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Practice Preference amongst Indian Paedodontists and post graduate students for Non-vital pulp therapy in primary Teeth

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ABSTRACT

Non-Vital Pulp Therapy is ever expanding with changing concepts and practices involved in Endodontics. There are upgradations leading to variations in choices amongst the practitioners. AIM: To investigate and compare the practice profile of paediatric practice for non vital pulp therapy amongst paedodontists.MATERIALS AND METHODS: A survey was conducted among paedodontists and PG students through a questionnaire consisting of 24 items for a minimum total of 392. It was circulated through printed sheets and E-mails. A total of 360 responses were received on which descriptive statistical analyses were carried out to obtain results. RESULT: Paedodontists are following the basic protocols and techniques in accordance with Guidelines on Pulp Therapy for Primary teeth by AAPD revised in 2014. 47.14 % paedodontists preferred using composite as definitive restorative material though 100 % of them believe that full coverage restoration is necessary following pulpectomy procedure. 46.26 % use NaClO for irreversible pulpitis and 70% use chlorhexidine in abscess case. CONCLUSION: Most of the treatment protocols are been followed in accordance to the American Academy of Pediatric Dentistry (AAPD) guidelines for management for pulp therapy of primary tooth while preferences show disparity in terms of isolation, choice of intra-canal medicaments and choice for definitive restorative material. There is a need for a more evidence-based research for a definitive treatment protocol regarding non-vital pulp therapy in Primary teeth that will help suggest a standardized Operating protocol.

KEYWORDS: pulpectpmy, nonvital teeth, pedodontists, treatment protocol

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INTRODUCTION

Primary teeth; although present for a small part of a person's life, have a very important role to play because they give the face its normal appearance, aid in the development of clear speech and help child attain good nutrition. Most importantly, they reserve spaces for their permanent counterparts.[1]The perception of these teeth being temporary results in negligence of maintaining a good oral hygiene by the children and their parents. As a result, a very large proportion of children require treatment of their teeth at a very young age. Childhood caries is a common but serious public health issue faced by the children today. It is said to be present in as many as 70% of children in developing countries.[2] Timely diagnosis and treatment of a carious lesion in primary teeth is important to prevent infection, which would otherwise result in early loss of the tooth. A survey in U.K. conducted by Duggalet al.[3] showed that almost 40% of 5-year old children have evidence of dentinal caries with 17% of children having teeth which were pulp ally involved at a young age. The American Academy of Pediatric Dentistry (AAPD) guidelines for primary tooth pulp therapy[5]outlines the indications and objectives for vital and non-vital pulpectomy. Also the American Academy of Endodontic sand Textbook of McDonald and Avery's Dentistry for the Child and Adolescent has given treatment protocols for non-vital pulpectomy.

The field of paediatricendodontics is expanding at a rapid pace with the entry of many new materials and technological advances. This often leads to a myriad of choices and treatment options for the paedodontists. A survey of common practices amongst epaedodontists throws light on the usual methods adopted, either correctly or incorrectly.

Pulpectomy is a root canal procedure for pulp tissue that is irreversibly infected or necrotic due to caries or trauma. The root canals are debrided and shaped with hand or rotary files. After proper irrigation, the canals are obturated using a resorbable material such as non-reinforced ZOE, iodoform-based paste, and commercially available obturation pastes[5]. Then, the tooth is restored with a restoration that seals the tooth from coronal leakage. With an ever-expanding cohort of paedodontists in India, a survey from an Indian perspective is needed to gauge the commonly selected practices. It is also important to compare these choices to global practices.

The aim of the study was to investigate and compare the practice profile of paediatric practice for non vital pulp therapy amongst Indian paedodontistsand various deviations from standardized treatment guideline.

The objectives of the study were (1) To assess the preference for pulpectomy over extraction; (2) To find out the most preferred instruments for endodontic therapy; (3) To determine local anesthesia administration routes for paediatric patients; (4) To find out the preferences for working

length determination methods; (5) To determine the preferences for irrigating solutions, intra-canal medicaments, intermediate restorative materials, root canal filling materials and definative restorative materials; (6) To determine the preference for crown following pulpectomy; (7) To find out the instrument which are susceptible to breakage during endodontic procedures.

MATERIALS AND METHOD

A cross-sectional, questionnaire survey was conducted among pediatric dentists in India for a period of 4 months. Ethical clearance was obtained from the institutional ethical committee of Sumandeep Vidyapeeth University, Gujarat, India. A closed-ended, multiple-choice questionnaire evaluating the knowledge and practice of Non-Vital pulp therapy in primary dentition was designed after prior validation. Construct, face, and content validities were carried out. Reliability of the tool was obtained using test-retest method. Reliability obtained for the tool is 98.43%.Validity was checked content as well as concurrent validity.The questionnaire was sent to 10 randomly selected, senior pediatric dentists with vast clinical and teaching experience. The questions were assessed for their difficulty in understanding, interpreting, and answering correctly. The modifications were done accordingly, and the proforma was finalized.

The rationalized questionnaire was randomly sent to 400 pediatric dentists of india through email and printed sheets. They were asked to choose the most suitable answer from the available choices. The identity of the participating pediatric dentists was kept strictly confidential, and participation was voluntary. Prior permission and written informed consent was obtained from the participants.The responses were collected and computed on The Statistical software IBM SPSS statistics 20.0 (IBM Corporation, Armonk, NY, USA) was used for the analyses of the data and Microsoft word and Excel were used to generate graphs, tables etc**.**Descriptive statistical analyses were carried out in the present study. Results on continuous measurements were presented on Mean ± SD and results on categorical measurement were presented in number (%). [6]

SAMPLE Description:

To calculate the sample size for the present study the following formula was used- Sample size n = [DEFF x Np(1-p)]/ [($d^2/Z^2_{1-\alpha/2}$ x (N-1)+p x (1-p)]

Population size (for finite population correction factor or fpc) (*N*): 500. Hypothesized % frequency of outcome factor in the population (*p*): 50% ± 5. Confidence limits as % of 100(absolute ± %) (*d*): 5 %. Design effect (for cluster surveys-*DEFF*): 1 ; Substituting the values in the formula, a sample size of 357 was derived. However, an additional 10% were included in the study [N = 392.7

(rounded off to 400)] in order to compensate for potential refusals. The sample size of the present study was thus estimated to be 400 at 95% confidence interval.

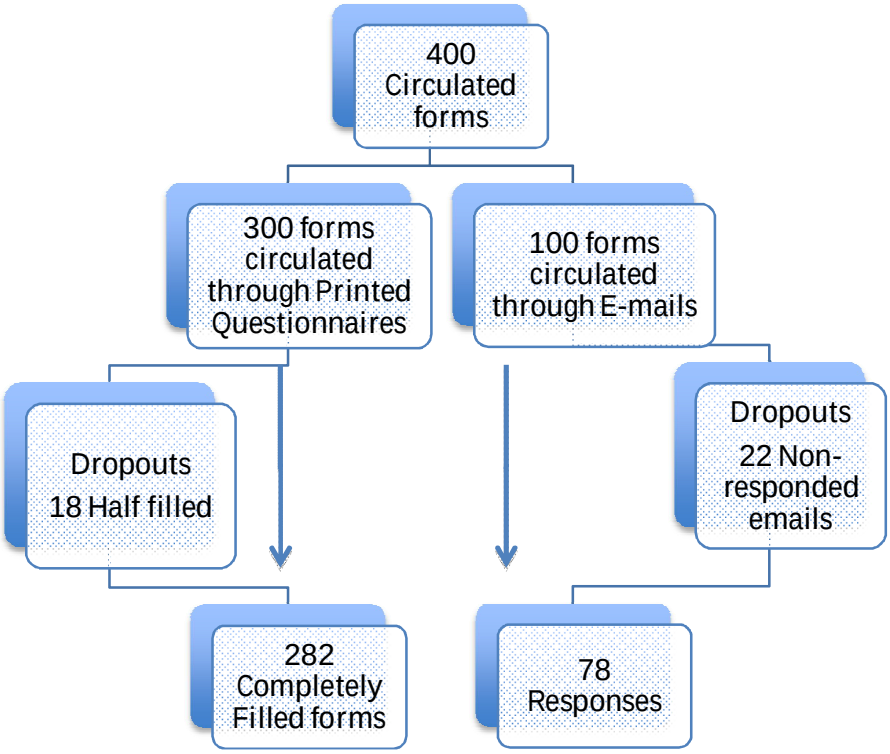

Figure 1 :Consort Flow Diagram

RESULT

A total of 360 pediatric dentists responded to the questionnaire, with an 85% response rate; 80% of pediatric dentists who participated in the study were academicians, as well as practitioners, and 94% of them had ≤4-7 year's experience with mean age of 29 years old. (Figure 2)

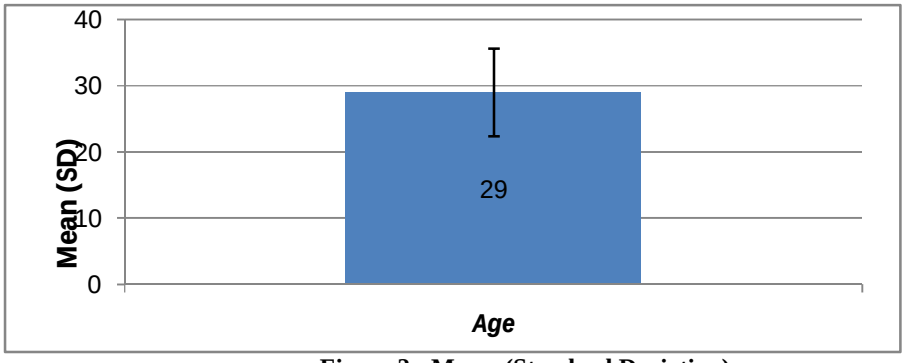

Figure 2 : Mean (Standard Deviation)

Disparity and dissimilarity for the use of rubber dam isolation was observed with 45 % of paedodontists facing challenge for rubber dam isolation. (Figure 3)

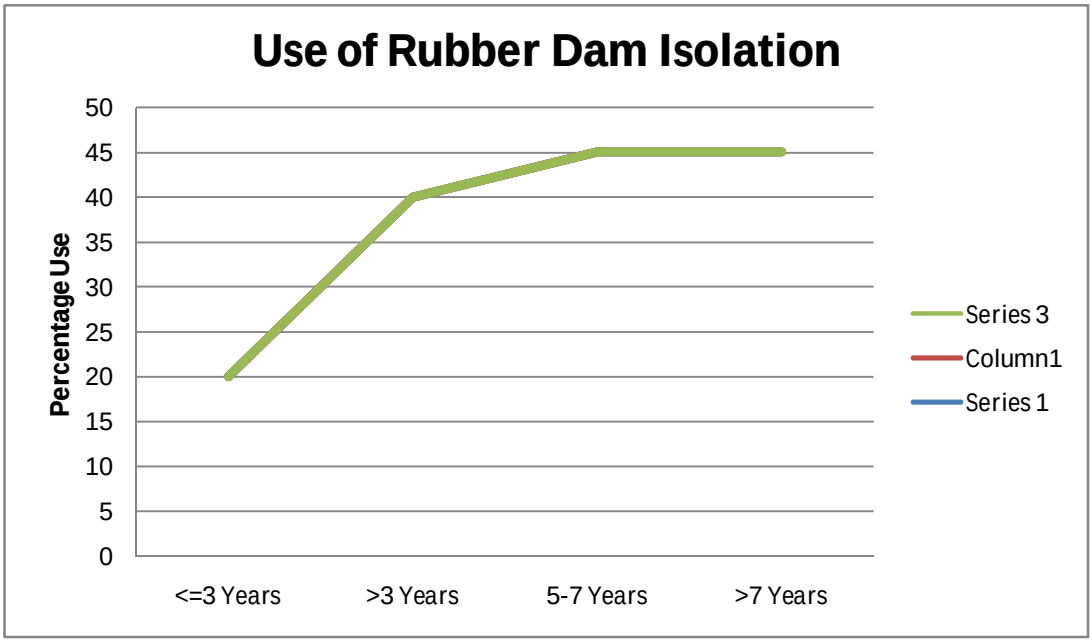

Figure 3 : Correlation of years of Experience and Use of rubber dam isolation

When asked for the preferred Local Anesthesia administration technique for paediatric patients, it was found that most of the practitioners preferred Inferior Alveolar Nerve Block for mandibular arch and infiltration for maxillary arch. (Table I)

Maxillary	Infiltration	100
Mandibular	Block	97.5

Table 1 : Use of local Anesthasia administration techniques

Use of irrigating solution was found to be 46.26 % use of NaOCl in irreversible pulpitis case and 70% use of chlorhexidine in abscess case as irrigating solution. (Figure 4)

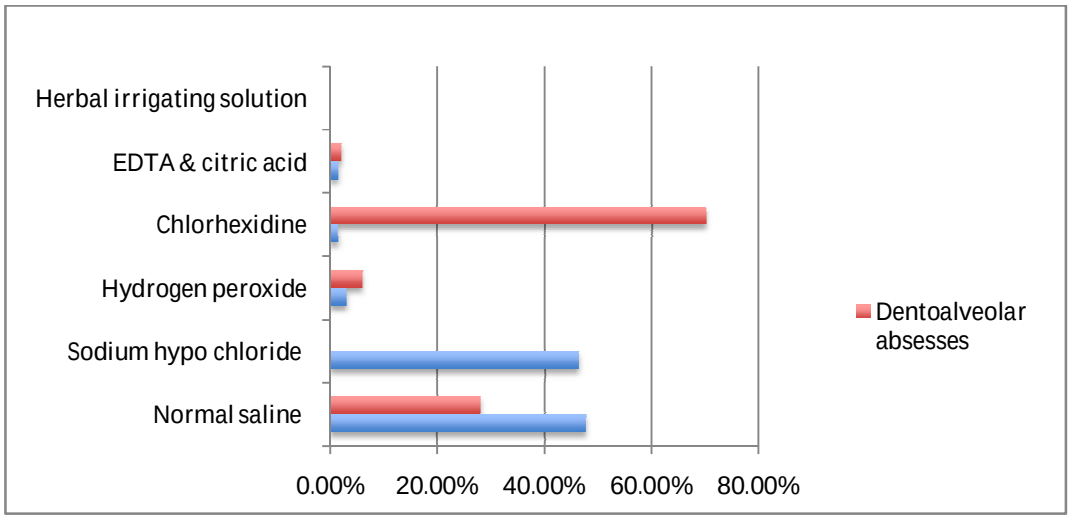

Figure 4 :Choice for irrigating solution during pulpectomy for irriversible pulpitis and dentoalveolar absesses

33.36 % use of calcium hydroxide in irreversible pulpitis case and 52% use of 2 mix antibiotic paste as intra canal medicament. (Figure 5)

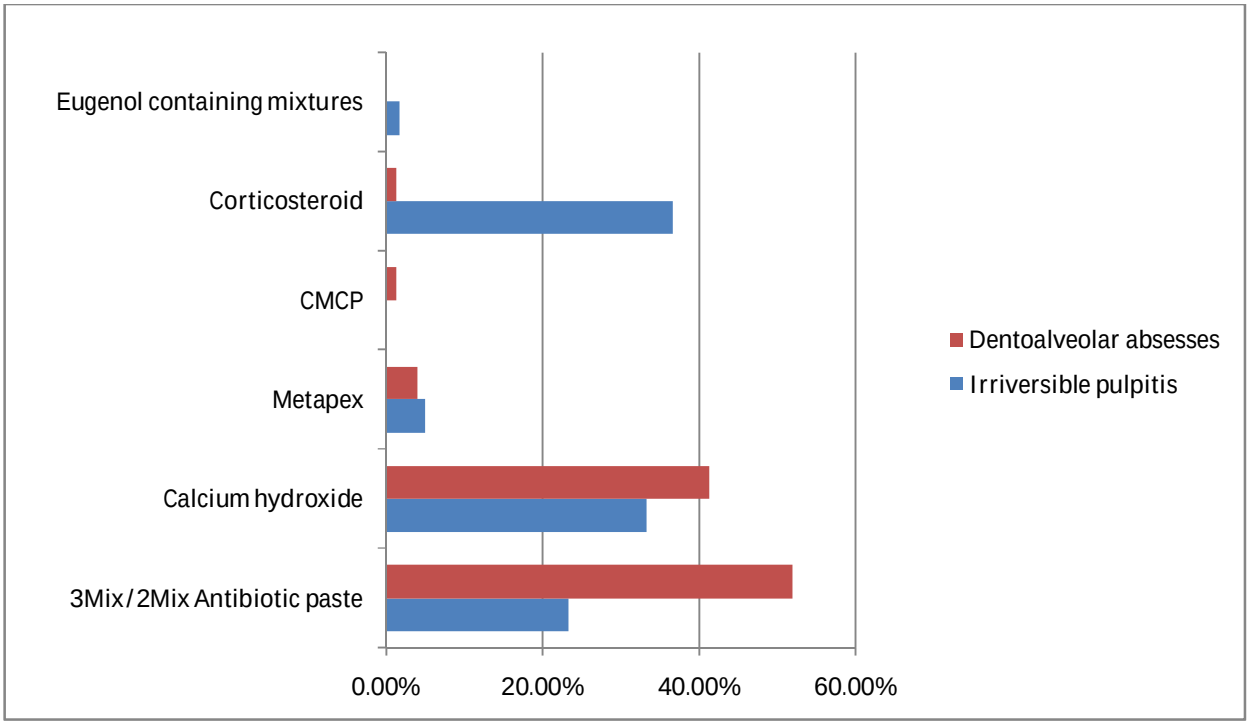

Figure 5 : Choice for intra-canal medicament during pulpectomy for irreversible pulpitis and dentoalveolar absesses

36.73% paedodontists use vitapex in irreversible pulpitis case and 90% use Endoflass in dentoalveolar absesses as root canal filling material. (Figue 6)

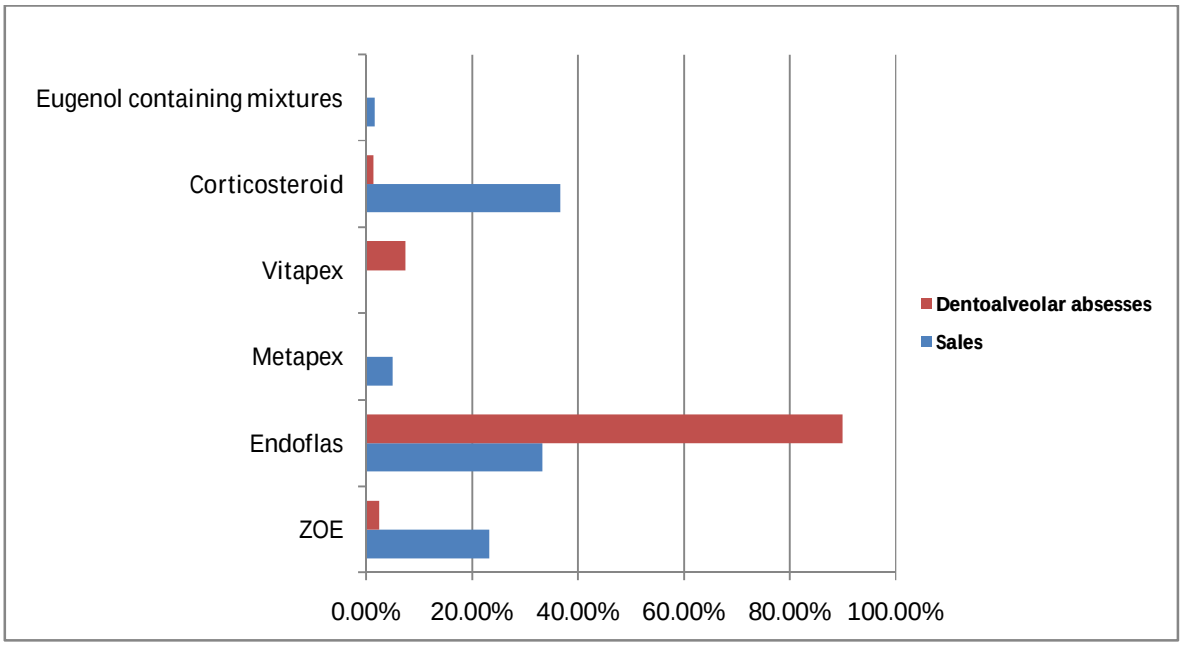

Figure 6: Choice for root canal filling material during pulpectomy for Irreversible pulpitis and dentoalveolar absesses

47.14 % paedodontists preferred using composite as definitive restorative material (Figure VII) though 100 % of them believe that full coverage restoration is necessary following pulpectomy procedure. (Figure 7)

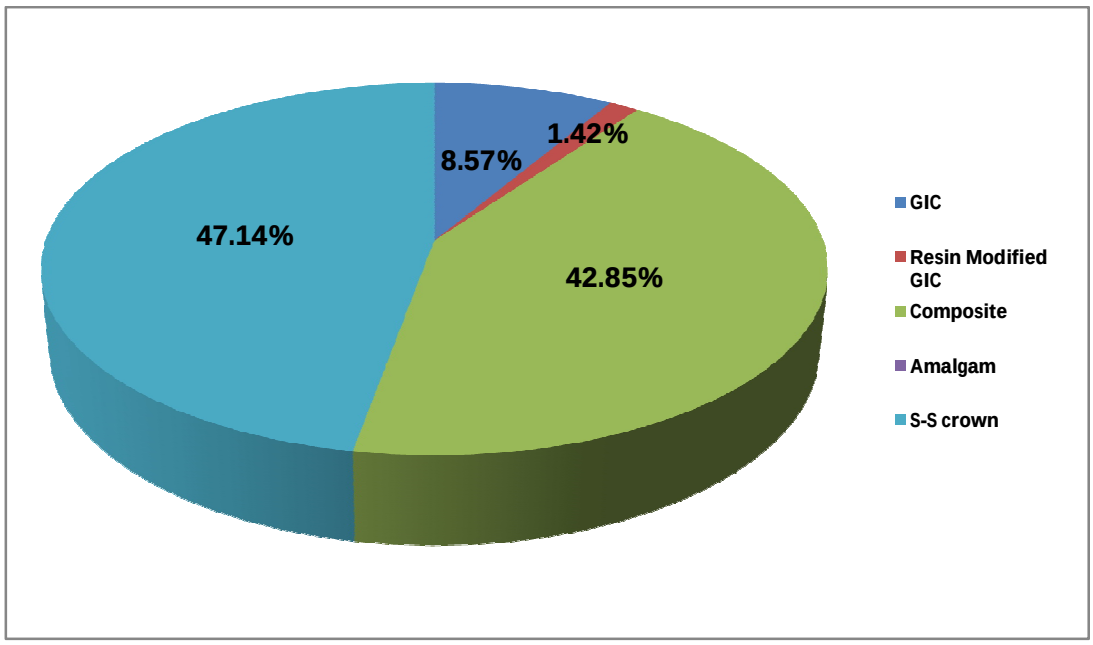

Figure 7 : Choice for Definitive Restoritive Material

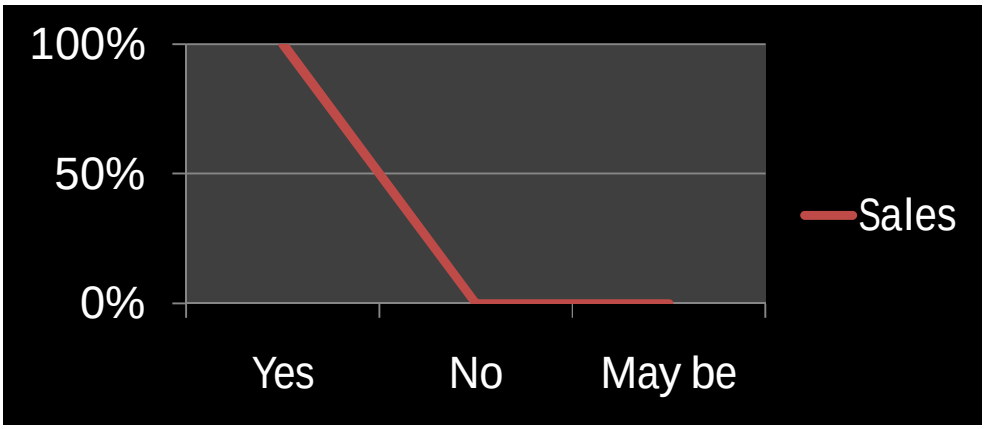

Figure 8: Preference for Full coverage restoration after pulpectomy

DISCUSSION

Management of Non- vital teeth is a challenge for a paedodontist. There are various treatment guidelines for treating Non-vital teeth. Amongst them, Guideline on Pulp Therapy for Primary and Immature Permanent Teeth by American Academy of pediatric Dentistry is widely accepted. It has laid down therapeutic interventions for pulp therapy, which are considered standardized guidelines in this study. Questionnaire was designed in a way that involves the materials and procedures mentioned in the AAPD guidelines and standard textbooks of pediatric dentistry. It was done in order to compare the result and statistically analyze the deviations from the guidelines. Treatment protocols and material choice varied though their experience.

It is an accepted fact that the success of a pulpal procedure drastically increases when performed under a rubber dam, but in the present study, there was limited dental dam use.[7] This is supported by another study, in which 97% of pediatric respondents reported that patients do not like rubber dam. However, Wolcott and Goodman reported that dentists might rationalize their failure to use a rubber dam by claiming patient resistance.[8] Dentist's motivation and positive attitudes toward rubber dams is a factor that influences patients' attitudes toward rubber dam application, thereby increasing patient acceptance.[9]

Shashirekha G et al in(2015)[10], conducted a Rubber Dam Survey and stated that Use of rubber dam was 15.4% in pediatric patients. Contrasting result was found in the present study with 45 % use of rubber dam (Figure 3). Although this suggests that 45 % of pedodontists face a problem in rubber dam application. Variations for the choice of rubber dam as an ideal isolation technique was also dependent on years of experience. Present data suggests that years of experience are directly proportional to the use of rubber dam. The main reasons among practicing dental surgeons for the lack of use of rubber dam was the lack of sufficient knowledge and training. Time and cost received

the least-important ratings. It can be concluded that the time saved by operating in a clean field with good visibility might compensate for the time spent applying the rubber dam.[10]

Use of irrgating solution was found to be in accordance to literature in the present study with 46.26 % use of NaOCl in irreversible pulpitis case and 70% use of chlorhexidine in abscess case as irrigating solution. (Figure 4)

Ercan et al (2004)[11]stated that since instrumentation and irrigation with an inert solution alone cannot adequately reduce the microbial population in a root canal system, disinfection with irrigants such as one percent sodium hypochlorite and/or chlorhexidine is an important step in assuring optimal bacterial decontamination of the canals. Irrigants play a major role in pediatric endodontics because of the bizarre internal geometry and features like internal connections and horizontal anastomoses seen in primary teeth. Microorganisms present within an asymptomatic root canal differ from those within a clinically symptomatic root canal. The most prevalent bacterial species in infected root canals of primary teeth have been found to be Enterococcus faecalis, Porphyromonasgingivalis and Treponemadenticola. Normal saline is isotonic to the body fluids. It is universally accepted as the most common irrigating solution in all endodontic and surgical procedures. It is also found to have no side effects, even if pushed into the periapical tissues. However, saline should not be the only solution to be used as an irrigant, it is preferably used in combination with or used in between irrigations with other solutions like sodium hypochlorite. Henry Drysdale Dakin and the surgeon Alexis Carrel popularized the use of buffered 0.5% NaOCl solution for the irrigation of infected wounds. NaOCl is a weak alkali that acts on the albumin (remains ofpulpal tissue, foods and microorganisms), denaturing themand turning them soluble in water. It acts on microbial cellsdisrupting their vital functions leading to cell death. The most effective irrigation regimen is reported to be 5.25% at 40 minutes. Irrigation using 1.3% and 2.5% NaOCl forthis same time interval is ineffective in removing E-faecalis from infected dentin. Altering the pH, temperature and use of ultrasonic agitationincreases the efficacy of NaOCl. Pure hypochlorite solutions,as are used in endodontics, have a pH of 12. Bloomfield and Miles confirmed that hypo-chlorites possessgreater antimicrobial activity at a lower pH.Rising temperature by 25 °C increases efficacy by a factor of 100. The dissolution power of 1% NaOCl at 45 °C is equivalent tothat of a 5.25% solution at 20 °C.[15]

According to the AAPD guidelines, disinfection with irrigants such as one percent sodium hypochlorite and/or chlorhexidine is an important step in assuring optimal bacterial decontamination of the canals. Because it is a potent tissue irritant, sodium hypochlorite must not be extruded beyond the apex.

Chlorhexidine 2% is also commonly used as root canal irrigant, but it completely lacks tissue dissolving Capability. CHX antimicrobial activity is pH dependent, with the optimal range being 5.5–0.7. 2% CHX is significantly effective against root canal pathogens like Actinomyces israelii and Enterococcus faecalis.[16,17] Two studies evaluating the antimicrobial activity of two forms of CHX (gel and liquid) of three different concentrations (0.2%, 1%, and 2%) found that the 2% gel and 2% liquid formulations of CHX eliminated Staphylococcusaureus and Candida albicans in about 15 seconds, whereasthe gel formulation killed E faecalis within 1 minute. All thetested irrigants eliminated Porphyromonas endodontalis,Porphyromonas gingivalis and Prevotella intermedia in 15Seconds. Because of its broad-spectrum anticollagenolytic activity, CHX can significantly improve the resin–dentine bond stability. In the clinically used concentrations, CHX has optimal biocompatibility. But in bactericidal concentrations it is lethal to canine embryonic fibroblasts while non-cytotoxic concentrations aids survival of bacteria. Khademi et al contradicts the use of CHX as a final irrigant in endodontic procedures stating its limited effect on gram negative bacteria compared to its effect on gram positive bacteria.[18-25]

In this study, 33.36 % use of calcium hydroxide was used in irreversible pulpitis case and 52% use of 2 mix antibiotic paste as intra canal medicament (Figure 5). Intra-canal medicaments in Endodontics havebeen used for the reduction in the number of microorganisms, rendering canal content static, prevention of post treatment pain and to improve anesthesia. Research has shown the toxicity andprobable allergenicity of the commonly usedintra-canal medicament particularly those ofphenolic and aldehyde derivatives.[27]With a widechoice of intra-canal medicament now available selection should be made according to the specialneeds of the case in question. Intra-canal medicaments are effective in reducing theincidence of post treatment pain. Use ofintra-canal medicament differs from case to caseand person to person depending on their clinicalexperience. Calcium hydroxide is the most usefulof all the intra-canal medicaments. It has aversatile action and very effective in cases of weeping canal and open root apex. It retains itseffectiveness for a long time in the root canal compared to other intra canal medicaments.Even though antibiotic has broad antimicrobial spectrum, the use of this in root canal has beencontroversial. One school of thought advocates the use of antibiotic in the root canal taking into consideration of topical and local action. Another school of thought discourages the use of antibiotics in the root canal because of many disadvantages like developing allergic reactions and immunologic reactions. Use of only root canal medicament in the control of infections is not advocated. Root canal medicaments are only an adjunct to root canal therapy. Takushige et al.[28]Evaluated the efficacy of poly-antibiotic paste consisted of ciprofloxacin, metronidazole, and minocycline, on the clinical outcome of so- called “Lesion Sterilization and Tissue Repair,” LSTR, therapy in primary teeth with peri-radicular

lesions.[29] Results showed that in all cases, clinical symptoms such as gingival swelling, sinus tracts, induced dull pain, spontaneous dull pain, and pain on biting disappeared after treatment, although in four cases clinical signs and symptoms were finally resolved only after retreatment using the same procedures.[30,31]Thus, gingival abscesses and fistulae, if present, disappeared after a few days. Efficient biomechanical preparation with copious irrigation along with the use of intra canal medicament will increase the success rate and prognosis of endodontic treatment. Estrela at al in 1999 investigate the role of vehicles in the antimicrobial effect of calcium hydroxide pastes. Different vehicles have been added to calcium hydroxide in an attempt to enhance its properties. Scientific reasoning indicates the use of hydrosoluble vehicles (distilled water, saline) associated with calcium hydroxide because of their chemical characteristics of dissociation, diffusibility and filling capability, which are decisive for the biological behavior, i.e., antimicrobial qualities and induction of tissue repair.[26]

In the present study, 36.73 % paedodontists use vitapex in irreversible pulpitis case and 90 % use Endoflas in abscess case as root canal filling material. (Figure 6)

Primary teeth with pulp necrosis are of polymicrobial in nature with predominance of anaerobic bacteria residing deeply with in the dentin and in cementum around the periapex.These microorganisms in the fins and isthmus canremain even after biomechanical preparation, thorough debridement with antibacterial irrigating agents and intra-canaldressing. Owing to the task of complete debridement relatedto the canal morphology and close presence of succedaneoustooth, the obturating material should be biocompatible andeliminate these residual pathogens. It should neutralize theirtoxic products and prevent the canal reinfection to createfavorable environment for the healing process to occur.

According to Azalp and Primoch (2015)[12]the canals are to be dried following filling of a resorbable material such as non-reinforced zinc/oxide eugenol, iodoform-based paste (KRI), or a combination paste of iodoform and calcium hydroxide (Vitapex®, Endo ax®) is used to fill the canals. e tooth then is restored with a restoration that seals the tooth from micro-leakage. [13,14]

Zinc oxide eugenol (ZOE) might be the most popular medicament, but its success rate varies. However, the dentists cited the ease of availability as the main reason for the selecting ZOE. Therefore, the use of ZOE might be acceptable, but the use of a combination of calcium hydroxide and iodoform, which are commercially available, should be encouraged, as both show higher success rates in the long run. The present study also supported the use of this combination, which has the advantage of easy cleaning and removal, excellent anti- bacterial effect, and radiopacity. It is also available in premixed paste in a convenient syringe, which makes the root canal easily accessible and prevents cross-contamination. However, for necrosed teeth, using combinations of antibacterial

drugs consisting of ciprofloxacin, metronidazole, and minocycline or ciprofloxacin, ornidazole, and minocycline is widely accepted.[32-35]

Most pediatric dentists consider stainless steel crowns an ideal permanent restoration after every pulp therapy. The pulp therapy leaves the treated tooth more brittle, which might subsequently fracture. This has led to cuspal coverage after endodontics in primary and permanent teeth. It is therefore recommended that placing a stainless steel crown in the first place prevents postoperative failure. In the present study, 47.14 % paedodontists prefer using composite as definitive restorative material though 100 % of them believe that full coverage restoration is necessary following pulpectomyprocedure(Figure 7,8).

CONCLUSION

1. Most of the treatment protocols are been followed in accordance to the American Academy of Pediatric Dentistry (AAPD) guidelines for management for pulp therapy of primary tooth while preferences show disparity in terms of isolation, choice of intra-canal medicaments and choice for definitive restorative material.
2. Emphasis should be made on the use of rubber dam isolation. If practitioners realize rubber dam's advantages such as increased treatment quality, its use would be irresistible.

A study was designed to bridge these lacunae. It will help to compare the best evidence protocols with what is being actually practiced and improve patient care. This study would not only help in monitoring endodontic diseases trends but also evaluate and assess endodontic treatment protocols.

With an ever-expanding cohort of paedodontists in India, a survey needed to gauge the commonly selected practices. It is also important to compare the choices and find the need of updating knowledge for materials.

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