

Preference Of Parents Towards The Type Of Topical Fluoride Application For Children With Permanent Dentition

Research Article

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Abstract

Introduction: Topical fluoride application helps in preventing tooth erosion and prevents caries. This fluoride is incorporated with the tooth structure in the form of fluorapatite crystals thereby making the surface more resistant to acid dissolution. Fluoride helps in restricting plaque metabolism, alters plaque composition and reduces the activity of plaque to produce large amounts of acid from carbohydrates.

Materials and Method: the current study was done under a university setting of Saveetha Dental College as a retrospective study. The total sample size after eliminating bias is 917. Inclusion criteria includes patients with an age group 13-17 years who all underwent topical fluoride application while exclusion criteria includes unclear photographs of fluoride application and error data. SPSS software is used for statistical data analysis with the Chi-square test.

Results and Discussion: The results of the current study shows that parents of both male and female pediatric patients prefer topical fluoride gel (99%) application over varnish (0.9%). There was no difference in the preference based on gender of the patient (p-value > 0.05).

Conclusion: The current study concludes that parents of both male and female paediatric permanent dentition patients prefer the usage of topical fluoride gel due to its effective post-treatment action.

Keywords: Topical Fluoride; Innovative Method; Permanent Dentition; Dental Caries.

Introduction

Dental caries is described as one of the chronic diseases all around the world and otherwise it is referred to as tooth decay. This caries develops either in the crown or roots of the tooth and can arise at an early childhood stage thereby affecting the primary dentition of children [1]. These dental caries are caused by the interaction between the acid-producing bacteria, fermentable carbohydrates and other host factors that come in contact with the tooth [2]. It is a kind of biofilm mediated, multifactorial, sugar driven disease that results in demineralisation of the tooth structure and undergoes phases of remineralisation of dental hard tissues [3]. The initiation and progression of dental caries are caused by imbalance in the pathological and protective factors. Dental caries is referred to as a preventable disease with substantial economic and

quality of life burdens [4]. Previous studies have documented the substantial decline of caries prevalence among highly industrialised countries around the world with reduction of lifetime caries experience exceedingly more than 75% [5]. Many articles depicted that the prevalence of dental caries around the world is found to be 60%-90%, that is six to nine children out of 10 are affected by dental caries [6]. The progression of caries differs within countries, economic status, education and employment. The progressive destruction of dental tissues is accompanied with severe pain and suffering [7]. This dental caries can be prevented by bringing up slight changes in the diet and nutrition of the individual [8]. It can also be prevented by application of fluoride gel and varnishes [9].

Around the developing countries, application of fluoridated

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toothpastes was found to reduce the incidence of dental caries and thereby prevent the dental tissues [10]. The use of fluoridated toothpaste came into practise and was officially endorsed by WHO in the 1960's [11]. Fluoride is also added in drinking water for increasing the amount of fluoride in the body. There is a successful reduction in incidence of dental caries in many countries that began from 1940 [12]. Fluoridated salt and water also plays an important role in decreasing the incidence and progression of dental caries [13]. Oral fluoride applicants are of two types. One is biological reservoirs in which fluoride interacts with the bacteria by forming calcium bonds [14]. The other type is mineral reservoirs. This type is known as phosphate contaminated "calcium fluoride like deposit" [15]. The content of fluoride reservoirs are found to be increased through topical fluoride application by using novel procedures [16]. This fluoride therapy is low-cost and is an easily operated treatment that is used to arrest active dental caries [17]. This fluoride is incorporated with the tooth structure in the form of fluorapatite crystals thereby making the surface more resistant to acid dissolution [18]. Fluoride inhibits the process of demineralisation, and enhances the speed of enamel remineralisation along with increase in the mineral content of affected teeth [19]. Fluoride helps in restricting plaque metabolism, alters plaque composition and reduces the activity of plaque to produce large amounts of acid from carbohydrates [20]. Though the complete mechanism of fluoride action is unknown, it is generally acknowledged that fluoride has an effect on the tooth surface.

The other commonly used sources of fluoride are through toothpaste, diet, fluoride supplements, water supply in developed countries, dentifrice, and fluoridated toothpaste and fluoride varnish [21]. Systemically taken fluoride is through fruit juices, carbonated fluoride, infant formulas and certain cereals contain fluoride within them [22]. Previous studies have stated that the application of topical fluoride in combination with the use of fluoridated toothpaste have achieved a modest decrease of dental caries when compared with use of fluoridated toothpaste alone [23]. The application of topical fluoride should be considered only after the overall review of patient general health and vulnerability to diseases. Our team has extensive knowledge and research experience that has translate into high quality publications [24-36, 37-43]. The aim of this study is to analyse the preferences of fluoride application for children with permanent dentition.

Materials and Methods

The current study was a retrospective study that is conducted under a university setting in the outpatient department of Paediatric

and Preventive Dentistry, Saveetha Dental College. The advantages of this study include the population of various strata of society and available data while the disadvantages include the study being unicentric, geographical trends that cannot be assessed. Ethical approval was obtained from the institutional committee (ethical approval number: SDC/SIHEC/DIASDATA). Data that is procured by reviewing patient records and analysed data of patients from June 2019 to February 2021. The total case sheets analysed for the study were 1,52,890. To eliminate bias, simple random sampling was done to narrow down the sample size to 917. Verification of the data was done with the presence of additional reviewers procedure notes and photographs of application of fluoride. Stratification and randomisation were done to minimise sampling error. Data that were incomplete were excluded. The obtained data were tabulated in excel systematically. Data were then entered in the SPSS analysis software and descriptive analysis and correlation statistics (chi-square test) were performed. The obtained results were tabulated and graphically represented.

Results

Among the study participants, 26.9% and 22.2% of patients belong to the age of 13 and 17 respectively. 15.7%, 16.9% and 18.2% of patients are with an age group of 14, 15 and 16 (figure 1). Among them 50.6% and 49.2% of patients were male and female children respectively while 0.11% was transgender (figure 2). 99% of patient's parents preferred topical fluoride gel application while 0.9% of patient's parents preferred topical fluoride varnish application (figure 3). There was no difference in the preference based on gender of the patient (figure 4). Pearson's chi-square test was done and the p-value was found to be 0.266 which was statistically not significant.

Discussion

The Council of Scientific Affairs (CSA) of the American Dental Association (ADA) issued recommendations for the professional application of topical fluorides for prevention of caries. Topical fluorides are mostly found to be incorporated in toothpaste due to their defensive properties against caries [44]. These fluorides are applied for children whose teeth comprehend certain structural defects or those who exhibit decalcified areas with high risk for caries development. Patients with early childhood caries are highly prone for application of topical fluoride treatment other than fluoridated toothpastes [45]. This accounts for the current study stating that application of topical fluoride is predominantly

Figure 1. The graph represents the age group of the patients with the application of topical fluoride. The X-axis represents the age of the patients while the Y-axis represents the percentage of patients with topical fluoride application. 26.7% and 22.3% of patients belong to the age of 13 and 17 respectively. 15.7%, 16.9% and 18.1% of patients are with an age group of 14, 15 and 16.

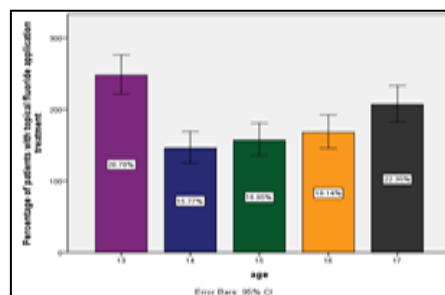


Figure 2. The graph represents the percentage of patients who underwent topical fluoride application in respect to their gender. The X-axis represents the gender and Y-axis represents the percentage of patients with topical fluoride application. 50.9% and 49% of patients belong to male and female respectively.

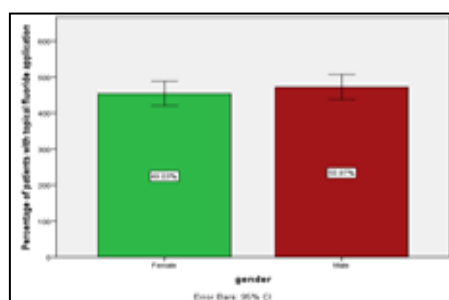


Figure 3. The graph represents the prevalence of type of topical fluoride application treatment. The X-axis represents the different types of fluoride application treatment and Y-axis represents the percentage of prevalence of the type of fluoride application treatment. 99% of patient’s parents preferred topical fluoride gel application that is indicated by blue color while 0.9% of patient’s parents preferred topical fluoride varnish application that is depicted by yellow color.

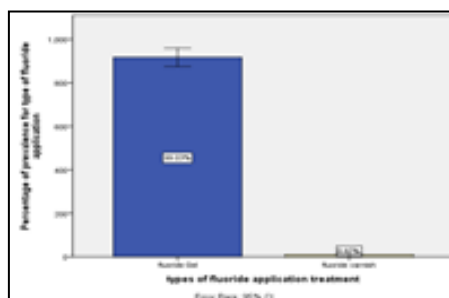
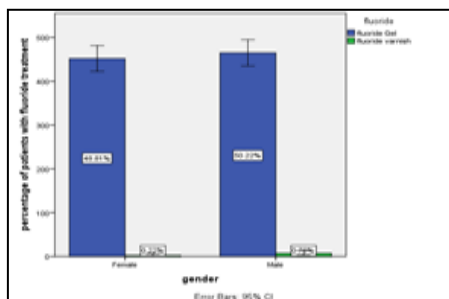


Figure 4. The graph represents the correlation between the percentage of patients with fluoride gel and varnish application with respect to their gender. The X-axis represents the gender of the patients and Y-axis represents the percentage of patients with fluoride application. Blue color indicates the prevalence of parents about the use of topical fluoride gel that was observed to be 48.8% in female patients and 50.2% in male patients. Similarly, the preference of parents for the application of fluoride varnish was found to be 0.22% in female and 0.76% in male patients. There was minimal difference in the preference based on gender of the patient. Pearson’s chi-square test was conducted and the p-value is found to be 0.268 which is statistically not significant.



seen in 13 year old children that is followed by 17, 16, 15 and 14 years of age with permanent dentition. Previous studies have reported that parents preferred the use of topical fluoride gel application in children which is found to be the most effective method of preventing early childhood caries than fluoride rinse or varnish [46]. The current study is on par with the former study affirming that fluoride gel application preference is higher when compared to that of fluoride varnish. Application of topical fluoride gel has supplementary advantages since it acts by restoring the minerals to tooth surfaces. Fluorides does not help in removal of caries, rather it creates a strong outer surface over the tooth that prevents the decay from further penetrating into the surfaces [47]. The only disadvantage of topical fluoride gel is the treatment time is 6 minutes whereas for topical fluoride varnish it is 2minutes. this time consumption is due to the technique of application of fluoride gel using trays [48].

The concentrated form of topical fluoride is referred to as fluoride varnish which has a concentration of 22,600ppm (2.26%) that is applied to tooth structures by using small brushes with sodium fluoride as its active ingredient. The use of fluoride varnish is the application time that is shorter than fluoride gel, since shorter duration procedures are well tolerated by pediatric patients. Similarly, fluoride varnishes can be applied by both dental and non-dental health care professionals with a variety of settings [49]. The only risk factor that is attained in fluoride application is the development of fluorosis where there is an ingestion of fluoride into the developing bone and tooth structures [50]. The other way of application of fluoride is by the over-the-counter fluoride rinse that has a lower concentration of sodium fluoride when compared to gel and varnishes. This rinse is not recommended for children with primary and mixed dentition since there

is a high risk for swallowing the rinse water and limited ability to rinse and spit [51]. The other risk factor of application of fluoride supplements is fluoride toxicity, that is rarely and particularly seen in children due to ingestion of large quantities of fluoride supplements. The lethal dose of fluoride in children is found to be between 8 and 16mg/kg [52].

The advantages of this study imply that this study was performed with available data and population of variant economic stature. The limitations of the study include that it was performed as a unicentric study, smaller sample size, unequal distribution and geographical trends not assessed. Larger sample size and different ethnicity of the participating patients can yield better results. It is also essential to create awareness of the importance of fluoride with respect to various factors such as control early childhood caries, reduce caries risk in children among parents and the general population.

Conclusion

Within the limits of the present study, fluoride gel was more preferred by the parents of children with permanent dentition. There was no gender based preference noticed. Furthermore studies have to be conducted with increased sample size to affirm this statement with significant statistical data reports.

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