

Original Article



Improving the Participation of Preschool Children's Mothers in Fluoride Varnish Program: An Educational Intervention

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Abstract

Background: Tooth decay is the most prevalent chronic childhood disease. Fluoride tooth restoration is a common method of controlling tooth decay, but common misconceptions in this area prevent family involvement. Therefore, the aim of this study was to determine the effect of educational interventions on the participation of preschool children's mothers in the fluoride varnish program.

Methods: This was an interventional study performed on 176 mothers of preschool children in Yazd in 2020. Participating mothers were randomly selected and divided into intervention and control groups. The research tool was a researcher-made questionnaire with confirmed validity and reliability. It included demographic variables and 4 sections of awareness, facilitators, barriers, and behavior. Intervention and control groups completed the questionnaires before and two months after the intervention. Chi-square, Mann-Whitney, Kruskal-Wallis, and Spearman correlation tests, as well as repeated measures analysis of variance and the generalized estimating equations model were used for data analyses.

Results: The proportion of people who participated in the fluoride varnish program before the study was the same in both intervention and control groups (35.2 and 37.5), but after the intervention, the percentage of people whose children participated in this program was more in the intervention group (88.6 and 51.1, $P < 0.0001$).

Conclusion: The findings of this study confirmed the positive effect of the educational intervention on increasing the participation of mothers in the fluoride varnish program. To better cooperate and involve families with oral health programs in schools, thinkers in the field should be fully justified in the program to provide timely training and interventions.

Keywords: Education, Oral health, Fluoride varnish, Mothers, Child



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Introduction

Today, oral health is a part of public health, and failure to observe it causes dental problems, public health, and reduced quality of life, especially in children, thus paying attention to this category is one of the programs of the World Health Organization (1).

Tooth decay in children is a global pandemic (2) and is also the most common chronic childhood disease (3) that can be prevented and managed at the individual and population levels (4). Early childhood caries (ECM) is a type of caries in infants and children that is highly common as one of the dental problems in this period (5). In general, by the end of infancy, 50% of children have one or more decayed baby teeth. However, the importance of these teeth should not be neglected (6) because it can lead to caries in adulthood (7).

Studies in Iran show that caries are on the rise (8), and the prevalence of ECC in three-year-old children is

52% (9). However, finding new and effective solutions to reduce the caries experience is a major challenge (10). The most common method of controlling tooth decay is the mechanical method of controlling and removing plaque. Conversely, Bashirian et al reported that oral health behaviors are poor among school children, and 53.8% of school children do not brush or brush only twice every week (11).

Fluoride tooth restoration is also a typical method (12). Fluoride Varnish is a semi-liquid, sticky, fluoride-containing substance used as a topical fluoride treatment against the tooth surface (13). The effectiveness, ease of use, and relative safety of fluoride varnish make it an attractive option compared to other topical fluoride products such as gels and mouthwashes (3,14-17). Using fluoride varnish for all children and on all teeth, 2-4 times a year can represent significant results in reducing decayed, missing, and filled surfaces by 30-40% (14,18).



Family cooperation has an important role in the fluoride therapy varnish program (8). Mothers play a vital role in caring for children’s oral health and creating children’s habits in relation to oral hygiene, and parental cooperation is an essential element in preventive dentistry (19). Therefore, misconceptions about oral health can deprive children of proper services (8). Common misconceptions about fluoride varnish and its effects such as irreversible discoloration of teeth, decreased intelligence, carcinogenicity, food poisoning, allergies, and the like prevent families from participating in the program (8). Numerous studies emphasize the importance of acquiring knowledge and modifying mothers’ beliefs and behaviors to improve their children’s oral health (20,21). Some studies (3,9) have shown that educated mothers play a key role in promoting their children’s oral health and fluoride varnish, thus parents should be informed about their effective role in child oral health (21). Therefore, this study was conducted to determine the effect of educational intervention on the participation of preschool children’s mothers in the fluoride varnish program.

Materials and Methods

The present interventional study was conducted on mothers of preschool children affiliated with the schools of Yazd in 2020. The sample size was estimated at 88 people in each of the two intervention and control groups by conducting a pilot study and considering the effect size of 2.5. Ten centers were randomly selected and considered for the experimental (n=5) and control (n=5) groups. The inclusion criteria were mothers whose children were not allergic to fluoride but did not participate in the first phase of the fluoride varnish program or did not perfectly perform protective behavior after the program, while the exclusion criterion was lack of complete participation in the training sessions.

The study tool was a researcher-made questionnaire that included demographic variables and questions in 4 sections, including demographic information such as age, gender, birth rank, number of family members, occupation, and the education of the mother and the father.

1. The awareness section consisted of 8 questions with multiple choices “Yes, no, and I do not know”; for example: “How long after fluoride varnish can a child eat?” The answers ranged from 0 to 10.

2. The facilitators Section included 6 questions with options from a 5-point Likert-type scale (“Strongly agree” to “strongly disagree”), and the possible score ranging from 6 to 30; for instance, “I think my family and friends agree with fluoride varnish”.
3. Barriers Section encompassed 14 questions with options from a 5-point Likert-type scale (“Strongly agree to “strongly disagree”) such as “Using fluoride varnish reduces my child’s intelligence”. The answers were in the range of 14-70.
4. The behavior section consisted of 9 questions with multiple choice options; for example, “How long after fluoride varnish did your child used no toothbrush?” The answers ranged from 3 to 11.

The questionnaire was prepared using valid sources and books and related scientific articles (8,9,14,22). Its face and content validity were confirmed by 5 health education specialists and 5 pediatric dentists.

The reliability of the questionnaire was evaluated by conducting a pilot study on 20 mothers who were not part of the main sample. The reliability was confirmed using test-retest and internal consistency (Cronbach’s alpha coefficient) of 0.7-0.9.

Based on the initial needs assessment, the required topics were prepared, and five 45-minute sessions were held for the experimental group. The training sessions were conducted by researchers in the salon of preschools. In the training sessions, first, an introduction was made about the prevalence of tooth decay, methods of its prevention, and the importance of fluoride and fluoride varnish. Then, mothers expressed their views and opinions about the fluoride varnish program and discussed them, and the mothers’ questions in this regard were answered as well. Finally, by showing the educational clip, the method of using fluoride varnish on the teeth and the materials and equipment needed for this purpose and the following conditions were explained, and educational pamphlets were distributed among them (Table 1). Two months (23) after the intervention, immediately after the implementation of the fluoride varnish program in preschools, the same pre-intervention questionnaire was completed by both groups.

Data were analyzed by SPSS software, version 22. Chi-square was used to compare demographic variables and the level of participation in the intervention and control groups. Mann-Whitney was employed to compare the

Table 1. How to Perform the Intervention

Sessions	Objectives	A Summary of Topics and Activities	Educational Time (min)
1	Increasing mothers’ knowledge of tooth decay prevention and fluoride varnish	Focusing on the prevalence of dental caries in Iran, oral health’s importance, and introduction of fluoride and its types	45
2	Increasing fluoride varnish facilitators	Evaluating the effectiveness of fluoride varnish in preventing tooth decay and effective factors in increasing the efficiency of fluoride varnish program	45
3	Reducing fluoride varnish barriers	Focusing on misconceptions about the consequences of fluoride varnish and the introduction of credible sources in this field	45
4	Informing the process of fluoride varnish program	How to do fluoride varnish in practice and conditions before and after it	45
5	Encouraging mothers to participate in the fluoride varnish program	Emphasizing the importance and influence of parents in fluoride varnish program Answering mothers’ questions and ambiguities	45

means of the studied variables in the intervention and control groups. Further, the repeated measures analysis of variance and the generalized estimating equations model were applied to compare the means of the studied variables in the intervention and control groups by modifying their effect before the intervention. The significance level of the tests was less than 0.05.

Results

The mean (\pm standard deviation) age of the participating mothers in the intervention and control groups was 31.08 ± 5.39 and 32.30 ± 5.41 , respectively. There was no significant difference in demographic variables between the two groups (Table 2).

In the awareness questions, the highest percentage of the correct answer (78.4) was related to the effect of fluoride on not deforming the permanent deciduous teeth, while the lowest percentage of the correct answer (15.3) belonged to the age range of fluoride varnish.

In the facilitators Section, the highest percentage of the strongly agree option (14.8) was related to the role of fluoride varnish in improving oral health, and in the barriers Section, the highest percentage of strongly agree option (23.3) was associated with the occurrence of allergies due to fluoride contact.

The results revealed that almost one-third of mothers applied fluoride varnish to their children, and Internet and virtual networks were the most methods used by mothers to obtain information (52.3), while the least applied methods were TV, radio, and newspaper (11.9). Mothers preferred to obtain their information from the dentist (43.2).

Before the intervention, the two groups were the same in

terms of all variables, but after the intervention, with the changes caused by the intervention, the difference in all variables in the two groups became significant. In all cases, the status of variables in the intervention group was more than the control group (Table 3).

The proportion of people who participated in the fluoride varnish program before the study was the same in both intervention and control groups. After the intervention, the percentage of people whose children participated in the fluoride varnish program was higher in the intervention group (Table 4).

Discussion

Considering that most studies have dealt with the other methods of caries prevention, including the use of toothbrushes and floss, the study of fluoride varnish, especially with the design and implementation of an educational intervention is necessary and significant. Therefore, this study sought to determine the effect of the educational intervention on the participation of preschool children's mothers in the fluoride varnish program.

The results of the present study showed that mothers' awareness about the mentioned program and the role of fluoride in preventing tooth decay was inappropriate, which is probably due to the insufficient education to parents by dentists and schools and insufficient attention of mothers to the varnish program.

Similar studies (19,24,25) demonstrated that most mothers had moderate to poor knowledge about preschool children's oral health. It is noteworthy that mothers are responsible for the oral health of children under 6 years, and preschool children do not yet have enough growth to take care of their mouths and teeth; thus, it is important to

Table 2. Distribution of Absolute and Relative Frequency of Maternal Demographic Variables in the Two Groups

Variable		Intervention Group		Control Group		P Value ^a
Variable Name	Variable Label	No.	%	No.	%	
Child gender	Boy	40	45.5	45	51.1	0.451
	Girl	48	54.5	43	48.9	
Child birth rating	1	43	48.9	45	51.1	0.932
	2	33	37.5	33	37.5	
	3 and more	12	13.6	10	11.4	
Job	Housewife	57	64.8	60	68.2	0.848
	Employee	21	23.9	20	22.7	
	Self-employment	10	11.4	8	9.1	
Spouse job	Self-employment	40	45.5	42	47.7	0.962
	Employee	26	29.5	25	28.4	
education	Labor	22	25.0	21	23.9	0.586
	Undergraduate education	14	15.9	19	21.6	
	Diploma	40	45.5	35	39.8	
Spouse education	University	34	38.6	34	38.6	1.000
	Undergraduate education	20	22.7	19	21.6	
	Diploma	32	36.4	32	36.4	
	University	36	40.9	37	42.0	

^a Chi-square test.

Table 3. Comparison of Mean Knowledge, Facilitator, Barriers, and Behavior in the Two Intervention and Control Groups Before and After the Educational Intervention

The Variable Under Consideration (Scope Range)	Evaluation Section	Intervention Group	Control Group	P Value Between Two Groups ^a
		Mean ± SD	Mean ± SD	
Awareness (0-10)	Before intervention	3.51 ± 1.77	3.45 ± 2.02	0.000
	After training	8.82 ± 1.16	4.80 ± 2.65	
	P value before ^a		0.779	
	P value after ^a		0.000	
Barriers (14-70)	Evaluation section	45.10 ± 12.01	43.12 ± 11.96	0.000
	After training	27.69 ± 6.39	41.68 ± 11.06	
	P value before ^a		0.419	
	P value after ^a		0.000	
Facilitator (6-30)	Before intervention	18.34 ± 4.40	19.15 ± 4.97	0.000
	After training	25.39 ± 2.70	20.26 ± 4.91	
	P value before ^a		0.250	
	P value after ^a		0.000	
Behavior (3-11)	Before intervention	6.09 ± 1.24	6.39 ± 1.24	0.003
	After training	9.51 ± 1	8.48 ± 1.35	
	P value before ^a		0.395	
	P value after ^a		0.000	

Note. SD: Standard deviation.

^aDifference between intervention and control groups. ^a Covariance test.

Table 4. Comparison of Participation in Both Intervention and Control Groups

Variable		Intervention Group		Control Group		P Value ^a
		No.	%	No.	%	
Participation	Yes	78	88.6	45	51.1	0.000
	No	10	11.4	43	48.9	

^a Chi-square test.

increase mothers' awareness in this regard.

Likewise, Mohebi et al (26) found that the level of awareness of mothers is low despite the use of various sources of information about the oral health of preschool children, thus by involving them in prevention programs, we can improve the oral health of preschool children at the community level, especially in less privileged areas.

A few mothers believed that fluoride varnish improves their child's oral health. A study by Scambler et al (27) in London showed that cultural influences, competitive pressures, and a lack of oral health knowledge are key factors influencing oral health beliefs.

Regarding the barriers, most mothers believed that their children might be allergic to fluoride. Some mothers also indicated that fluoride varnish reduces their baby's intelligence and may also be carcinogenic and harmful according to traditional medicine sources. Jafari et al (8) presented that common beliefs among the mothers of students started from "no need for fluoride therapy in school" and extended to "fluoride Satanism". The most important belief among mothers was "a decrease in students' intelligence". "The lack of this program in developed countries" to "the harm of fluoride therapy for children" was heard among mothers.

It seems that providing appropriate educational

interventions for parents through kindergartens and schools and paying attention to continuing education programs for teachers and health educators can help improve beliefs and correct misconceptions in this regard.

Behavioral results demonstrated mothers' inappropriate behavior in the field of fluoride varnish for their children so that 63.6% of mothers had not performed fluoride varnish for their children. Among these people, the observance of correct behaviors after fluoride varnish was extremely low so that only 2.8 mothers forbade their children to eat hot, hard, colored, and sticky foods 12 hours after fluoride varnish.

Therefore, in formulating policies related to children's oral health, it is necessary to pay attention to mothers' oral health behaviors and increase the skills needed to remove barriers to caring behaviors.

There was a significant difference in the scores of knowledge, barriers, facilitator, and behavior in the intervention group before and after the intervention so that scores of knowledge, facilitator, and behavior increased by 5.31, 7.05, and 3.42, while that of the barriers decreased by 17.41. Health education is one of the important measures to prevent oral diseases and improve the health of the community. One of its important roles is to prepare the people of the community by giving them knowledge and information and showing them health skills and experiences during which people can have more control over their health and health education. Merely observing oral health will not have a beneficial result, and in fact, turning awareness into active thinking and health action requires creating and changing insights (28).

In the control group, the difference in the score of

knowledge, barriers, facilitator, and behavior before and after the intervention was significant so that awareness, facilitator, and behavior increased by 1.35, 1.11, and 2.09 compared to before the intervention, whereas and that of barriers decreased by 1.44. However, this difference was extremely negligible in comparison to the intervention group. The control group, unlike the intervention group, received only content through the virtual preschool channel, which was dedicated to informing all programs, thus the common training in this field, which is usually non-specific and among a multitude of diverse information, due to the lack of attention and insufficient accuracy, is easily forgotten and cannot be effective in changing parental behavior.

The proportion of people who participated in the fluoride varnish program before the study was the same in the two intervention and control groups (35.2 and 37.5). After the intervention, the percentage was higher in the intervention group (88.6 and 51.1), representing the role of educational intervention in the field of fluoride varnish.

The findings of a study by Mohebbi et al (9) indicated that mothers' participation in preventive programs such as the use of fluoride varnish can play a key role in promoting children's oral health. The results of the study of da Silva et al (29) showed that the acquisition of knowledge by mothers is essential to improve oral health in children.

Data collection through self-report was one of the limitations of this study. In addition, in this study, the subjects were mothers of preschool children affiliated to public schools, who generalized the results to the other mothers of non-profit preschool children, and the children of other grades encounter restrictions.

Conclusion

Most mothers had inadequate and inappropriate awareness of the facilitator and behavior toward the fluoride varnish program, and many barriers and negative attitudes were common among parents, which can be due to insufficient education and information in this field and cultural and social influences.

The results of this study confirmed the positive effect of the educational intervention in increasing awareness, the facilitator, and behavior while reducing barriers for mothers in relation to the fluoride varnish program. Considering that fluoride varnish is a new method of preventing oral caries, there are barriers and negative attitudes toward it among parents. Therefore, to better cooperate with oral health programs in schools, thinkers in the field, including dentists and related staff, and school health educators, should be fully justified in the program to provide timely training and interventions, and the fluoride varnish program should be performed with maximum efficiency.

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Authors' Contribution

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Ethical Approval

This study was presented to the Ethics Committee of the Faculty of Health of Shahid Sadoughi University of Medical Sciences of Yazd and was approved with the ID IR.SSU.SPH.REC.1398.026.

All participants were informed about the objectives and stages of the study. Obtaining parental consent and maintaining the confidentiality of information (assuring participants that their personal information is confidential and inserting a code for the questionnaire instead of the first and last name) were taken into consideration.

Competing Interests

The authors declare that there is no conflict of interests.

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