The role of fluoride in the prevention of tooth decay

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Abstract

Aim and objectives; This study aims to demonstrate the need for fluoridation at an early age, in order to reduce the risk of tooth decay. Local fluoridation, associated with oral hygiene and general fluoridation, combined with a rational diet, scientifically designed in the spirit of non-karyogenesis, systematically applied in preschool and school children, has allowed a significant reduction in frequency and intensity indices of dental carie, in European populations with high economic and health standards. Systematic oral hygiene, generalized in school children through educational methods has led to a reduction in the rates of marginal gingivitis.

Material and methods; 50 children aged 6-12 years were selected and randomly divided into two groups (n = 50): (1) control: no preventive intervention oral hygiene instructions; (2) oral hygiene instructions and fluoride varnish at baseline and 6 months later. At baseline and 6 and 12 months after the intervention, caries risk reduction was the primary outcome.

Results; A total of 43 completed the study. There was no significant difference between groups. Oral Hygiene Instructions alone or associated with the use of fluoride varnish reduced the caries incidence in young children.

Conclusions; The incidence of dental caries in young children was decreased by oral hygiene instructions either by themselves or in conjunction with fluoride varnish use.

Keywords: tooth decay, fluoride-based substances, prophylactic measures, oral hygiene, oral health, periodontal disease

INTRODUCTION

Fluoridation has been talked about since the end of the 18th century, when various articles appeared in the European press. They promoted fluoride as a method of combating tooth decay. It was then believed that the addition of 100g of fluorine in powder form could help remedy dental disease. Attention has also been drawn to calcium fluoride tablets that appeared in Denmark in the early 20th century, they were supposed to help "fix tooth decay" (R. Allan Freeze, Jay H. Lehr, 2009). [1]

In 1901, an American surgeon, John M. Eager, sent to Naples, noticed and described the appearance of dark brown spots on the teeth. He wrote a statement about what was happening and the following year was the first article published by the Public Health Service on the subject. [2]

Temporary teeth have an important role in forming and guiding permanent ones. Tooth loss is most commonly caused by untreated tooth decay. The caries process progresses if left untreated. That is why it is important to be treated early. [3] By affecting the temporary teeth by the caries process, it is possible to reach the penetration of the permanent tooth bud.

Fluoride is known to primarily help remineralize tooth enamel, which strengthens teeth and removes their sensitivity. If the temporary teeth have demineralized enamel, it is recommended to use fluoride to remineralize the enamel. Through its mechanism of action, fluorine, forms a hydroxyapatite crystal that enter the enamel and form fluorapatite. [4, 5]

For fluoride treatment to be effective, the patient must have good dental hygiene and follow regular visits to the dentist's office. In order for the fluoride treatment to be as good as possible and to give results, it is also recommended to use different methods for the home, such as fluoride toothpastes, mouthwashes, but only according to the dentist's instructions. [6] Fluoridation is a process by which the tooth is given an additional supply of fluoride, thus increasing its resistance to caries and stopping the evolution of caries already formed. [7-9] Fluoridation is a non-invasive technique, and easily accepted by patients of all ages, and is also a painless method. The multitude of existing fluoridation methods allows the choice of the most effective for each patient. Fluoridation can be used even in early caries, the process of which is slowed down due to the intake of fluoride, which combats the demineralization of tooth enamel. [10-12]

Aim and objectives

This study aims to demonstrate the need for fluoridation at an early age, in order to reduce the risk of tooth decay. Local fluoridation, associated with oral hygiene and general fluoridation, combined with a rational diet, scientifically designed in the spirit of non-karyogenesis, systematically applied in preschool and school children, has allowed a significant reduction in frequency and intensity indices of dental carie, in European populations with high economic and health standards. Systematic oral hygiene, generalized in school children through educational methods has led to a reduction in the rates of marginal gingivitis.

MATERIAL AND METHODS

There are fluoridation methods that can also be used at home, such as fluoride toothpastes (Fig. 4), mouthwashes, floss (fig. 5) and fluoride toothpicks.

The success of fluoridation is seen in time, depending on the chosen treatment method, sooner or later. The effectiveness of the treatment also depends on the patient's oral hygiene, on how he follows the instructions given to him by the dentist.

We conducted a research on a group of 50 children aged 6-8 years and 8-12 years, of different sexes.

Exclusion Criteria

- ✓ medical history of systemic diseases
- ✓ drug allergies
- ✓ congenital physical or mental disabilities
- ✓ oral or dental anomalies or disabilities
- ✓ unwillingness to participate due to lack of time

Inclusion Criteria

- ✓ at least 4 erupted primary teeth
- ✓ none of the teeth showed signs of noncavitated or cavitated caries
- ✓ age between 6-12

A sample size of 50 persons was estimated

Figure 1. Application of fluoride varnishes

Figure 2. Application of fluoride gel

Figure 3. Fluoride sealing

Figure 4. Fluoride toothpaste

Figure 5. Dental floss

After dental examinations the children were randomly divided into two equal groups of 25 participants each.

Group 1 (Control) - Control group participants did not receive any oral health care intervention. The placebo, a water-based colored solution similar to FV, was painted over the tooth surfaces, and the placebo varnish was applied at baseline and at the 6-month follow-up appointment.

Group 2 (Test) - The parents received oral health instruction. The dentist cleaned the children's teeth by brushing and isolated them with cotton rolls. FV that contained 5% sodium fluoride was applied with a disposable brush to all tooth surfaces and left for 1 min. A small amount of varnish was applied to all primary teeth at baseline. The parents were advised not to allow the child to eat rough (abrasive) foods for the remainder of the day [Holve, 2008] and not to brush until the following day [Weyant et al., 2013]. The FV was applied again 6 months later.

RESULTS

This study aims to demonstrate the need for fluoridation at an early age, in order to reduce the risk of tooth decay. Local fluoridation, associated with oral hygiene and general fluoridation, combined with a rational diet, scientifically designed in the spirit of non-karyogenesis, systematically applied in preschool and school children, has allowed a significant reduction in frequency and intensity indices of dental carie, in European populations with high economic and health standards. Systematic oral hygiene, generalized in school children through educational methods has led to a reduction in the rates of marginal gingivitis. We conducted a research on a group of 50 children aged 6-8 years and 8-12 years, of different sexes. (table 1)

Table 1. Classification of patients according to age

age	Group 1 (n=25)	Group 2 (n=25)
6-8	11	10
8-12	14	15
total	25	25

In children aged 6-8 years, poor oral hygiene was found, as they needed more training in brushing their teeth. In the category of 8-12 years, better oral hygiene was found (fig. 6)

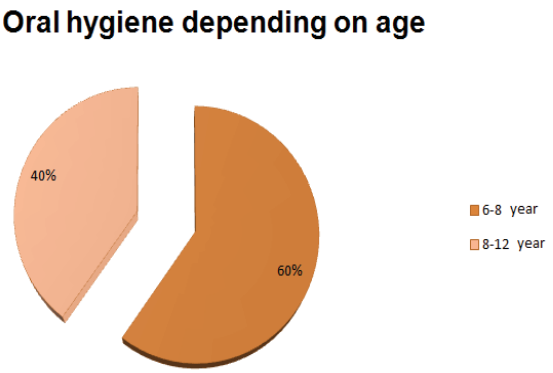

Figure 6. Oral Hygiene depending on age

Of the total number of patients examined, there were 27 girls (54%) and 23 boys (46%). Better oral hygiene was observed in girls than in boys. Regarding the need for fluoridation in both cases, a deficiency of fluoride was observed in the oral cavity. Fluoridation was performed on groups of teeth, but also isolated on a single tooth, the needs being different for each. (fig. 7)

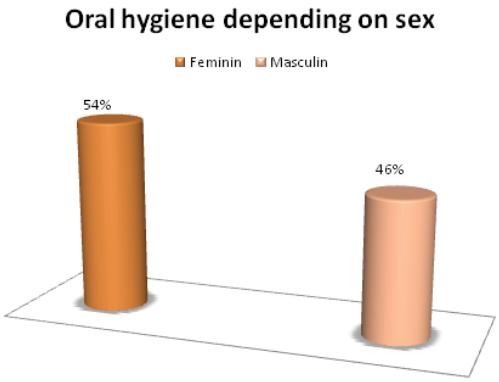

Figure 7. Oral hygiene depending on sex

The predisposition to dental caries is diffrent from one patient to another, so we have patients with low predisposition to caries, medium and high. This predisposition interests us to see to what extent it is necessary to perform dental fluoridation and to know the number of people affected to determine the necessary treatment. Fluoridation helps to strengthen teeth

and prevent the formation of cavities, so by establishing the predisposition to caries of each can be established fluoridation by the most appropriate method. (fig. 8)

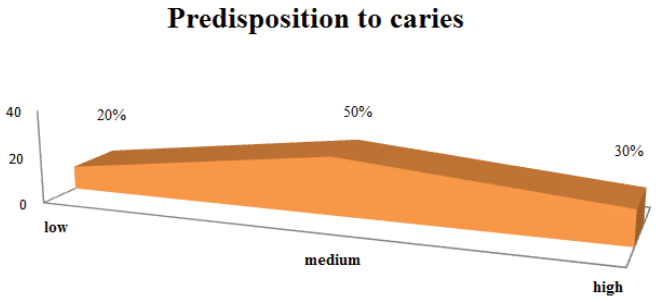

Figure 8. Predisposition to caries

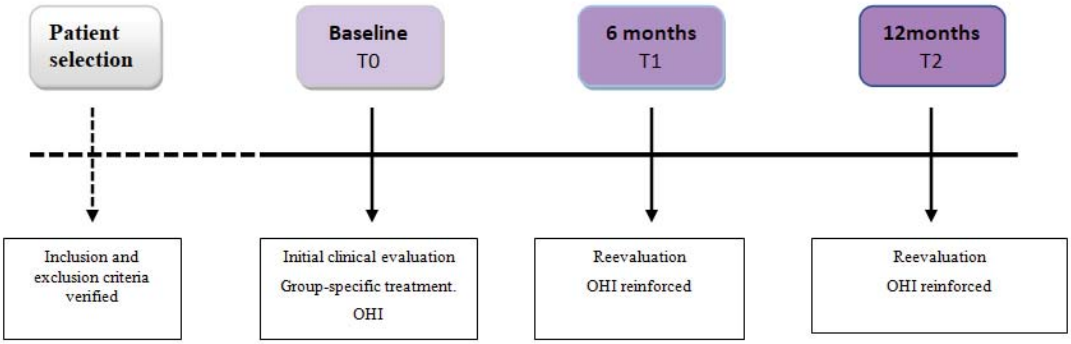

Figure 9. TIMEFLOW

Table 2. Reduction in caries incidence during the follow-up period

caries	Group 1 (n=25)	Group 2 (n=25)
6 months	1	-
12 months	2	2
Difference to baseline	3	2

DISCUSSIONS

Our study's potential weaknesses included the small sample size, the participants' geographic locations, and the lack of knowledge of the risk factors for childhood caries. Furthermore, children from different socioeconomic backgrounds—such as those who live in rural areas or see a private pediatrician—were not included in this study. While these factors may have an impact on the features of oral health education programs, they may not be

practical in all clinical settings. It's also possible that some of the parents didn't fully or accurately follow our instructions.

The study aimed to highlight the different methods of fluoride-based treatment in combating tooth decay. It is known that the prevalence of caries is still high due to the lack of information to people about prevention methods. Following the study, we noticed that girls had better oral hygiene than boys and were more concerned about what might happen over time if they did not follow, first of all, the rules of oral hygiene. I also explained to the children the correct brushing technique to help them improve their oral hygiene. We have also provided them with various additional methods that help make brushing more efficient, such as mouthwashes and flossing. [13]

Fluoridations were performed in several sessions with fluoride varnishes, fluoride gels, fluorine sealants, fluoride-releasing devices and even fluoride-releasing glasionomeric cements in those who needed fillings. Fluoridation helps primarily to restore demineralized enamel and strengthen teeth. This is a non-invasive method and much more easily accepted by children, taking into account the fact that it is also a painless application technique. We have seen the success of fluoridation over time, but also due to the fact that children have understood how important it is to have good oral hygiene and how much it helps to form and maintain healthy teeth in the oral cavity. [14]

Untreated tooth decay is the most common cause of tooth loss. The causes of dental caries are bacterial plaque deposits formed due to poor hygiene. The appearance of fluoride in dental practice has led to better prevention of caries. Fluoridation is one of the methods used to reduce the risk of tooth decay. By fluoridation the enamel is remineralized, the tooth strengthens and the tooth sensitivity disappears. Fluoride, through its mechanism of action, inhibits enamel demineralization and accentuates its remineralization.

The technique of fluoridation is easy to perform, without traumatizing the teeth in the oral cavity. Fluoride materials are applied either by brushing, in the case of fluoride varnishes or with the help of special gutters, for fluoride gels, or by ingestion or can be applied to tooth sealants that release fluoride ions. [15]

Regular check-ups at the dentist help maintain the success of fluoride therapy. Through visits to the dentist, he can detect the demineralization of the enamel in time and can immediately institute a suitable fluoride treatment, so as not to lead to caries. Because there are teeth with much deeper morfology and here the effectiveness of simple fluoridation is lower, it is recommended to use fluoride sealants. [16]

CONCLUSIONS

Fluorine sealants release fluoride ions into the tooth structure. They help to keep healthy teeth in the oral cavity for a long time and being a non-invasive method can be recovered at any time. Dental fluoridation is an effective method of remineralizing tooth enamel, so the risk of tooth decay decreases greatly.

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