



Assessment of Commonly used Irrigants During Pulpectomy in Primary Teeth in a Hospital Based Setting - A Retrospective Study

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ABSTRACT

Pulpectomy is a procedure done for non-vital teeth which involves the extirpation of pulp from primary teeth and filling it with an inert substance. pulpectomy requires biomechanical preparation, but this biomechanical preparation alone is insufficient. Irrigants are used during this procedure for the purpose of lubrication, disinfection and washing away action. These irrigants penetrate the smaller accessory and lateral canals, thereby cleaning and disinfecting them. It is essential to eradicate the microorganisms and their by products from the root canal and pulp chamber. The collected data was further analyzed, recorded in Microsoft excel software and was subjected to statistical analysis using IBM SPSS statistics analyzer. The total sample size of the current study was 2400 cases. The most common age group of the patients who reported to the clinics were 0 to 5 years of age (69.1 %) ($p < 0.05$ - significant). The more common gender for using saline as an irrigant were male (57.7 %) ($p < 0.05$ - significant). We found that saline was the most commonly used irrigant (58.7 %), while sodium hypochlorite was the least commonly used (0.1 %). The most common visit for using saline as an irrigant were single visit ($p < 0.05$ - significant) followed by multi-visit. Within the limitations of the current study, saline was the most commonly used and sodium hypochlorite was the least commonly used for pulpectomy procedure in primary teeth. Saline was also commonly preferred for single visit in patients in the age group of 0 to 5 years.



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INTRODUCTION

Pulpectomy is a procedure done for non-vital teeth which involves the extirpation of pulp from primary teeth and filling it with an inert substance (Govindaraju *et al.*, 2017a,b; Jeevanandan, 2017). Pulpectomy requires biomechanical preparation, but this biomechanical preparation alone is insufficient (Govindaraju *et al.*, 2017c; Jeevanandan and Govindaraju, 2018). Irrigants are used during this procedure for the purpose of lubrication, disinfection and washing away action. These irrigants penetrate the smaller accessory and lateral canals,

thereby cleaning and disinfecting them. Without the use of irrigants there will not be proper disinfection of the canals leading to the possible failure of the treatment (Lakshmanan *et al.*, 2020). It is essential to eradicate the microorganisms and their by products from the root canal and pulp chamber. Some of the more commonly used irrigants during pulpectomy procedure include sodium hypochlorite, chlorhexidine gluconate, Ethylenediamine tetraacetic acid, mixture of tetracycline, acid and detergent, hydrogen peroxide, etc. (Walia *et al.*, 2019). This research study shows promise as newer materials are being created everyday. The reasons for loss of pulp vitality could be attributed to dental caries that invades the pulp and results in pulpal inflammation and necrosis (Packiri, 2017; Panchal *et al.*, 2019). Other reasons could include traumatic injuries (Ravikumar *et al.*, 2017).

Some of the difficulties faced by other researchers in the clinical choice of irrigants include the variety in the choice of irrigant, each possessing its own physical and chemical properties (Kaur *et al.*, 2014). There was also severe lack of research based evidence in order to determine an irrigant as "ideal" (Gondim *et al.*, 2012). Other obstacles faced by researchers included the complexity of the canal system which varied from tooth to tooth and the presence of a smear layer after access opening and mechanical preparation (Ismail *et al.*, 2017).

Research study requirement as of now is that there is no data regarding the clinical choices of the dentist and why he/she made that choice. This study will aid dental professionals in south india as well as wound the world to gain awareness about irrigant choice. The aim of this study is to evaluate the most common irrigants used during pulp therapy in primary teeth by south indian dentists.

MATERIALS AND METHODS

The research study was designed as a comparative and a descriptive study where the data of all the pediatric patients reporting to the Department of Pediatric and Preventive Dentistry who have undergone pulpectomy procedure were obtained from the dental information archiving software. This record management system records all patient data which was helpful in collecting data required for the study.

This retrospective study was done under a university setting which was predominantly frequented by the south indian population (Christabel, 2015). This setting came with a variety of pros and cons. The selection of the study population was performed at random. The population size of the current study was 2400 (Pozos-Guillen *et al.*, 2016). Eth-

ical approval was obtained from the institutional ethical committee (ethical approval number: SDC/SIHEC/ 2020/ DIASDATA/ 0619-0320). Sample collection period was set from June 2019 to April 2020. Cross verification was performed by an additional reviewer. The minimisation of sample bias was performed by an additional reviewer, acquiring all the data from within the university and as an additional measure, simple random sampling was performed. There was a presence of high internal and low external validity.

The data was then arranged in a methodical manner using microsoft excel software and was tabulated. The data was validated by an additional reviewer. Any incomplete data that was present in the collected data was excluded from the study.

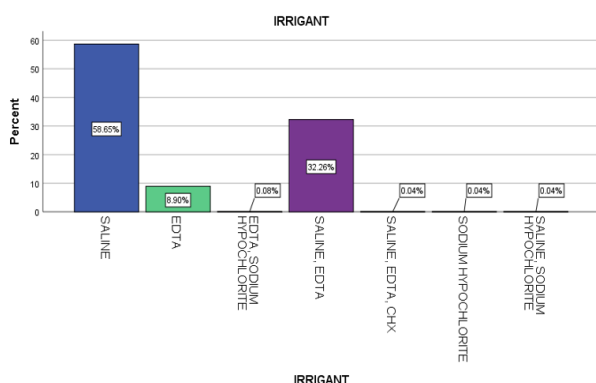
Statistical analysis of the compiled data was performed using IBM SPSS statistical analyzer (Buldur and Kapdan, 2018). Chi-square test was done for statistical analysis (Vora *et al.*, 2015). The data constituted those of the patients who underwent pulpectomy. The inclusion criteria for this study was pediatric outpatients who have undergone pulpectomy procedure irrespective of their age or gender. The exclusion criteria included pediatric outpatients who have not undergone pulpectomy procedure and adult patients.

RESULTS AND DISCUSSION

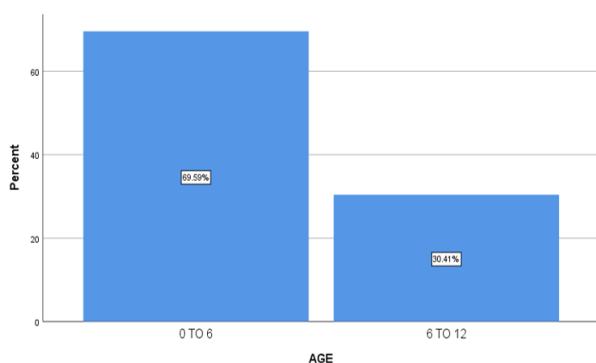
The total sample size of the current study was 2641 cases. We found that saline was the most commonly used irrigant (58.7 %) followed by saline, Ethylenediamine tetraacetic acid (32.3 %), Ethylenediamine tetraacetic acid (8.9 %) with the least commonly used irrigants being sodium hypochlorite (0.1 %) and saline, Ethylenediamine tetraacetic acid and chlorhexidine (0.1 %). The most common age group of the patients who reported to the clinics were 0 to 5 years of age ($p < 0.05$ - significant) (69.1 %) followed by 5 to 10 years (30.4 %), 10 to 15 years (0.37 %) and 15 to 20 years (0.03 %). The most common visit for using saline as an irrigant were single visit ($p < 0.05$ - significant) followed by multi visit.

The most common irrigant preferred and used for pulpectomy procedure in primary teeth was saline (58.7 %) with the least commonly used irrigants being sodium hypochlorite (0.1 %) (Graph 1). Some of the other research studies such as the one done by Kandaswamy D *et al.*, showed similar results as the most commonly used irrigant was normal saline (Kandaswamy and Venkateshbabu, 2010). Some other studies such as the one shown by Zehnder M *et al.*, showed opposing results as the most commonly used irrigant was sodium hypochlorite

which was the least commonly used in the current study (Zehnder, 2006). The reasons for preference of saline over other root canal irrigants and scanty use of sodium hypochlorite could be due to the reason that saline possesses the least adverse effects and also because it is an isotonic solution. The limited use of sodium hypochlorite could be due to the increased amount of adverse effects associated with it (Svec and Harrison, 1977; Dube and Jain, 2018).

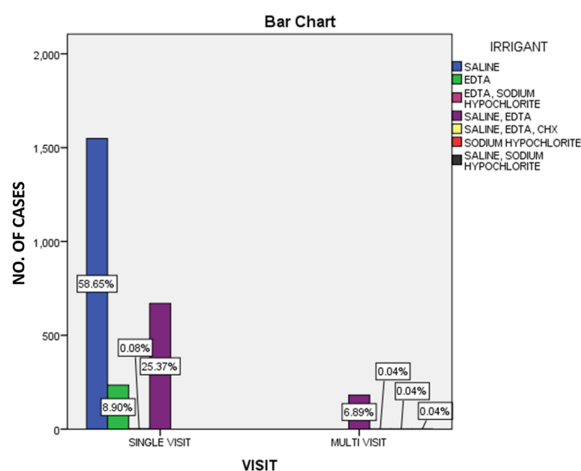


Graph 1: Bar graph showing the frequency distribution of irrigants used for pulpectomy in children.



Graph 2: Bar graph showing the distribution of age groups in the study.

Gender predilection that was observed were male, the reasons for which could include an increased cariogenic diet acting synergistically with poor oral hygiene (Govindaraju, 2017) which has resulted in early childhood caries (Subramanyam et al., 2018) which has led to increased chances for tooth going for a pulpectomy which thereby increases the use of irrigants (Ahmed, 2014) (Graph 2). Lack of use of adjuncts such as fluoride containing toothpastes and mouthwashes for the maintenance of oral hygiene could also increase the risk of the tooth going for pulpectomy (Somasundaram et al., 2015; Ramakrishnan and Bhukri, 2018). Dental neglect over a long period of time can result in progressive worsening of oral hygiene and tooth condition, which



Graph 3: Bar graph showing the comparison of the type of irrigants to single-visit or multi-visit pulpectomy.

could also lead to the tooth going for a pulpectomy (Gurunathan and Shanmugaavel, 2016).

The age prediction that was observed was 0 to 5 years. At this age, the patient has increased risk of early childhood caries which increases the chances of undergoing pulpectomy thereby increasing the use of irrigants (Chen et al., 2017) (Graph 3).

Graph 1 shows (X-axis represents type of irrigant and Y-axis represents the percentage of cases) where blue colour denotes Saline, green colour denotes EDTA, pink colour denotes combination of EDTA & sodium hypochlorite, violet colour denotes combination of saline & EDTA, yellow colour denotes combination of saline, EDTA, CHX, red colour denotes sodium hypochlorite and black colour denotes combination of saline & sodium hypochlorite. Saline was the most common irrigant (58.7 %) followed by a combination of saline and Ethylenediamine tetraacetic acid (32.3 %).

Graph 2 shows (Y-axis represents the age and X-axis represents the percentage of children) Children in the age group of 0 to 6 years were 69.59 % and in the 6 to 12 year age group were 30.41 %.

Graph 3 shows (X-axis represents the visit, Y-axis represents the number of cases) where blue colour denotes Saline, green colour denotes EDTA, pink colour denotes combination of EDTA & sodium hypochlorite, violet colour denotes combination of saline & EDTA, yellow colour denotes combination of saline, EDTA, CHX, red colour denotes sodium hypochlorite and black colour denotes combination of saline & sodium hypochlorite. Saline was the most common irrigant used in single visit pulpectomy (58.7%) and combination of EDTA & saline was

the most common irrigant used in multi visit pulpectomy (7%). (Chi-square test, p-value = 0.000 - statistically significant).

The advantages that this setting provides include the presence of a versatile population and the ability to perform preference analysis. The limitations of the current study were that there was a limited demographic data to select subjects from and that there was no wide variety of irrigants to choose from and also the study being conducted in a unit centred setting. The future scope for the research study is that it could pave the way for further research with the development of newer materials which possess enhanced physical and chemical properties and preference assessment of dentists around the world. Greater sample size, combined with varied ethnicity, is guaranteed to provide better results.

CONCLUSION

Within the limitations of the current study, saline was the most commonly used and sodium hypochlorite was the least commonly used irrigant for pulpectomy procedure in primary teeth. Saline was also commonly preferred irrigant for single visit in the patients of the age group of 0 to 5 years.

Conflict of interest

The authors declare that they have no conflict of interest for this study.

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