

Comparative Analysis Of Use Of Topical Anesthetics And Local Anesthetic Infiltrations Among Pediatric Dental Patients - A Retrospective Study

Research Article

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Abstract

Aim of this study was to assess the use of topical anesthetics and local anesthetic infiltrations in pediatric dentistry. Local anesthesia is one of the most commonly used agents in dentistry. Pain control in dental treatment for children is very important. Pain and anxiety related to dentistry has been historically the main reason for poor attendance to the dentists particularly children. Topical anesthetics alter pain thresholds by controlling pain sensations through a blockade of signals that are transmitted from the peripheral sensory nerve fibers. Usage of topical anesthesia can widely reduce pain and pain associated with needle prick. The purpose of this study is to evaluate the usage of both topical and infiltration local anesthesia in pediatric patients visiting saveetha dental college and hospitals. Total of (n=109) subjects who visited an institution were evaluated. All the details required for the study such as age, type of local anesthesia used were retrieved retrospectively and evaluated using SPSS software. Topical anesthesia is less used (n=41) and no association between age and type of anesthesia being used, All age groups of children receive topical anesthesia but it is found to be less number when compared to infiltration. Within the limitations of this institution based study it was concluded that there is lesser usage of topical anesthesia in pediatric dentistry. Topical anesthesia was used frequently only while treating upper posterior teeth. Using topical anesthesia prior to infiltration can reduce anxiety and reduce the needle prick pain as well.

Keywords: Anesthesia; Infiltration; Pediatric Dentistry; Pain; Topical.

Introduction

Pain is a multidimensional phenomenon, and its treatment in children reflects both the nature of pain and attitudes towards pain in children [1]. Effective pain control is critical in dentistry. Treating the patients painfully has been shown to be important in the etiology of dental fear and anxiety. People who are hurt while receiving dental care as children are more likely to avoid dental care as adults [2, 3]. Pain and anxiety related to dentistry has been historically the main reason for poor attendance to the dentists particularly children [4]. Managing behavior and anxiety so a child can become a cooperative dental patient is critical to the success of treatment [5].

Local anesthesia is the most commonly used agent in dentistry.

Effective local anesthesia is arguably the single most important phenomenon in which current dentistry stands. Paradoxically, the injection of local anesthetic is also becoming one of the greatest sources of patient anxiety, and inability to obtain adequate pain control with minimal discomfort remains a significant concern of dental practitioners. Although the traditional aspirating syringe is the most common method by which local anesthetics are administered [6], However, there is a persistent search for ways to avoid the invasive and often painful nature of the injection, and find a more comfortable and pleasant means of achieving local anesthesia before dental procedures [7, 8]. Continuous use of local anesthesia makes dentists to become confident about its usage and leading to forget its adverse effects such as local anesthetics toxic reaction most commonly syncope [9, 10]. In previous studies it has been found that there are no specific techniques that

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make a successful local anesthesia [11]. However sometimes using topical anesthesia will reduce pain while injecting infiltration or a nerve block, the primary usage of a topical anesthesia is to reduce the pain sensation needle prick through the soft tissues of the oral cavity [12]. It has been suggested that topical anesthesia should be placed on a dry oral tissue surface to reduce needle penetrating pain to greater extent [13].

Topical anesthetics alter pain thresholds by controlling pain sensations through a blockade of signals that are transmitted from the peripheral sensory nerve fibers. However, they are only effective in blocking the pain stimuli in the superficial layer of the mucosa [14]. Local anesthetics that are used for topical anesthesia should have high mucosal permeability in order to effectively and easily reach free nerve terminals. Vasoconstrictors are not added to topical local anesthetics due to the reason that it undermines mucosal permeability [15]. Furthermore, topical local anesthetics are actually more concentrated than injectable local anesthetic forms which help it to promote diffusion after passing through the soft tissue. The most popular topical anesthetic preparation is benzocaine 20% gel due to its rapid onset of action (30 seconds), acceptable taste, and lack of systemic absorption. Lidocaine 5% ointment is less frequently used as it has a slower onset of action (2-5 minutes) [16], less acceptable taste, and greater potential for complications associated with systemic absorption due to its water solubility [17]. The use of different types of anesthesia and oral premedication [18] all have been suggested to influence the effectiveness of pain control [19]. These factors can be classified as dentist-dependent or child characteristics or behaviors [20]. Provided with a little solid information about the effectiveness of pain control in pediatric dentistry. We undertook a retrospective study to add knowledge. Previously our team has a rich experience in working on various research projects across multiple disciplines [21-35]. The aim of this study was to assess the use of topical anesthetics and local anesthetic infiltrations in pediatric dentistry.

Materials And Method

Study Design

This study was based on Saveetha dental college and hospital (university setting). The case records of 86000 patients visiting Saveetha Dental College were analysed and a total of 109 pediatric patients visiting the pediatric department were analysed.

Sampling Technique

This study was based on a non probability convenience sampling. To minimize the sampling bias all the case sheets were reviewed and included.

Ethical Clearance

This study was approved by the research ethical committee of saveetha dental college and hospitals.

Data Collection And Technique

All the data of the patients undergone extraction was retrieved retrospectively. sample size was estimated to be 110 pediatric patients visited the pediatric department of saveetha dental college

and hospital between June 2019 to March 2020.

Inclusion criteria

- Children between 1 to 15 years of age.
- Treatments using local anesthesia.

Exclusion criteria

- Children above 15 years of age.

In case of doubts or discordance of Data, the patients were contacted over the phone or asked to report back to the College to confirm the findings.

Statistical Analysis

All the statistical data was done using SPSS software (version 2019). Mean, standard deviation and all descriptive analysis were done for age, gender and demographic data. Chi square test was done to analyze association between categorical variables. And ($p < 0.05$) was set to be statistically significant.

The internal validity of the study was established as the data was collected from a verifiable and standardised database. The external validity is established as the data is from a clinical setup which is duplicatable.

Results And Discussion

Out of ($n=109$) pediatric patients male ($n=70$) and female were found to be ($n=39$) (Figure 1). And the age group of the subjects was found to be ranging from 1 to 15 years of age. 1-5 years ($n=9$), 6-10 years ($n=69$), 10-15 years ($n=31$) (Figure 2). Higher number of subjects were from the age group of 10-15 years of age. Type of local anesthesia used: lignocaine with adrenaline/infiltration was found to be used in higher numbers when compared to topical anesthesia (Figure 3). This implies less usage of topical anesthesia prior to infiltration or nerve block. Correlation between age and the type of local anesthesia: in this we found there is no significant correlation between age and different types of local anesthesia used ($p > 0.05$) (Figure 4). In most of the pediatric patients topical anesthesia was not used. Correlation between site of tooth and local anesthesia used: topical anesthesia is used in higher numbers when treating upper posterior teeth ($p < 0.05$) (Figure 5). This can be because of the reason to reduce pain while administering infiltration anesthesia in the upper posterior especially in the palatal side which is more painful.

The word anesthesia is a derived word from the Greek words an- ("without") and aesthesis ("sensation"). Anesthesia is broadly divided into general and local anesthetics. Local anesthesia refers to a loss of sensation caused by a reversible blockade of nerve conduction around the site of application. In dentistry, local anesthetics are administered via a variety of anesthetic techniques that are classified according to their specific effects as (1) conduction anesthesia, (2) infiltration anesthesia, (3) topical anesthesia or surface anesthesia [36, 37]. The actual efficacy of topical anesthesia is reducing pain associated with intraoral injection of local anesthesia [38-40]. Although the actual efficacy of topical anesthesia in reducing pain associated with the intraoral injection of local

Figure 1. Pie chart shows gender distribution among subjects. It was inferred that more number of male kids (blue colour 64.22%) were assessed in this study.

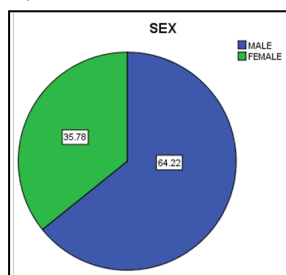


Figure 2. Pie chart shows the age groups of the study subjects. It was inferred that more number of study subjects are from the age group of 6-10 years of age (63.30%, green colour).

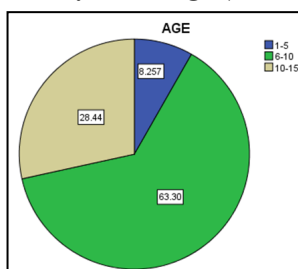


Figure 3. Bar chart shows different types of local anesthesia used in pediatric patients. (X axis represents the type of LA ; Y axis represents the number of cases). It was inferred that topical anesthetic is used in less number while treating pediatric patients (n=41, blue colour) when compared to lignocaine with adrenaline (n=68, green colour).

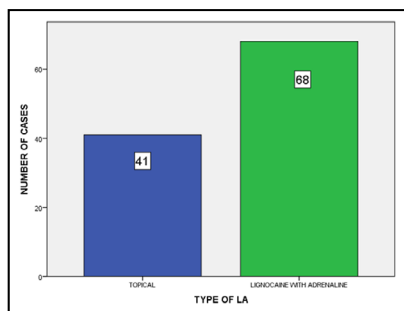
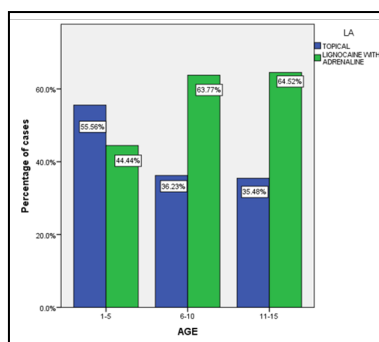


Figure 4. Shows association between age and type of anesthesia used. (X axis represents the age of the subject in years; Y axis represents the percentage of cases). It was inferred that topical anesthesia was preferred for treating children in the age group of 1-5 years (55.56%, blue colour). Among the age groups between 6 to 15 years old children lignocaine with adrenaline was used more frequently (green). However the analysis showed that the association between age and the type of anesthesia was not statistically significant,(chi square test, p=0.057 (p>0.05) statistically not significant).

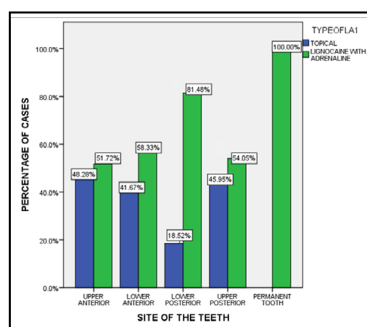


anesthesia is in dispute, its routine use is still strongly advocated [41]. Acute pain can be due to psychological factors, such as anxiety, fear, perceived control over the stimuli and trust, which may always account for the equal findings of topical anesthesia efficacy used in dentistry [42]. And while disposing of biomedical waste it should be taken care of in such a way that it has been in no sight of children [43]. In this study the age distribution was ranging from 1 to 15 years of age. There is no increased usage of topical anesthesia in infants. Some practitioners prefer topical

anesthesia as the infant has fear towards needles. This was found to be in agreement with previous studies [44, 45], where authors suggested that there is no correlation between age and sex and local anesthesia used. one in ten pediatric patients was found to have ineffective pain control in the OP. This rate was confirmed in analyses of the reports of the dentists themselves.

Previous studies also suggest that the mucosal contact of 1-2 min is essential for topical anesthesia is essential for its full potent

Figure 5. Shows association between site and type of anesthesia used. (X axis represents the site of the tooth; Y axis represents the percentage of cases). Lignocaine with adrenaline was preferred over topical anesthesia for all the teeth treated. Topical anesthesia (blue) was used more frequently while treating upper anteriors. Lignocaine with adrenaline (green) was used more frequently while treating lower posteriors. However, it was inferred that the site of tooth did not influence the type of local anesthesia (chi square test, $p=0.057$, $p > 0.05$. statistically not significant).



usage [46]. Our institution is passionate about high quality evidence based research and has excelled in various fields [47-57]. In this study we also found that the topical local anesthesia is used in higher numbers when treating the upper posterior teeth. This can be mostly due to the fact that the prior usage of topical local anesthesia before injection can reduce the pain associated with the needle prick. This is found to be in agreement with the previous literature [58, 59]. In this study we compared only the usage of local anesthetic spray and infiltration. This is a retrospective study, there was no direct patient interaction to evaluate pain. Further studies with large sample size and direct patient evaluation is required which can assess the benefits of topical anesthesia in pediatric dentistry. Further studies with large sample size and direct patient evaluation is required which can assess the benefits of topical anesthesia in pediatric dentistry.

Conclusion

Within the limitations of this institution based study, it was concluded that topical anesthesia was preferred over local anesthesia in the age group of 1 to 5 years old children. Local anesthesia was preferred for age groups between 6 and 15 years old children. Topical anesthesia was used frequently only while treating upper posterior teeth.

Author Contributions

Santosh had contributed to the design of the study, data collection, analysis of data, results tabulation, manuscript preparation. Balakrishna RN had contributed to the design of the study, analysis of data, results, manuscript preparation.

Sankari had contributed to the design of the study, manuscript preparation, proofreading of the manuscript.

Conflict Of Interest

This research project is self funded and is not sponsored or aided by any third party. There is no conflict of interest.

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