

WHAT DO PARENTS KNOW ABOUT THE USE OF FLUORIDE PRODUCTS IN CHILDREN? A QUESTIONNAIRE STUDY

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ABSTRACT: The aim of this study was to evaluate parental knowledge about the use of fluoride (F) products in children. The study included 500 correctly filled in questionnaires from randomly chosen parents of children aged 1 to 17 years who received treatment in the Department of Pediatric Dentistry (Medical University of Warsaw). The questionnaire contained 33 questions relating to F products used by children, as well as their benefits and usage limitations. For statistical analysis, a chi-square independence test and Spearman's rank correlation ($p < 0.05$) were applied. More than 89% of parents admit that their children use F toothpaste, whereas 90.2% of them are not aware of its F concentration. Out of children aged over six years, 61.9% participate in school-based F preventive treatment and 64.2% of all children do not participate in professional F treatment in a dental office. None of the women participating in the questionnaire were advised to use F supplements while pregnant. Among 35.6% of the parents who are aware of the term "fluorosis," 66.6% do not know F poisoning symptoms and 90% would not be able to help their child in such a situation. There is an association between female gender and knowledge about the benefits of F prevention, the F level in the toothpaste used by one's child, the knowledge of the symptoms of acute F poisoning and the first aid skills needed in this case, and knowledge on the safety of endogenous F treatment. The parental knowledge about oral hygiene and anti-caries prevention with the use of F in children is insufficient. Most parents are neither familiar with the type of toothpaste their children should use, nor aware of the proper amount of dentifrice to apply on a toothbrush. The parents should control the teeth brushing of children, especially when the children are at an early age, in order to prevent the swallowing of large amounts of fluoride toothpaste. Care must be taken to ensure that a balance is maintained between maximizing the protective F effect against dental caries and minimizing the risk of dental fluorosis. It appears necessary to raise parental awareness by implementing proper educational programs.

Keywords: Children; Fluoride preventive treatment; Fluoride products; Parents; Questionnaire study.

INTRODUCTION

The use of fluoride (F) compounds is considered the most efficient method of caries prevention.¹ The widespread application of F is connected with the fluoridation of drinking water and the high availability of toothpastes, oral rinses, and nutritional supplements with F. In order to apply cariostatic doses of F and simultaneously minimize the risk of caries occurrence, organizations such as the American Academy of Pediatric Dentistry (AAPD) and the European Academy of Pediatric Dentistry (EAPD) have been publishing guidelines concerning the right doses of F for more than 30 years.²⁻⁵ Brushing one's teeth with F toothpaste constitutes a basic method of preventing caries. In order to ensure effective teeth brushing, one needs to pay special attention to its frequency and time, as well as control the amount of toothpaste and the concentration of F (or lack of F) together with the amount of water used for rinsing the mouth.⁶

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The aim of this paper was to evaluate parental knowledge about using F products and mouth care methods, as well as F anti-caries prevention treatment in children.

MATERIALS AND METHODS

The questionnaire study was conducted between July 2015 and January 2016. The study was approved by Bioethics Commission at the Medical University of Warsaw (A4BE/104/15). The survey contained 33 single-choice test questions about the F products children are served by their parents. The questions were worded with a special reference to age, gender, socioeconomic status, and parents' education. The next questions referred to the toothpaste used by the child, the F concentration, the amount of toothpaste, group F preventive treatment, endogenous F supplementation, and the safety of F compounds, as well as the dangers arising from overdose. The participants of the questionnaire study included 515 randomly chosen parents of children aged 1–17 years who received their treatment in the Department of Pediatric Dentistry, Medical University of Warsaw. A statistical analysis was conducted, based on a χ^2 independence test and a Spearman's rank correlation ($p < 0.05$). The criterion set for determining the correlation coefficient and the features independence level was the choice of at least one correct answer, without marking the incorrect one.

RESULTS

Five hundred correctly filled in questionnaires were statistically analyzed. Fifteen surveys were rejected due to a lack of answers. Sample size was determined at $n=500$ to obtain a margin of error of less than 0.04 (4%) for binomial proportions at the 95% confidence level. The characteristics of the surveyed population are demonstrated in the Table.

As many as 89.4% of the individuals admit that their children use F toothpaste, whereas 64.2% of them use toothpastes designed especially for children. However, only 0.8% of parents are able to identify the F concentration in a toothpaste. Out of the parents, 51.4% admit that their children brush the teeth on their own, 34.4% do it under parental supervision, and 14.2% help their children to brush their teeth properly. According to the collected data, 37.8% of the respondents put the toothpaste on their children's toothbrushes—in the case of 24.7% of them it is a pea-size amount in children aged up to 6 years. Among children aged 2–6 years, 18.5% of children put such an amount of toothpaste on the toothbrush. The results reveal that 28.8% of children above 6 years old put a 1 cm strip of toothpaste on the toothbrush. In the case of merely 4.9% of children aged under 2 years, the parents put a slight amount of toothpaste onto the toothbrush.

As many as 74.2% of respondents admit that their children brush their teeth with F toothpaste twice a day. According to the results, 36.8% of parents claim that after brushing their teeth with F toothpaste, their children rinse the mouth with a small amount of water. The results demonstrate that 52% of parents who are familiar with the term "fluorosis" claim that their children rinse their mouth with a large amount of water, 36.1% of children allegedly rinse their mouth with a small amount of water, and 11.9% fail to do it after brushing their teeth with F toothpaste. Out of teenagers (aged 16 or more years), 25.8% were recommended to use high-F toothpastes (Duraphat[®] 5000). As many as 83.9% of children aged over 6 years use fluoride mouthwashes in accordance with the EAPD recommendations. Over 52% of children

participate in school-based F preventive treatment. Among primary school children, 72% participate in group F preventive treatment.

Table. Characteristics of the population.

Parameter		N	%
Gender	Female	406	81.2%
	Male	94	18.8%
Socioeconomic status	Low	13	2.6%
	Medium	408	81.6%
	High	79	15.8%
Education	Basic education	6	1.2%
	Secondary school education	140	28.0%
	Higher education (incomplete)	54	10.8%
	Professional education	43	8.6%
	Higher education	257	51.4%
Children's age:	Children up to the age of 6 yr	171	25.83%
	Children aged 6–16 years	398	69.49%
	Children over the age of 16 yr	31	4.68%
	Age range	1–17 yr	
	Average age	8.69±4.45 yr	
Age of the questioned person:	Female	36.48±6.50 yr	
	Male	40.03±7.46 yr	

Out of questioned the parents, 60.2% know the advantages of using F products in children. However, 64.6% their children do not participate in any professional F treatment in a dental office. The children, who participate in such treatment, receive it quarterly (5.2%), every six months (13.8%), or once a year (12.0%). Among 35.4% of parents whose children participate in F treatment in a dental office, the most frequent methods are teeth varnishing (54.3%) and applying F gel (22.3%). The results of the questionnaire demonstrate that as few as 1.4% of children aged 3 to 15 years used to take or still take F pills or drops, and none of the women participating in the questionnaire were advised to use F supplements while pregnant. As many as 84% are unaware of the F level in food and water their children are served on everyday basis. More than half of parents are not familiar with the term “fluorosis”

and 83.0% do not know the symptoms of F poisoning. Unfortunately, 90.0% would not be able to help their child in case of acute F poisoning.

The results indicated that 85.8% of parents would like to extend their knowledge about F prevention and the usage of F products in their children. The χ^2 independence test indicates a strong association between the female gender of the questioned person and the knowledge of F preventive treatment benefits, F level in the toothpaste used by one's child, the knowledge of the symptoms of acute F poisoning and first aid skills needed in this case, and knowledge on the safety of endogenous F treatment.

DISCUSSION

Parents have a significant influence on their children in terms of confronting them with health-oriented attitudes and dental hygiene. Thus, they should be firstly informed about proper dental care. The questionnaire results suggest that parents do not possess sufficient knowledge in terms of F usage in their children. The results of the questionnaire clearly state the fact that most parents choose F toothpastes for their children and nearly 70% purchase the ones designed especially for kids. According to the guidelines on the use of fluoride in children by EAPD³ children aged between 2 and 6 years should use toothpastes with F concentration of 1,000 ppm F. In a questionnaire study conducted among 248 mothers, Bennadi et al.⁷ demonstrated that 72% of them allow their children to use toothpastes for adults (1,450 ppm F), regardless of their age. These results appear quite alarming because using toothpastes with an inappropriate F level in young children may lead to serious complications, e.g., dental fluorosis. A study conducted in India regarding the knowledge of the parents of 4–48-month-old children showed that a F dentifrice used by less than half of the children.⁸ Only 11% of the parents chose a toothpaste with the advised F concentration (500 ppm F) and nearly 75% of the parents were unaware if there was an adequate F concentration in a toothpaste. The lack of parental knowledge on the amount of a toothpaste to use and on the proper fluoride concentration seems to be a common problem.^{9,10} A study by Gussy et al.¹¹ showed that the majority of the questioned parents know that a small amount of toothpaste is recommended for children. However, more than 20% of the respondents were not sure whether these recommendations are correct and over 50% of them doubt if a fluoridated toothpaste should be used in toddlers at all.¹¹ Another study assessing knowledge about fluoride dentifrice among parents of children aged 7–12 years showed that almost 55% of them are unaware of the fluoride concentration in a toothpaste. Moreover, only 25% of the parents know that having the proper amount of F in a toothpaste has a positive impact on teeth development and that excess of F may be harmful.¹²

The data we acquired show that 18.5% of children aged between 2 and 6 years, or their parents, put a pea-sized amount of toothpaste on the toothbrush, which reflects the reports submitted by other authors.^{13,14} However, it should be emphasized that children under the age of 2 years should use a minimal amount of toothpaste because their expulsion habit, or their ability to spit out the toothpaste after brushing, is not yet sufficiently developed, thus resulting in a risk of swallowing the toothpaste. The results of the questionnaire revealed the fact that 4.4% of children under the age of 6 years brush their teeth using an amount of toothpaste which is too large (a 1 cm long strip), which corresponds to the result of another paper.¹⁵ Similar results were

obtained from the research carried out among German, British, and American parents.¹⁶ German guardians dispensed nearly twice as much dentifrice on the toothbrush of their 3–6-year-old children compared to parents from the UK or the US. As a comparison, 38% of Indian parents would use enough toothpaste to cover half of a toothbrush head.¹⁶ The results of this questionnaire support the hypothesis that children brush their teeth twice a day on their own. Parental supervision during teeth brushing applies to a smaller number of the questioned individuals (34.4%). The related study mentioned above showed a much higher awareness (96–97%) among parents from Germany, the UK, and the US regarding parental supervision during brushing in children under the age of 6 years.¹⁶ The parents of young children demonstrate active commitment and help their children with tooth brushing.^{17, 18}

On the basis of this paper, the products with a higher F level (e.g., Duraphat[®] 5000) were quite rarely recommended (in 25.8% of patients aged over 16 years). The 2-year clinical trial by Nordstrom and Birkhed¹⁹ on adolescents, resulted in a significantly lower progression of caries and a lower caries incidence in individuals using 5,000 ppm F toothpaste compared to those using 1,450 ppm F toothpaste. In addition, 5,000 ppm F toothpaste appears to be an important vehicle for the treatment and prevention of caries in patients at high caries risk. The study by Sonneson et al.²⁰ showed that using 5,000 ppm F products may be an efficient solution that inhibits enamel demineralization in orthodontic patients. However, the data may indicate that 5,000 ppm F toothpaste has a greater impact on individuals who do not use toothpaste regularly or do not brush twice a day.²¹

The present study reveals that almost 50% of children do not participate in school based group F preventive treatment. There are three principal reasons for such a status quo: (i) age (they still attend preschool); (ii) their school does not offer group F preventive treatment; and (iii) parental prejudices against using F. The study conducted by Humphris and Zhou²² concerning the possible reasons for non-participation in group prevention programs also mentions past experiences, and concerns and fear accompanying a visit to a dental office or a nurse's visit in school. The study by Al-Jundi et al.²³ indicates that caries tend to be less intense in children participating in school-based caries prevention programs. After a four-year study period, a statistically significant difference in caries occurrence was observed between the group in which the F products were used and the control group in which no F was applied. According to the questioned individuals, 35.4% of children participate in professional F prevention treatment (varnishing in 54.3%)—in 13.8% of children it is repeated every six months. As one can clearly observe on the basis of the study by Kaczmarek et al.,²⁴ the most frequently used F products in a dental office are also varnishes (60.6%) and F gels (31.2%). In the case of F preventive treatment in a dental office, it is recommended that the children at high risk for caries participate in F treatment four times a year and that the children at moderate risk for caries participate twice a year.³

According to the results of the present questionnaire, none of the women were advised to apply fluoride supplementation while pregnant. This results agree with the investigations of the other authors.^{17-19,25-27} On the basis of the literature review published so far, there is no clear scientific evidence on the real effectiveness of fluoride supplementation during pregnancy to prevent caries in children.^{17-19,25-27} It

must be however noted that F tablets positively influence the condition of a mother's teeth, especially thanks to an exogenous effect of the sucked pills.²⁷ It has been recently proven that the main cariostatic mechanism of fluoride is basically a local posteruptive effect that stops demineralization, facilitates remineralization, and halts bacterial plaque.²¹ The American Dental Association (ADA) and the American Academy of Pediatric Dentistry (AAPD) recommend prescribing dietary fluoride supplements (tablets, drops or lozenges) for use by children aged six months to at least 16 years who are at high caries risk, who live in nonfluoridated areas, or who drink fluoride-deficient water (less than 0.6 ppm F).^{2,5} According to the European Academy of Paediatric Dentistry (EAPD), if the level of fluoride in drinking water is between 0.3 and 0.6 mg F/L there should not be any additional fluoride use other than F-toothpaste in the 2–3 years-old age group. In the older groups the daily tablet dose should then be reduced to 0.25 mg F/day.³

The symptoms of fluorosis include disorders in the construction of the mineralized tooth issues caused by intensive F exposition during the tooth development. The risk of mild fluorosis may occur in individuals who consume over 0.1 mg F/kg bw/24 hours and mottled enamel is the first symptom of chronic F poisoning.²⁸ In this questionnaire, 64.4% of the individuals are not familiar with the term “fluorosis,” similar to the results of Sami's et al.²⁹ study (49.6%). As many as 52% of the parents are aware of “fluorosis” and answer that their children rinse their mouths with a large amount of water. The study by Creeth et al.¹⁶ showed that 60% of German and American parents and 30% in the UK are aware that excessive ingestion of F toothpaste may result in dental fluorosis. As is described in other studies, 5% of children under 2 years and 32% of children between 2.5 and 4 years (the age groups of risk of dental fluorosis) rinse their mouth after brushing the teeth and 27% of children swallow most of the water together with toothpaste.²⁸ It is claimed that a probable toxic dose (PTD) that may trigger toxic symptoms and needs to be treated in a hospital is 5 mg F/kg bw.³⁰ Parents are not aware of the symptoms of acute F poisoning. Depending on the consumed amount of F, the symptoms may include not only stomach ache and vomiting, but also salivation, tetany, arrhythmia, and the child's pulse becoming fast or imperceptible. Respiratory acidosis and cardiac arrest may also occur.³⁰ According to the questionnaire, only 3% of the individuals think that one of the first aid methods is provoking vomiting, which is recommended in conscious patients, accompanied by serving calcium salts as 1% chloride or calcium gluconate.³⁰ The therapy is strictly related to the age and weight of child, the type of the product, and the duration of the time since it was swallowed. In most cases of acute F poisoning hospitalization is required.³¹

CONCLUSIONS

The questionnaire study puts an emphasis on the fact that parental knowledge about using F products in children is insufficient. Brushing one's teeth with F toothpaste constitutes a basic method of oral hygiene. However, often the amount of toothpaste used does not correspond to the child's age. Most parents are neither familiar with the type of toothpaste their children should use, nor aware of the proper amount of dentifrice that should be applied on a toothbrush. The parents should control the brushing of their children, especially when they are young in order to prevent the swallowing of large amounts of fluoride toothpaste. Most parents would like to

extend their knowledge about F prevention in children. Therefore, dentists should focus on educating the parents on the importance of daily and periodic fluoride prophylaxis. Care must be taken to ensure that a balance is maintained between maximizing the protective F effect against dental caries and minimizing the risk of dental fluorosis. It appears necessary to raise parental awareness by implementing proper educational programs.

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