root canal microorganisms report that most common in primary teeth with necrotic pulp were anaerobic microorganisms(16). Since the caries progression is rapid in primary teeth, the control on infection with endodontic treatment is necessary(17).

A successful pulp therapy requires proper instrumentation, sufficient irrigation and complete obturation of the root canal. Irrigation is a key determinant in the healing of the periapical tissues. Irrigants help by mechanical or chemical debridement of the canal. There are various types of irrigants used for root canals present. The ideal requisite of irrigants are that it needs to have an broad spectrum of antimicrobial activity, high potency against facultative and anaerobic microorganisms. It should dissolve the necrotic pulp. Inactivated endotoxin, prevent smear layer formation to dissolve smear layer and should be systemically non toxic and non caustic with little to none potential of causing anaphylactic reactions(18).

Our team has a plethora of research and knowledge that has resulted in high-quality publications.(19–38). This research is needed to determine the irrigants used in the primary teeth pulpectomies. This research provides valuable information to the oral health planners with the preference and choice of root canal irrigants for development of dental health care management.

MATERIALS AND METHODS

Study Setting

This present study was conducted as a cross sectional study among the patients coming for treatment to Saveetha Dental College and Hospitals in Chennai, Tamil Nadu. The study was conducted in a hospital setting. The institutional ethical committee had approved the present study. The patients included in this study had visited the dental clinic and had undergone a pulpectomy. Both single visit and multi visit pulpectomies were included in the study. A total of 75000 patients records were reviewed and analysed. The age group of the participants enrolled in the study were from 1 to 12 years and they were grouped as 1 to 4 years, 5 to 8 years and 9 to 12 years of age. Sampling bias was reduced by simple random sampling. The study sample had predominantly South Indian patient due to the geographical limitations and it included both male and female genders. This study was done in the month of June 2019 to March 2020.

Data Collection

Demographic data was received from the patients of the study - Age, Gender, Address etc was collected. Then clinical examination was done both intraoral and extraoral.The patients had to undergo treatment of single visit or multi visit pulpectomy for their primary teeth. All these records were recorded in DIAS- Dental information Archiving Software of Saveetha Dental College. Any incomplete data was verified from the concerned department or the patient. Any other data which had the likelihood of bias and could deter the studies was removed and was not included. For the dentolegal documentation the data were photographically registered. The data which has been collected for this study was analysed with the help of another examiner and was cross verified.

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Data Analysis

Excel version 16.37 was used to input data into a spreadsheet (Microsoft Corp, Redmond, Wash). Statistical Package for Social Sciences (SPSS) software, version 1.0.0.1347 64 bit, was used to analyse the data gathered (IBM corp., NY, USA). The data was analysed using descriptive statistics in the form of crosstabs and was subjected to descriptive analysis using frequencies, percentages, and averages. Correlation and association were the types of analyses performed. Individual factors were subjected to univariate analysis. To determine the statistical significance of the current study, a nonparametric test - Chi square test of Independence - was used with the same SPSS programme. The level of statistical significance was determined to be $p<0.05$.

RESULTS :

The total number of patients included in this study were 75000 patients. All the study participants were the patient who had visited Saveetha Dental College and Hospital for their treatment. Among them 1200 had to undergo primary teeth pulpectomy. The single visit pulpectomy was 997 patients and multi visit pulpectomy was 207 patients.

In single visit pulpectomies, 571 (57.5%) were males and 422 (42.5%) were females. The age distribution was 477 (48.04%) were 1 to 4 years, 482 (48.54%) were 5 to 8 years and 34 (3.42%) were 9 to 12 years. In multi visit pulpectomies, the gender distribution was 132 (63.77%) were males and 75 (36.23%) were females. The age distribution in multi visit pulpectomies was 35 (16.91%) were 1 to 4 years, 153 (73.91%) were 5 to 8 years and 19 (9.18%) were 9 to 12 years.

The irrigant of choice in single visit pulpectomy in males were 25.58% saline, 4.33% EDTA and 27.59% saline and EDTA and in females 11.98% saline, 7.55% EDTA and 22.96% saline and EDTA (Figure 1). The age distribution in irrigant choice was saline 16.62% in 1 to 4 years, 19.64% in 5 to 8 years and 1.31% in 9 to 12 years; EDTA was 5.54% in 1 to 4 years, 5.84% in 5 to 8 years and 0.5% in 9 to 12 years; saline and EDTA 25.88% in 1 to 4 years, 23.06% in 5 to 8 years and 1.61% in 9 to 12 years (Figure 2).

The choice of irrigant in multi visit pulpectomy in males were 35.75% saline, 6.76% EDTA and 21.26% saline and EDTA and in females 15.94% saline, 3.86% EDTA and 16.43% saline and EDTA (Figure 3). The age distribution in irrigant of choice was saline 7.73% in 1 to 4 years, 38.65% in 5 to 8 years and 5.31% in 9 to 12 years; EDTA was 1.45% in 1 to 4 years, 7.73% in 5 to 8 years and 1.45% in 9 to 12 years; saline and EDTA 7.73% in 1 to 4 years, 27.54% in 5 to 8 years and 2.42% in 9 to 12 years (Figure 4).

The descriptive and inferential analysis were carried out using the statistical software SPSS. The statistical significance of the study was determined using a non parametric test called the chi square test. The P value was determined to be $P< 0.05$, which is considered statistically significant. As a result, the research was statistically significant. (Table 1,2).

DISCUSSION:

Irrigation and instrumentation are cornerstones for endodontic treatments. The American Academy of Pediatric Dentistry reported that there was no significant difference between water/saline or sodium hypochlorite or chlorhexidine as an irrigant for pulpectomy(39). The structural complications of the roots in primary teeth like the accessory canals, root tip bifurcation and dentinal tubules makes the removal of microorganisms difficult to remove only by instrumentation. Irrigants are employed for this reason and it provides an antimicrobial effect and has biological compatibility. The removal of the hard and soft bacteria containing tissue is the main objective during the cleaning of the root canal system(40).

Irrigating the canal and its biomechanical preparation is required to eliminate necrotic tissue, debris, microorganisms from the root canal(41). Irrigation is the best method in pulpectomy to lubricate and flush away any necrotic debris during instrumentation(42).Sodium chloride has an antimicrobial effect and tissue dissolving properties(43). This could be the reason why it was irrigant of choice in multi visit pulpectomies. EDTA is Ethylenediaminetetraacetic acid which effectively dissolves the inorganic component and smear layers but doesn't have any antibacterial effect(44–46).

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There is no agreement between dentists about the best irrigating solution for infected pulp. This absence of opinion could be due to the lack of research to support the best irrigants(47). Even though mechanical instrumentation can remove and can reduce the bacterial colonies, the effective removal of bacteria can be achieved by antimicrobial irrigants and medication(48,49). Effective irrigation of the root canal system can be achieved when a combination of irrigants are used(50). To reduce the bacterial count and for efficient cleaning of the root canal minimum two root canal irrigant solution must be used(51).

There are certain constraints to the research. This was a cross sectional and univariate study with a geographic limitation that included more of the South Indian population. For better findings, the sample size and time period of the study can be increased.

For future research, the size of the sample can be increased and the inclusion of people of various ethnicities will yield better results. Periodic and longitudinal investigations could be conducted to assess the patients' response to pulpectomy treatment. This study contributes to the improvement of dental health care management by providing vital information to oral health planners.

CONCLUSION:

Within the limitations of the present study, the most commonly used irrigant of choice for primary teeth pulpectomy was saline and EDTA for single visit pulpectomy and saline for multi visit pulpectomy. Epidemiological studies usually vary considerably between countries and between geographical regions within a population.The knowledge of preference of root canal irrigants can increase the success of the pulp therapy along with the healing of the periapical tissues.

ACKNOWLEDGEMENT

The authors would like to acknowledge the help and support rendered by the Department of Pediatric Dentistry and Information Technology department of SIMATS for their constant assistance with the research.

FUNDING:

The present study is sponsored by

- Saveetha Institute of Medical and Technical Sciences
- Saveetha Dental College and Hospitals
- Saveetha University
- Thomas Cook Private Ltd., Chennai

CONFLICT OF INTEREST

Authors declare no potential conflict of interest.

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Table 1: Chi square test for Single Visit Pulpectomy

	Age	Gender	Irrigant
Chi-Square	399.776[a]	22.368[b]	230.737[a]
df	2	1	2
Asymp. Sig.	.000	.000	.000

Table 2: Chi square test for Multi Visit Pulpectomy

	Age	Gender	Irrigant
Chi-Square	155.246[a]	15.696[b]	54.116[a]
df	2	1	2
Asymp. Sig.	.000	.000	.000

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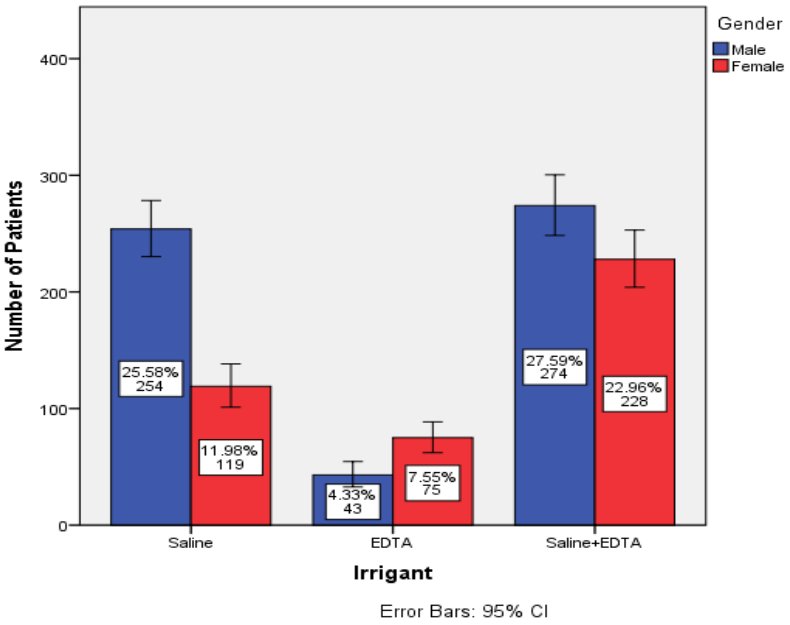

Figure 1: Bar graph showing the gender distribution in the preference of root canal irrigants in single visit pulpectomy across the scale of patient count in the y-axis and gender prevalence in the x-axis.

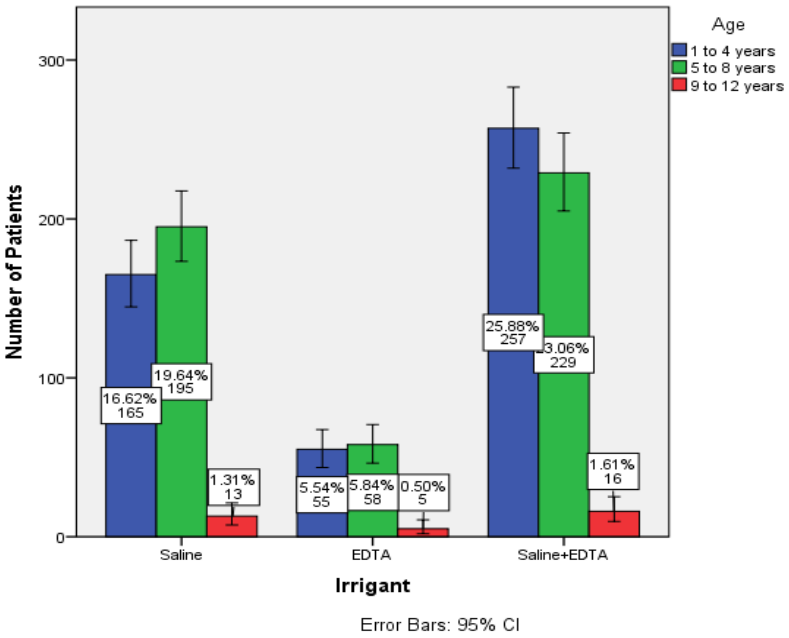

Figure 2: Bar graph showing the distribution of different age groups in the preference of root canal irrigants in single visit pulpectomy across the scale of patient count in the y axis and x axis represent age prevalence.

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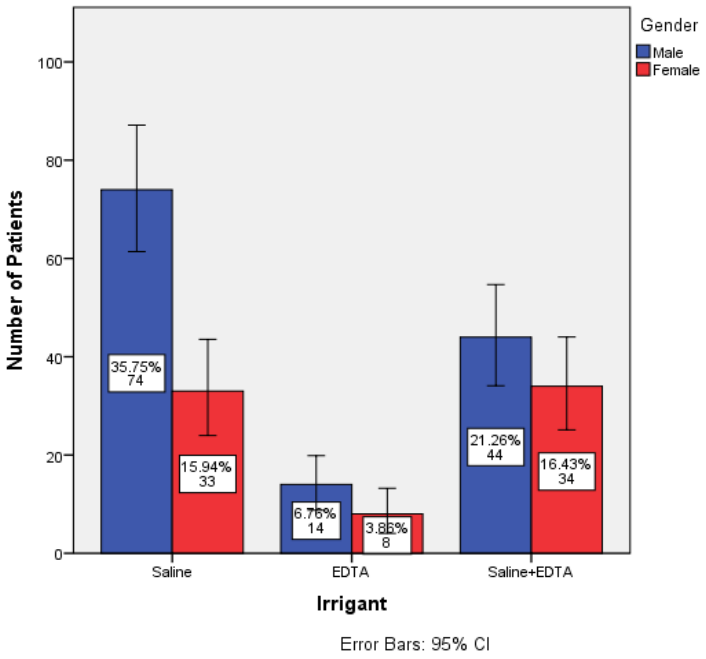

Figure 3: Bar graph showing the gender distribution in the preference of root canal irrigants in multi visit pulpectomy across the scale of patient count in the y-axis and gender prevalence in the x-axis.

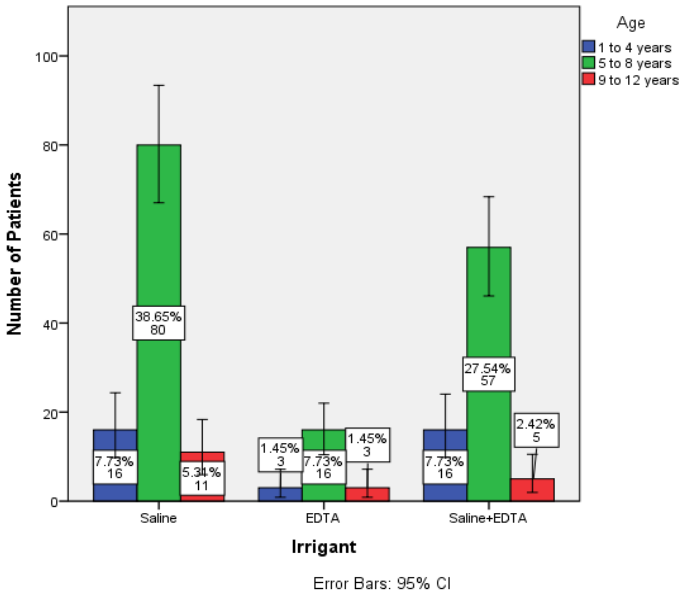

Figure 4: Bar graph showing the distribution of different age groups in the preference of root canal irrigants in multi visit pulpectomy across the scale of patient count in the y axis and x axis represent age prevalence.