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The Effect of an Educational Leaflet on Parents' Knowledge, Performance, and Self-Assessment Scores Regarding Oral Health Elements, with a Special Focus on Fluoride.

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Abstract

Background: Increasing parental knowledge on dental health is crucial as it has a direct influence on their children's oral health and behavior related to oral care. While most parents exhibit positive attitudes towards preventive dental healthcare, there exists a level of uncertainty regarding several facets of oral care such as fluoride usage, sugar consumption, and more. Consequently, oral health education initiatives should explicitly emphasize various elements encompassing oral health.

Objectives: The aim of the present research was to assess the impact of an educational leaflet on parents' knowledge and performance regarding children's dental health with a particular emphasis on fluoride.

Methods: In this educational experimental study, parents of 124 children were assigned randomly to either a leaflet group (n=61) which received an educational pamphlet, or a control group (n=63) without any pamphlet. All participants were asked to complete a valid and reliable researcher-developed questionnaire both before the distribution of the pamphlet and one month after. The questionnaire consisted of four domains of demographic information, knowledge questions, performance questions and self-assessment questions. The results were analyzed using SPSS 21 via t-test and General linear regression model.

Results: The participants' age ranged from 25 to 47 years. By the conclusion of our study, there was a significant improvement in knowledge scores for both groups ($p<0.001$), with the intervention group showing a more prominent increase compared to the control group ($p<0.001$) but there was no significant difference between the two groups regarding performance change. There was a statistically significant decrease in the self-assessment scores for both groups ($p<0.001$), but there was no significant difference between the intervention and control group ($p=0.151$).

Conclusion: The use of the educational leaflet demonstrates effectiveness as a tool for oral health education.

Keywords: health education; fluorides; oral health

1. Introduction

"Dental caries is a multifactorial, transmissible, infectious disease that is mainly caused by the complex interaction of oral microflora (biofilm) with fermentable dietary carbohydrates on the tooth surface over time" (1).

Beside other oral diseases, dental caries has a major impact on individuals and communities in terms of functional impairment and reduced quality of life (2). It has been found that the parents' especially the mothers' health-related attitudes and knowledge influence children's oral health and related behavior (3).

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By successfully educating caregivers about this disease and by motivating them to engage in oral health efforts, dental caries can be prevented (4). Akpabio et al. suggest that there are many mothers who need information about how to prevent caries in their children (4).

Although several measures contribute to caries prevention and control, using fluoride is the most effective and widely used approach (5). Based on O'Mullane et al. study, maintaining a constant low level of fluoride in the oral cavity is the most effective way of applying fluoride for caries prevention; so using strategies such as fluoridated toothpaste are more effective compared to professional fluoride applications (6).

The education of mothers or caregivers to promote healthy dietary habits in infants has been the main strategy used for the prevention of Early Childhood Caries (ECC) (4). Several studies have examined parents' knowledge about ECC prevention behaviors, but parental knowledge and awareness regarding the preventive effect of fluoride-containing products have been rarely found (4, 7-9). Gussy et al. concluded that parents need accurate and evidence-based information of the benefits and risks associated with the various forms of fluoride in the context of their own local environments in order to make informed choices (8).

To our knowledge, a few numbers of studies have focused on parents' knowledge regarding dental health with specific focus on fluoride-containing products before and after an educational pamphlet intervention. Therefore, the purpose of this study was to determine if such a pamphlet, which provides information about oral health elements with a special focus on fluoride, could influence the knowledge, behavior, and self-assessment scores of parents whose 4–12-year-old children attended the pediatric department clinic.

2. Material and Methods

2.1. Study design

This experimental analytic study was designed with two groups: a) Intervention (leaflet) group that received a leaflet contained information about fluoride, fluoride-containing products, fluoride role in dental health and fluoride overexposure consequences, and b) Control group that did not receive any educational material. The ethics approval for the current study was obtained from the Ethics Committee of the School of Dentistry of the Tehran University of Medical Sciences (TUMS.DENTISTRY.REC.1396.2070).

According to the pilot study conducted on 20 parents and using two-independent proportions tab of PASS Π software (NCSS, LLC, Kaysville, UT, USA), considering α=0.05, β=0.2, mean difference=0.3, and knowledge score in control group=40%, the minimum required sample size for each of the two groups was calculated to be 57 samples, however 6 samples were added to each group in order to compensate participants withdrawal.

2.2. Participants

This study was conducted on 126 parents of children aged 4–12 years who attended the undergraduate pediatric dental clinic at the Tehran University of Medical Sciences, Tehran, Iran, and volunteered to participate in the study after being informed. The parents were informed about the study and informed written consent was received from the volunteered parents.

Individuals were assigned to either the intervention or comparison group by a computerized randomization process.

Of the 126 parents screened, 2 persons in the intervention group refused to complete the study; thus 63 were in the leaflet group and 61 were in the control group.

2.3. Survey

The survey tool included four sets of questions that the researchers developed and were filled out by parents. The survey tool structure was evaluated by two pediatric dentistry professors and the drawbacks were corrected resulting in a valid and reliable questionnaire. The reliability was confirmed using the Cronbach's α statistic. The content validity of the questionnaire was examined by two pediatric dentists regarding the grammar, vocabulary, and scoring. The questions were pilot-tested among parents of 20 children of the same age. The first part contained questions concerning the respondents' demographic background, such as their age, gender, education, and the number of children. It also consisted of oral health-related questions such as questions concerning the parents'/guardians' and children's health behavior and dental history.

The second part had 14 knowledge questions addressed 2 topics. The first topic was concerned with children's oral health-related behavior such as tooth brushing time, duration and frequency, important factors in choosing toothpaste, and the effect of different measures in dental caries prevention. The second topic was about fluoride, fluoride sources, fluoride role in preventing dental caries, fluoride content of Tehran drinking water, rinsing of mouth with water after tooth brushing and fluoride overexposure consequences.

The third part was consisted of 6 performance questions about tooth brushing habits of children, using toothpaste, and fluoride exposure. The last part was a 5-item self-assessment questionnaire in which the parents assessed their knowledge level, specified the sources helped them improve their dental health information, determined whether

they attended pediatric department educational meeting for parents and explained their opinions about the more effective ways regarding dental health education.

After completing the pretest questionnaire, the intervention group participants received an educational leaflet providing information on dental caries mechanism, preventive measures including diet management, oral hygiene program, using toothbrush, floss, and toothpaste, and also raising their awareness of fluoride and fluoride-containing products while the control group did not receive any written educational material and they were only informed about oral health verbally. Individuals in the intervention group were asked not to bring the leaflet with themselves in later sessions. After one month, a post-intervention survey was developed that contained the same questions as the pre-intervention survey.

2.4. Statistical analysis

For each parent, a total knowledge, performance, and self- assessment score was calculated for the pre and post-intervention surveys by summing up all relevant scores. Knowledge, performance, and self-assessment overall scores were within the ranges from 0 to 40, 6, and 5 respectively. In the knowledge domain, some questions had some subdivisions, and some questions had more than one answer to choose from, so the overall score was between 0 and 40.

Data were analyzed using t-test and General linear model. All statistics were performed by IBM SPSS Statistics 21 (IBM Corp., Armonk, NY) (SPSS, RRID:SCR_002865). The $p \leqslant 0.05$ was considered statistically significant.

3. Results

Among the 124 parents participated in this study, 61 were in the intervention and 63 were in the control group. Table 1 presents demographic information of the study participants. The participants were between 25 to 47 years old. The average ages of the intervention and control groups were 36.4±3.4 and 35 ±4.9 years respectively (mean ± SD). Participants were mostly female (58.9 %), and the average in the last degree received was diploma. The average child's age was 7.2 years, and the average number of children per family was 1.2. Among children 55.6% were female, 61.3 % were first child of the family, and 46% did not receive any dental treatment before. Comparisons showed there were no significant differences between the intervention and the control group in age, gender, education, number of children, child's age, child's gender, child's ordinal position in the family, and dental history ($p > 0.05$).

Table1. Demographic characteristics of the study participants.

	Intervention group(n=61)	Control group(n=63)	p-value
Parents' Age (mean)	36.4	35.9	0.08
Parents' Gender	F: 39(63%) M: 22(39%)	F: 34(53.9%) M: 29(46.1%)	0.26
Education levels Primary and middle school High school Associate degree Bachelor's degree Graduate degree	 22.6% 46% 12.1% 16.9% 2.4%	 21.5 % 45.2% 13% 17.3% 3%	0.96
Number of children(mean)	1.78	1.88	0.45
Child's age(mean)	6.89	7.69	0.06
Child's gender	F: 31(50%) M : 30 (50%)	F: 38(60%) M : 25 (40%)	0.28
Child's ordinal position in the family	1.5	1.4	0.5
Child with previous dental history	55%	44%	0.20

At baseline, there was no difference between the intervention and the control group regarding knowledge, performance and self-assessment scores (p=0.874, p=0.981, p=0.421, respectively) (Table 2).

After one month, the knowledge scores of the two groups increased significantly ($p<0.001$) and this increase was more pronounced for the intervention group ($p<0.001$) (table 2).
The performance scores of the two groups showed significant improvements after one month ($p<0.001$) but there was no difference between the two groups regarding performance change (Table 2) . The self-assessment scores of the two groups had a statistically significant decline after one month ($p<0.001$) but there was no difference between the intervention and control group ($p=0.151$) (Table 2).

Table 2. Baseline and post-intervention knowledge, performance and self-assessment scores of two groups.

	Knowledge		Performance		Self-assessment	
	baseline	**post intervention**	**baseline**	**post intervention**	**baseline**	**post intervention**
Intervention group	13.4±4.2	26.57±7.65	3.2±1.36	4±1.7	3.3±1.7	2.9±1.36
Control group	13.5±3.7	18.3±4.16	3.2±1.5	4±1.6	3.06±1.7	2.16±1.2
P	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Two groups comparison (p)	<0.001		0.591		0.151	

4. Discussion

Low levels of general oral health knowledge in parents have been previously identified as a risk factor for high caries incidence in children (10, 11). A recent study showed that despite the generally positive attitudes of parents towards preventive oral healthcare, confusion regarding different elements of oral care, including fluoride use, necessitates putting specific emphasis on each of these items in oral health promotion programs (12).
Okada et al. suggested that, at least in the lower grades school children, the attitude of mother toward oral health has a significant influence on the gingival health level of the child (13). Similar results have been reported in a study on 5-6 years old children (14). As for younger children the mother typically takes care of their dental health.
The results of this study showed that the educational leaflet could enhance knowledge and performance but decrease the self-assessment scores of parents about oral health-related behaviors, fluoride, and fluoride role in preventing dental caries.
In the control group post-intervention knowledge and performance were significantly increased compared to the baseline scores as well, although about the performance, this change was not different from the leaflet group. While knowledge enhancement in the leaflet group may be attributed to the educational leaflet, this enhancement in the control group may be the result of increased motivation for seeking oral health-related information caused by participating in this study. Although, the Hawthorne effect cannot be overlooked. "The Hawthorne effect is a type of reactivity whereby subjects change that aspect of their behavior which is being studied due to the awareness that they are under observation" (15). It does not affect the assessment of the difference between the intervention and the control group, but it may result in an overestimation of the effect magnitude by overestimating the response in the two groups (15)
In contrast to our study results, others (16, 17) suggest that just giving patients written material containing oral health information is not sufficient to improve knowledge and a more active approach, such as that involved in answering text messages, may be needed to cause changes in knowledge (16-18).
The decline of post-intervention self-assessment scores in the leaflet and the control group can be attributed to the awareness of their lack of knowledge after studying the leaflet and seeking information respectively.
Sharma et al. compared the effectiveness of two media (text messages and leaflets) in imparting health education to mothers of preschool children. There were significant improvements in knowledge, attitude, and practices in both groups but text messaging was more effective in improving abovementioned parameters. Sharma et al. concluded that this difference was related to this fact that people tend to read text messages rather than materials like leaflets which may be put aside and forgotten (17).
Makvandi et al. concluded that a brief multicomponent theory-based intervention among mothers of 1-2 years old children was moderately effective in improving cognition and self-reported cleaning of their children's teeth. The authors suggested that the well-known theory of planned behavior (TPB) can be used as a model of changing

behavior in the oral health area. “TPB assumes that the proximal predictors of behavior are a person’s intention to perform that behavior and perceived behavioral control” (19).

In terms of oral health knowledge, we found that participants were generally well informed about the necessity of regular dental visits, oral health education, sugar exposure restriction, tooth brushing, and dental flossing in caries prevention but had considerable gaps in specific knowledge about the role of fluoride and fissure sealant in dental caries control and prevention. These findings are consistent with those reported in the study by Jensen et al. in which the participants recognized the tooth brushing as a very important habit, even though they had little knowledge about the techniques of and reasons behind using fluoridated toothpaste effectively (9).

Before the intervention, the parents implied that, respectively, the media, educational institutes (e.g. schools, universities), and health care professionals, are their main sources of gathering information about oral and dental health. After intervention, the percentage of parents reported having gained knowledge from dentists and brochures has increased, and the media is still among the top two sources; supporting the role of dentists and educational leaflets and in addition to emphasizing the importance of media in growing awareness about dental health.

Since changing behavior is a time-consuming process and this study included only a 1-month follow-up, long-term behavior changes cannot be evaluated and that is a limitation to our study.

Lack of differences between the leaflet and the control group in pre-intervention responses suggests that randomization was adequate.

5. Conclusions

Based on the results of this study it is concluded that the educational leaflet appears to be an effective instructional tool in oral health education.

Declarations

Ethics approval and consent to participate

The ethics approval for the current study was obtained from the Ethics Committee of the School of Dentistry of the Tehran University of Medical Sciences (TUMS.DENTISTRY.REC.1396.2070). Informed consent was obtained from all participants.

Data availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Conflict of Interest

There is no conflict of interest to be declared.

Authors' contributions

conception or design of the work (SG); Acquisition of data (MF); Analysis or interpretation of data (all authors); Drafting the manuscript (ZE); Revising the manuscript (all authors); Accountable for all aspects of the work (all authors).

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