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Original Article

The Effects of Educational Program Based on the Health Belief Model on the Oral Health Behaviors of Elementary School Students

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Abstract

Background and Aim: Oral disorders are among the commonest health problems which usually begin during adolescence. This study was conducted to investigate the effects of an educational program based on the Health Belief Model (HBM) on oral health behaviors of elementary school female students.

Methods: This was a quasi-experimental study in which 60 female fifth-year elementary school students participated. The participants were recruited from Mashhad, Iran, through multistage random sampling and were randomly allocated to the two groups of experimental and control. The study intervention was developed and implemented based on the components of the Health Belief Model. The data were collected via a researcher-made questionnaire whose content validity and reliability were assessed and confirmed. The Cronbach alpha values of different domains of the questionnaire ranged from 0.7–0.8. The collected data were entered into the SPSS (v. 16.5) and were analyzed by conducting the paired- and the independent-samples *t* test, chi-square, and Fisher exact tests at a significance level of less than 0.05. Moreover, the measures of descriptive statistics were used for describing and presenting the data.

Results: The means of the students' age in the experimental and the control groups were 10 ± 0.48 and 10 ± 0.61 years, respectively. The paired-samples *t* test showed that in the experimental group, there were statistically significant differences between the pretest and posttest values of the constructs of the HBM ($P < 0.05$); however, these differences were not significant in the control group ($P > 0.05$). Moreover, after the study intervention, the oral health behaviors of the students in the experimental group were significantly better than before the intervention ($P < 0.001$); however, the behaviors of the students in the control group did not change significantly ($P = 0.9$).

Conclusion: The study findings indicate that education based on the HBM is effective in promoting the behaviors that prevent oral disorders among students. Accordingly, the HBM seems to be an appropriate model for developing and implementing educational interventions for disease prevention and health promotion.

Keywords: Education, Health Belief Model, Oral health, Female students, Elementary education, Mashhad.

Introduction

Oral disorders are the commonest health problems which usually begin during adolescence and whose prevalence is increasing progressively (1). Studies have shown that one of the commonest problems of childhood is dental caries and periodontal diseases. Currently, the prevalence of dental caries and gingivitis among Iranian adolescents is respectively 60% and 95%. According to the reports presented by the Oral Health Department of the World Health Organization (WHO), the mean of decayed missing filled teeth (DMFT) index for 12-year-old children in 188 countries in 2004 was 1.61 (2). This organization also reported that the mean of DMFT in Iran has been increasing since 1957 up to now while it was at moderate level among Iranian 12-year-old children in 1993 (3). Yazdani et al conducted a study in Tehran, Iran, on 15-year-old students and reported that DMFT was 2.1 and 40% of the students needed treatment for dental caries (4). These statistics show the vital necessity for planning to maintain and protect healthy teeth because dental

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caries in childhood can finally result in tooth removal in adolescence or youth (5).

Oral disorders can cause problems such as pain, gingival bleeding, tooth loss, aesthetic problems, unhappiness, and deterioration of daily living activities (6). The complications of oral disorders may include impaired health, frequent absence from school, endocarditis, increased healthcare costs, and compromised quality of life. The high prevalence of oral disorders and their complications among children necessitates education for oral health (7).

Oral health is one of the indicators of general health. Health education and protection are two inseparable components in promoting oral health both at personal and social levels. Moreover, oral health is among the initiatives of the WHO for preventing chronic conditions and promoting health. The main goal of oral health until 2020 is to improve the quality of oral healthcare delivery systems (7).

Among the strategies for preventing dental caries are fluoride therapy, regular and accurate tooth brushing, using dental floss, toothpaste, and fluoride-containing mouth wash solutions, and avoiding frequent and excessive use of sugar-containing products (8). Another strategy for this purpose is education; however, unplanned and disorganized education is a fruitless and vain attempt while providing educations based on an educational program can enhance the effectiveness and the success of educational programs (8,9). Educational models and theories can be used for maintaining the coherence of educations.

One of the models which can be used for organizing educations is the Health Belief Model (HBM). The HBM is among the first models which were developed for regulating health-related behaviors (10,11). This model focuses mainly on disease prevention and mainly deals with people's motivation for action. It emphasizes on changing people's beliefs and behaviors. This model presumes that for shaping preventive behaviors, individuals need to perceive the associating threats (perceived susceptibility) and understand the seriousness and the physical, psychological, and socioeconomic complications of the threats (perceived severity). After receiving positive reactions from internal or external environments, the afflicted individual feels that he/she needs to take an action (cue to action). Then, in order to show preventive behaviors, he/she should accept the benefits and the practicality of the action (perceived benefits) and understand that removing barriers to action would be less costly than the negative consequences of the problem (perceived barriers). For complementing this model, the construct of 'self-efficacy' was added to it in the 1980s. Self-efficacy is the result of person's confidence in having adequate ability to pursue a certain behavior (12).

The importance of using the HBM model has been confirmed in numerous studies (11,13). Given the high prevalence of dental caries among students who have an age of 10–12 years old (4 and 5), this study was conducted to investigate the effects of an educational program based on the HBM on oral health behaviors of female elementary school students.

Methods

This was a quasi-experimental study in which 60 female fifth-year elementary school students participated. The participants were recruited from Mashhad, Iran, through multistage random sampling. Initially, one district (the district 6) was randomly selected from the seven districts of Mashhad. Then, two schools were randomly selected from this district. Finally, one class was selected from each school. All of the students from the class of school A were randomly allocated to the experimental and all students from the class of the school B were allocated to the control group—30 students in each group. This allocation strategy was used to prevent contact of students in the experimental group with the students in the control group. The students participated in the study voluntarily and after giving written consent.

The study instrument was a researcher-made 2-part questionnaire. The first part of the questionnaire included demographic data. The second part consisted of questions in the five domains of the HBM including perceived severity (10 questions), perceived susceptibility (five questions), perceived benefits and barriers (10 questions), and self-efficacy (four questions). These questions were scored on a Likert scale including the five points of 'Completely agree' (scored 5), 'Agree' (scored 4), 'Have no idea' (scored 3), 'Disagree' (scored 2), and 'Completely disagree' (scored 1). The questionnaire was filled by the students in their classroom and on a self-report basis. Moreover, the students' oral health behaviors were evaluated by using five 4-choice questions. The right and the wrong answers to these questions were respectively scored 1 and 0. Accordingly, the total score of these five questions was 0–5; the higher the score, the better the behaviors. Finally, cues to action were assessed through asking the students about positive signs regarding oral health provided by others. For instance, we asked them, 'In your opinion, what are the most important sources for providing you with information about oral health?' Answers to these questions were selected by the students from the provided choices.

The validity of the questionnaire was evaluated by calculating the content validity index (CVI) and the content validity ratio (CVR) for each domain of the questionnaire. Primarily, the questionnaire was developed through reviewing the literature and using themes generated from interviews with dentists and specialists in the area of oral health. Then, the questionnaire was provided to 45 faculty members and experts in health education as well as dentists for validity assessment. In total, 10 experts sent their comments to us. A Likert scale was used for calculating the CVI for the three criteria of simplicity, relevance, and clarity. CVIs of greater than 0.79 were considered as acceptable validity. The CVIs of perceived susceptibility, perceived severity, perceived

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barriers, perceived benefits, self-efficacy, and behavior constructs were respectively 0.84, 0.83, 0.84, 0.84, 0.81, and 0.81.

The CVR of the questionnaire was assessed by using the essentiality criteria on a three-point scale including 'Essential', 'Helpful but not essential', and 'Not essential'. The CVRs of the aforementioned six constructs were 0.83, 0.84, 0.84, 0.84, 0.81, and 0.83, respectively. According to the standards in Lawshe's Table, the minimum acceptable CVR is 0.62 (14). Finally, the internal consistency of the constructs was evaluated by calculating Cronbach alpha. The Cronbach alpha values for the perceived susceptibility, perceived severity, perceived barriers, perceived benefits, self-efficacy, and behavior constructs were respectively 0.76, 0.83, 0.80, 0.78, 0.79, and 80.

After performing the pretest, an educational program was developed based on the concepts of the HBM. Educational materials were provided to the students in four lecture sessions and one practical education session. Teaching methods such as lecture, question-and-answer, role playing, video presentation for showing how to brush teeth, slide presentation, and a teeth model were used for educating the students. Students in the control group received no education. Two months after educations, the study questionnaire was re-completed by the students.

The collected data were entered into the SPSS software (v. 16.5) and were analyzed by conducting the paired- and the independent-samples *t* test, chi-square, and Fisher exact tests at a significance level of less than 0.05. The measures of descriptive statistics were also used for describing and presenting the data.

Results

The means of the students' age in the experimental and the control group were 10 ± 0.48 and 10 ± 0.61 years, respectively. The two groups did not differ significantly regarding age, parents' educational and employment status. All students were living in Mashhad, Iran. Other demographic characteristics of the students are shown and compared in Table 1.

The paired-samples *t* test showed that in the experimental group, posttest values of different domains of HBM as well as oral health behaviors were significantly higher than pretest values ($P < 0.05$) while in the control group, pretest-posttest differences were not statistically significant ($P > 0.05$; Table 2).

Before the study intervention, 56% and 36% of the students in the experimental group brushed their teeth respectively once and more than once a day. In the control group, these values were equal to 66% and 26%, respectively. After the study intervention, 56% of the students in the experimental group reported tooth-brushing more than once a day while in the control group this value did not change.

On the other hand, before the study intervention, 16.7% of the students in the experimental group always used dental floss, 53.3% used it occasionally, and 30% of them never used it. After the study intervention, these values changed to 16.7%, 66.7%, and 16.7%, respectively, denoting a greater use of dental floss among the students in the experimental group after the study intervention. In the control group, only 10% of the students used dental floss regularly before the study. This value did not change after the study.

Finally, two months after the study, 10% of the students in the experimental group referred to dentists while in the control group, this value was equal to 6%.

Discussion

The aim of this study was to investigate the effects of an educational program based on the HBM on oral health behaviors of female elementary school students. The findings revealed that the educational program had positive effects on students' tooth-brushing and dental floss

Table 1. Comparing the Study Groups Regarding the Students' Demographic Characteristics

Variable	Groups		*P* Value (The Chi-Square and the Fisher Exact Tests)
	Control (n = 30) No. (%)	Experimental (n = 30) No. (%)	
Mother's education			0.26
Primary	6 (20)	8 (26.7)	
Guidance school	3 (10)	8 (26.7)	
High school and diploma	8 (26.7)	5 (16.7)	
University	13 (43.3)	9 (30)	
Father's education			0.92
Primary	5 (16.7)	5 (16.7)	
Guidance school	2 (6.6)	4 (13.3)	
High school and diploma	11 (36.7)	10 (33.4)	
University	12 (40)	11 (36.6)	
Mother's employment			0.32
Employed	7 (23.3)	4 (13.3)	
Housewife	23 (76.7)	26 (86.7)	
Father's employment			1
Blue-collar worker	3 (13.3)	4 (13.3)	
White-collar worker	15 (50)	16 (53.3)	
Self-employed	11 (36.7)	10 (33.3)	

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Table 2. Comparing the Study Groups Regarding the Means of the HBM Constructs Before and After the Study

The constructs of the HBM	Group	Before	After	Mean Difference	P value (The Paired-Samples *T* Test)
		Mean ± SD	Mean ± SD		
Perceived severity	Experimental	40.46 ± 3.5	42.7 ± 3.6	2.3 ± 4.7	0.004
	Control	32.9 ± 4.1	39.4 ± 4.7	0.13 ± 3.9	0.8
	The independent-samples *t* test	0.2	0.003		
Perceived susceptibility	Experimental	26.43 ± 4.01	28.36 ± 4.3	1.9 ± 4.9	0.04
	Control	26.23 ± 3.5	26.96 ± 4.01	0.73 ± 4.6	0.3
	The independent-samples *t* test	0.85	<0.001		
Perceived barriers	Experimental	38.7 ± 5.8	44.5 ± 4.7	5.8 ± 1.1	<0.001
	Control	37.4 ± 6.6	38.5 ± 6.9	1.1 ± 0.3	0.19
	The independent-samples *t* test	0.2	<0.001		
Perceived benefits	Experimental	33.9 ± 3.3	36.2 ± 4.1	2.2 ± 3.6	0.04
	Control	33.8 ± 2.8	33.7 ± 3.8	0.1 ± 0.8	0.4
	The independent-samples *t* test	0.9	<0.001		
Self-efficacy	Experimental	15.4 ± 2.07	18.2 ± 2.2	3.8 ± 0.86	<0.001
	Control	15.00 ± 1.07	15.05 ± 2.1	0.05 ± 0.04	0.9
	The independent-samples *t* test	0.2	<0.001		
Behavior (brushing, using dental floss, referring to dentist)	Experimental	3.4 ± 1.3	4.03 ± 0.05	0.9 ± 1.1	0.01
	Control	3.1 ± 1.0	3.2 ± 0.9	0.1 ± 0.1	0.9
	The independent-samples *t* test	0.3	<0.001		

use behaviors. Moreover, the number of students referring to dentist after the study was 10% in the experimental group and 6% in the control group. This finding is in line with the findings reported by Kheirollahi et al (15), Bahmanpour et al (16), and Mazloomi Mahmoodabad and Roohani Tanekaboni (17). They reported that the percentage of students referring to dentist once every 6 months was respectively equal to 10.1% (15), 3.2% (16), and 11.1% (17). The reason behind students' limited referring to dentist may be their perceptions of oral health and the necessity of dental visit in that some individuals believe that referring to dentist is necessary only once they have pain in their teeth.

The study findings revealed that posttest value of perceived severity in the control group was not significantly different from pretest value; however, the difference between pretest and posttest values of perceived severity in the experimental group was statistically significant, showing the positive effects of the educational program. Solhi et al also found that health education had significant effect on perceived severity (13). Kasmaei et al reported perceived severity as a significant factor behind students' tooth-brushing behavior (18). Accordingly, individuals' perceptions and evaluation of a threat is the core of using the HBM and hence, for regulating students' unhealthy behaviors, their perceived severity should be enhanced by parents and teachers.

Our findings also indicated that while pretest-posttest difference of perceived susceptibility was not statistically significant in the control group, this difference was significant in the experimental group. In line with this finding, Solhi et al (13) and Zamani Alavijeh (11) also reported the significant effect of their educational intervention on perceived susceptibility. However, in a study conducted by Kühner and Raetzke, this difference was not statistically significant (10).

We also found that our educational program significantly affected students' self-efficacy. Morowatisharifabad and Shirazi reported self-efficacy as a determinant of students' oral health behaviors (19). Bahmanpour et al (16) and Buglar et al (20) also reported the same finding.

According to Bandura, a good strategy for enhancing self-efficacy is modeling (21). Modeling means that patients who are successful at coping with their problems are invited to act as a model for other patients. Accordingly, students who are successful in showing healthy behaviors need to be identified and employed as a model for other students in educational programs.

We also found a significant difference between the pretest and the posttest oral health behaviors of the students. This finding agrees with the findings reported by Solhi et al (13) and Zarei (22). Morowatisharifabad and Shirazi (19) found that the highest correlation of self-efficacy was with oral health behaviors.

One of the study limitations was that the study data were collected on a self-report basis. The accuracy of the data collected by self-report methods greatly depends on respondents' carefulness and attentiveness while providing data. We attempted to manage this limitation by providing the students with adequate and clear explanations. It is recommended that future studies use other data collection methods such as interview and observation and compare the gathered data with the data obtained from self-report instruments.

Conclusion

The findings of the present study indicate that providing health education based on the HBM has positive effects on the oral health perceived threat, benefits, self-efficacy, knowledge, and behaviors of the students who have an age of 10–12 years. Although the study intervention significantly changed the students' behaviors, their

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behaviors were still way below the optimum situation. Using the HBM and employing strategies for enhancing perceived self-efficacy and threat and reducing perceived barriers can be helpful in predicting and changing students' health behaviors. Some strategies which can promote health-related behaviors are, employing educational models based on students' educational needs, encouraging teachers and parents' participation for changing students' behavioral habits, turning schools into environments that support healthy behaviors, enhancing students' perceptions of the susceptibility and the severity of the diseases which are resulted from unhealthy behaviors, improving their perceptions of the benefits of healthy behaviors, and providing them with cues to action. Accordingly, comprehensive programs need to be developed based on the experiences of health education and health promotion experts. Moreover, the main priority of oral health programs should be self-efficacy enhancement.

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