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Effect of Education on Promoting Preventive Behaviors of Oral and Dental Problems: Applying Health Belief Model

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ABSTRACT

Aims Oral and dental problems are among the most common diseases in the world. The aim of this research was to determine the effect of an education program designed based on the health belief model on improving the behaviors preventing oral and dental problems in the 7th-grade students.

Materials & Methods This semi-experimental study was conducted on 7th-grade female students in Qom in 2016. The samples were selected via multistage sampling method. Using the list of students, a total of 100 students were selected of each school. The participants were divided into two groups include the intervention and control groups, there were 50 people in each groups. Before the intervention, a standardized questionnaire based on the health belief model was distributed in both groups. Then the educational content which had been already prepared was presented to cases in five sessions via different methods. Data were analyzed using independent t-test, chi-square, paired t-test and SPSS 20 software.

Findings After the intervention, the constructs of Knowledge ($p<0.001$), perceived susceptibility ($p=0.001$), perceived severity ($p=0.01$), perceived barriers ($p=0.02$), and perceived self-efficacy ($p<0.001$) had significantly changed in the intervention group, as compared with the time before the intervention.

Conclusion Health belief model has an impact on student's knowledge and perception of oral health and it can be used to increase students' Knowledge and understanding in order to promote their oral and dental health.

Keywords Oral Health; Adolescent; Health; Students

CITATION LINKS

[1] Evaluation of the effect of repetition of oral health education in 9-10 years old ... [2] Comparison of two methods of dental health education lectures and film screenings on ... [3] The World Oral Health Report 2003: Continuous improvement of ... [4] A systematic review of population-based dental caries ... [5] Determinants of oral health behaviors among preuniversity ... [6] DMFT index and bilateral dental caries occurance among 12-year-old students ... [7] Oral and Dental Health. Tehran: Ministry of Health and ... [8] Health behaviors among adolescents and young adults with congenital ... [9] Predictors of tooth brushing behavior in Iranian adolescents: An application of the planned ... [10] Oral health knowledge, attitude and behavior among Saudi ... [11] Dimensions of transformational leadership: Conceptual and ... [12] The prevention of oral ... [13] Discussions in the health education ... [14] The effect of oral health education based on health belief model in mothers who had 3-6 year old children ... [15] Reliability assessment of the effectiveness of oral health education project ... [16] Predictors of oral health care in pregnant women based on health belief ... [17] Assessment of oral - dental health status: Using Health Belief Model (HBM) in first ... [18] The application of the health belief model in oral health ... [19] The effect of education based on a health belief model on Giardia Lamblia preventive behaviors of primary ... [20] Survey of some related factors to oral health in high school female students in Yazd ... [21] The role of self-efficacy in dental patients' brushing and flossing: Testing an extended ... [22] Utilizing the Health Promotion Model to predict oral health behaviors in the students of Islamic ... [23] The effect of health beliefs on the compliance of periodontal patients with oral hygiene ... [24] Predictors of oral health behaviors: Examining the effect ... [25] Effect of education based on health belief model on students' oral ... [26] Impact evaluation of an oral health intervention amongst primary school children ... [27] Evaluation of oral and dental hygiene in students ... [28] The effect of educating mothers in inter-dental cleaning behavior on their children's dental health ... [29] Role of oral hygiene beliefs in regular brushing among the 9-10 years old female ...

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Introduction

Oral health is the establishment and maintenance of effective preventive habits in individuals [1]. Oral health is one of the most important aspects of a healthy lifestyle [2]. In fact, oral health plays a key role in the general health of the body [3]. Oral diseases, especially caries and periodontal diseases, are among the most common diseases in the world. These kinds of diseases are painful and incur high costs and they affect the nutritional health and overall health of the person and lead to a decrease in the quality of life of people [4].

Tooth decay is the most common and most prevalent human disease which affects more than 99% of humans, and there are only very few people who do not suffer from this problem in their life span [5]. The prevalence of dental caries in 12-year-old students in Iran is higher than the World Health Organization's standard declared in 2010 [6]. Based on the statistical data obtained from the Health Office of the Ministry of Health in 2004, the Decayed, Missing, and Filled Teeth (DMFT) of 12-year-old children were about 1.9%. In addition, the mean DMFT of 12-year-old boys and girls, respectively, were 1.7 and 2.0. The estimated mean DMFT was 1.7% of people living in rural areas and 1.9% of people living in urban areas [7]. Recent studies in the United States have shown that because of the training of preventive behaviors such as the use of toothbrushes and dental floss and regular dental examinations, there has been an increase in the percentage of people in the American society who have been able to maintain their natural teeth at older ages [8]. However, the use of toothbrushes and floss in the United States is still at a low level [9].

In the Eastern Mediterranean, only 30% to 40% of teenagers reported tooth brushing twice a day. The statistics are different in Iran, as only 44% of 12-year-old teenagers brush at least once a day [10]. One of the goals of the World Health Organization concerning oral health is to reduce the DMFT level to less than one [6, 11].

Health education is an essential factor in the improvement of health; one of its key roles is to prepare the people of the community by providing information for them, raising their awareness, and teaching the skills and health experiences which can be utilized by people to have more control over their health [12]. Various health education models and theories are used to change the behavior in people; one of these models is the health belief model that was established by Hochbaum and Rosenstock between 1950 and 1970 and then it was completed by Becker and Maiman [13]. The health belief model is mainly based on the prevention of diseases and behaviors and suggests a relationship between health beliefs and behavior [13].

This model is based on seven constructs, including perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, perceived self-efficacy, and likelihood of behavior [14]. In this model, considering its constructs, people perceive a health threat and their behaviors lead them to health. In other words, it can increase the person's susceptibility and perception of a disease and determine the perceived severity (The person's perception of the seriousness of the disease and its related complications) about tooth decay, and help to perceive the benefits (The person's perception of the benefits resulting from the behavior) and the barriers (The person's perception of problems hindering the behavior), cues to action (Factors accelerating the behavior), and perceive self-efficacy (Trusting its own ability to do behavior) which finally lead the person toward observing the oral health [13]. In line with this, Hajimiri *et al*. studied the effect of education using the health belief model on the reduction of dental plaque [14].

To achieve some of these goals, it is the easiest and most cost-effective way to use schools for reaching a large group of people who are in this age group. The people in this age group are structuring and shaping their own habits, beliefs, and perceptions, and any change or improvement in their training can create long lasting and remarkable effects on the behaviors of the future generation of society [15].

This study is important by considering the high rate of dental caries in primary schools and junior high schools in the country and the effect of beliefs on promoting preventive behaviors among students.

The aim of this research was to determine the effect of an education program designed based on the health belief model on improving the behaviors preventing oral and dental problems in the 7th-grade students.

Materials and Methods

This semi-experimental study was conducted on 7th-grade female students in Qom in 2016. The participants were selected using a multistage sampling method. Accordingly, a region was randomly selected from among the education regions (As clusters). Then, taking into account the simulation conditions, two schools were randomly selected from among the total number of schools. Using the full list of students in each school, 100 students were chosen as the participants (50 students were allocated to the intervention group and 50 to the control group). The inclusion criteria were the followings: Full consent for participation in the study, being at a minimum age required for admission to the study, not being absent in training sessions, and not having physical and mental disabilities. The exclusion criteria were the followings: Being over 14-year-old, lack of consent for attending training sessions, being absent in training sessions, and having physical and mental

disabilities.

Data collection was carried out, using a questionnaire based on health belief model. It included 12 multiple-choice questions (With 4 options) about knowledge related to oral health condition, 6 questions about the construct of perceived susceptibility, which investigated the probability of developing oral and dental diseases and problems, 9 questions about the constructs of perceived severity of oral diseases and problems, 6 questions about the construct of perceived benefits of observing oral health (Brushing teeth and using dental floss), 10 questions about the construct of perceived barriers to observe oral health (Brushing teeth and using dental floss), and 4 questions about the construct of perceived self-efficacy for observing oral health (Brushing teeth and using dental floss).

Each of the above-mentioned constructs was scored on a Likert-type scale with 1 to 4 points from "totally disagree" to "totally agree". The four options were scored as follows: 4 points for "Totally Agree", 3 points for "Agree", 2 points for "Disagree", and 1 point for "Totally Disagree". The 5 questions on oral health behavior (Brushing teeth and using dental floss) were also designed as multiple-choice questions. It is worth noting that the questionnaire of health belief model regarding oral and dental health was a standard questionnaire and its validity and reliability had already been tested and verified in studies conducted by Shamsi *et al.* [16] and Hazavei *et al.* [17]. In their studies, the reliability coefficient of the questionnaire was calculated using Pearson correlation coefficient (p=0.07). In addition, the Cronbach's alpha coefficient test was used for testing internal consistency; according to the results, the internal consistency coefficient was 0.81 in awareness domain, 0.79 in perceived susceptibility domain, 0.83 in perceived benefits domain, 0.64 in health behavior domain, 0.80 in perceived severity domain, 0.74 in perceived barriers domain, and 0.67 in the self-efficacy domain.

In the first step, the required information was collected from the selected schools prior to the intervention. Then, based on the results of the pretest, the required educational contents were designed and the trainings were performed using educational methods such as lectures, posters, group discussions, questions and answers, pamphlets, and films. Accordingly, five training sessions each lasting 30 minutes were held (First session: Training students about oral and dental structure and existing diseases caused by non-compliance with oral health; second session: Training students about the importance of oral health and the risk of oral diseases; third session: Training students about the severity of oral and dental problems; fourth session: Training students about the benefits of oral health and ways to reduce barriers to oral and dental health behaviors; fifth session: Empowering students to observe oral and dental health and training them about how to properly use toothbrush and dental floss).

Then, two months after training in the intervention group, the questionnaire was returned to the intervention and control group and the required information was collected.

It should be noted that before the start of the study, the aim of the study was explained to the target group and the eligible persons were entered into the study after obtaining informed consent.

For data analyze independent t-test, Chi-square test, paired t-test, and SPSS 20 software were used.

Findings

Before the educational intervention, there was no significant difference between the two groups in terms of demographic characteristics including age, parent's education, parent's job, and income status (p>0.05; Table 1). The Mean age was 12.78 and 12.84 in control and intervention groups, respectively.

Table 1) Demographic characteristics of the samples in two groups (n=50 in each groups, the numbers in parentheses represent percentages)

Variables	Control	Intervention
Unit Studies Father Lowbrow		
Rudiment	12 (24.0)	15(30.0)
Guidance	13 (26.0)	14 (28.0)
Diploma	17 (34.0)	14 (28.0)
Collegiate	8 (16.0)	7 (14.0)
Unit Studies Mother Lowbrow		
Rudiment	19 (38.0)	19 (38.0)
Guidance	12 (24.0)	14 (28.0)
Diploma	14 (28.0)	12 (24.0)
Collegiate	5 (10.0)	5 (10.0)
Workless Office Father		
Openness	19 (38.0)	20 (40.0)
Worker	1 (2.0)	8 (16.0)
Employee	10 (20.0)	6 (12.0)
Pensioner	1 (2.0)	1 (2.0)
Other	19 (36.0)	15 (30.0)
Hub Office Mother		
Openness	25 (50.0)	25 (25.0)
Worker	1 (2.0)	0
Employe	6 (12.0)	7 (14.0)
Other	18 (36.0)	18 (36.0)
income status		
Good	20 (40.0)	15 (30.0)
Tolerable	27 (54.0)	30 (60.0)
Faint	3 (6.0)	5 (10.0)

Before the educational intervention, there was no significant difference in variables between the intervention and control groups except perceived severity and perceived benefits (p>0.05). However, after the intervention, the mean score of knowledge, perceived susceptibility, perceived severity, perceived barriers and perceived self-efficacy had a significant difference between the two groups (p<0.05), but there was no significant difference between the two groups in terms of perceived

benefits and behavior of the use of toothbrushes and dental floss (p>0.05; Table 2).

Table 2) Statistical mean of scores variables in the health belief model between the two groups before and after the educational intervention (n=50 in each group)

Variables	Control Group	Intervention Group	p-value	t-value
Knowledge				
Before	4.70±1.60	4.70±1.70	0.8	-0.17
After	4.80±2.20	7.80±1.90	<0.001	7.1
Perceived susceptibility				
Before	18.30±2.40	18.02±2.30	0.5	-0.6
After	18.10±2.30	19.90±2.80	0.001	3.4
Perceived severity				
Before	29.06±3.20	27.30±3.10	0.01	-2.5
After	27.70±3.90	31.00±8.10	0.01	2.4
Perceived benefits				
Before	19.50±2.50	18.30±3.07	0.03	-2.1
After	18.80±3.20	19.60±3.10	0.2	1.2
Perceived barriers				
Before	18.70±4.70	18.60±4.40	0.9	-0.09
After	20.70±4.70	18.06±6.80	0.02	-2.2
Perceived self-efficacy				
Before	12.20±2.70	12.20±2.80	0.9	0.03
After	11.10±2.30	13.20±2.70	<0.001	3.9
Behavior of the use of toothbrushes and dental floss				
Before	8.20±2.50	8.20±2.90	0.9	-0.03
After	7.90±2.30	8.90±3.10	0.07	1.82

Discussion

The aim of this research was to determine the effect of an education program designed based on the health belief model on improving the behaviors preventing oral and dental problems in the 7th-grade students.

In this study, the findings indicated that after an educational intervention, there was a significant increase in the mean scores of the constructs of knowledge, perceived susceptibility, perceived severity, perceived barriers, and perceived self-efficacy.

The present study showed that before the training, the students in both groups had a low level of knowledge about the behaviors preventing oral and dental problems, which may be due to inadequate trainings in schools about this field of health. However, after the training, the mean score of knowledge in the intervention group was significantly different from that in the control group. The results of a study done by Hazavei *et al*. are in line with the results of the present study [17]. Furthermore, the findings of this study are in line with the results of a study that was conducted by Islami Poor and Asgari in which they presented educational films for students aged 12-14 years [15]. There was a significant increase in the mean score of knowledge, which may be attributed to the students' interest in the intervention group to the topic, the accuracy of the trainer's discussions, and the various questions of the students about the oral health.

In addition, after the educational intervention in the present study, the perceived susceptibility in the intervention group was significantly increased, as compared with the control group. In line with these findings, the results of studies that were conducted by Solhi *et al*. [18] and Mosayebi *et al*. [19] showed a significant difference in the perceived susceptibility after the training in the intervention group, as compared with the control group, which is consistent with the results of the present study. However, these are not consistent with the results of Mazloumi-Mahmoud and Rohani's study [20]. Perhaps the discrepancy between the finding of the present study and other findings might be attributed to the differences in the target groups.

In this study, the results indicated that there was a significant difference between the intervention group and the control group in terms of the perceived intensity, which is consistent with the results of a study that was done by Mazloumi-Mahmoud and Rohani [20] and a study performed by Hazavei *et al*. [17]. The change in this construct was significant, which may be attributed to students' perceptions of serious problems and illnesses caused by non-compliance with oral health.

In the present study, after the educational intervention, there was a significant increase in the construct of perceived self-efficacy in the intervention group, as compared with the control group, which is consistent with the results of a study done by Buglar *et al*. in Australia [21].

Mehri and Morowatisharifabad investigated oral health behaviors in university students in Sabzevar, Iran, and their results indicated that the direct effect of self-efficacy was stronger than other variables in the health promotion model [22]. In the present study, similarly, self-efficacy was identified as a strong component for promoting the behaviors preventing dental caries in the intervention groups after the educational intervention. Taking into consideration the important role of self-efficacy, individuals are tempted to practice healthy behaviors and even behave in the face of challenges only when they feel they are able to control health behaviors. In addition, in the present study, the perceived barriers after the education in the intervention group were significantly different from that in the control group, which was consistent with the results of a study of Solhi *et al*. [18] and a study performed by Mosayebi *et al*. [19]; however, it is not in line with the results of a study performed by Kuhner and Raetzke [23].

In the present study, there was no significant difference between the intervention and the control group in terms of the perceived benefits, which is consistent with the results of a study done by Mazloumi-Mahmoud and Rohani [20]. In a study that was conducted by Hawkins, the results showed that perceived benefits did not predict behaviors

preventing oral and dental diseases [24], which is consistent with the results of the present study. However, it is not consistent with the results of study conducted by Karami *et al*. [25]. It is also not consistent with the results of the study done by Mosayebi *et al*. [19].

In the present study, after the intervention, there was no significant difference between the intervention and control group in terms of the behavior of brushing and dental flossing, which is consistent with the results of a study done by Friel *et al*. in Ireland [26].

In the study of Jorvand *et al*., about oral health behaviors in students, it was indicated that there was a significant increase in knowledge after the educational intervention (from 3.6±1.37 to 4.98±1.57), attitude (from 28.17±5.7 to 30.98±6.35), and behavior (from 15.03±2.98 to 17.08±2.60). The results of their study showed the positive results of educational intervention indicate that education through appropriate methods can improve students' behavior in the field of oral health [27].

The results of a study that was done by Tavakoli *et al*. showed after intervention, most of the mothers and their children were in action and preparation stages and the direction of change improved after the intervention. Significant statistical differences were found in self-efficacy, perceived benefits, and also Gingival index before and after the intervention between two groups (p=0.03-0.001). In their study findings showed a positive relationship between stages of behavior of inter-dental cleaning in mothers and their children. Qualitative research can be used to reveal the underlying inter-dental cleaning perception and behaviors of mothers and children [28].

In the study of Kasmaei *et al*., [29] (Role of oral health beliefs in regular brushing) findings showed The logistic regression analysis indicated that perceived severity (OR=0.48, 95% CI=0.27-0.86, P=0.014), perceived barriers (OR=1.97, 95% CI=1.29-3.02, P=0.002) and mothers' educational level (OR=4.78, 95% CI=1.24-18.46, P=0.023) were the significant predicting factors for tooth brushing twice a day or more. There are significant statistical correlations among the perceived severity of losing good eating and good speaking, and perceived barriers of tiredness, laziness, and impatience with desirable behavior. Overall, 66.5% agreed with one of the two physical barriers: Painful tooth brushing and gums bleeding.

The results of this study indicated promoting an educational level and educational programs for Iranian women are recommended. Planning useful educational interventions for the students of concrete operational stage is required attention to the application of Piaget's Theory of cognitive development. Educational interventions should focus on items of beliefs named above. At least 70% of Iranian people need to learn the correct ways of brushing teeth [29]. Overall, training programs must be designed in a way that strengthen the constructs of perceived susceptibility, perceived benefits, perceived severity, and perceived self-efficiency. In addition, the perceived barriers to doing these behaviors must be reduced and reinforcing the idea in people that, in spite of the barriers, they can observe oral and dental health. In order to significantly promote the perceived benefits after the training, it is necessary to increase effective trainings in this field and increase the focus on the related topics. Therefore, the educational interventions must focus on perceived benefits of behaviors preventing oral and dental problems and focus on factors which motivate students to become more sensitive to the benefits of using toothbrushes and dental floss to prevent tooth decay. Moreover, the difference in the behavior of using toothbrushes and dental floss after training was not significant, which may be due to the fact that the students in the control group before the training and after giving the questionnaire had become more sensitive to the questions in the questionnaire than the control group and tried to use toothbrushes and dental floss more than the students in the intervention group during this two month period after the intervention; this might have promoted the control and intervention group to show the same level of this behavior after the training; therefore, according to the results of the test, there was no significant difference between the two groups in terms of this behavior. It can be also said that the students in the control group have received more and effective training on the prevention of oral and dental problems through health educators and parents, which promoted these behaviors, resulting in insignificant difference in oral health behaviors.

Based on the results of the study, health belief model can be used to increase students' knowledge and understanding in order to promote their oral and dental health. In educational interventions, especially in schools, in addition to training through professionals and trainers, it is better to consider the impact of media, peers, and parents, and use the health belief model in educational programs.

The limitations of this research include the lack of a suitable place for training, parents' limitation of access especially to mothers due to their training, and the lack of accordance among students in training session hours. The suggestions are using different and various training models and procedures to teach mouth and teeth health, using training in different ages and sex, and attending health coach at schools.

Conclusion

The health belief model has an impact on students' knowledge and perception of oral health and it can be used to increase students' knowledge and understanding in order to promote their oral and

dental health.

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