

## Effects of a Nutrition Education Intervention Designed based on the Health Belief Model (HBM) on Reducing the Consumption of Unhealthy Snacks in the Sixth Grade Primary School Girls

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### Abstract

#### Background

Malnutrition can threaten mental and physical development of children while healthy nutrition can improve mental and physical status of children. To select the best foods, children need nutrition education. This study aimed to determine the effect of nutrition education on reducing the consumption of unhealthy snacks in female primary school students in Qom- Iran.

#### Materials and Methods

This interventional study was conducted on 88 students in intervention and control groups who were selected via multistage random sampling method. The data was collected using a valid and reliable researcher-made questionnaire which was designed based on the health belief model (HBM). First four training sessions were held for the intervention group; two months later, data were collected again from both groups of students (intervention and control group). The collected data were analyzed by SPSS version 16.0 using descriptive statistics and independent and paired t-test.

#### Results

The mean score of knowledge and performance of the intervention group, were 96.12 and 18.61 before the intervention which changed to 110.00 and 68.22 after the intervention. The results showed that before the intervention there was no statistically significant difference between the two groups in terms of mean scores of knowledge, and the constructs of the health belief model ( $P>0.05$ ). After the intervention, the scores of all variables and the behavior of unhealthy snacks consumption were significantly increased in the intervention group ( $P<0.05$ ).

#### Conclusion

This study showed that the nutrition education program (designed based on the HBM) was effective in reducing the consumption of unhealthy snacks as it increased the scores of the Health Belief Model constructs and decreased the score of perceived barriers.

**Key Words:** Health belief model, Iran, Students, Unhealthy snacks.

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## 1- INTRODUCTION

Students make up a significant percentage of the population; as they are at growth age and because of their physical, psychological, and social characteristics, they are highly vulnerable (1). Nutritional health, especially in childhood and during the process of growth, plays an essential role in health (2). Multiple risk factors, including obesity, hyperlipidemia, and blood pressure disorders start from childhood and continue to adulthood, and they are linked to illnesses in later stages of life. The results of many studies are indicative of the rising trend of overweight and inactivity (3); they have also warned about people's tendency toward the consumption of high calorie junk foods with low nutritional value (4).

The current unfavorable behaviors and habits of children in our community not only are seen as a threat to the health of this vulnerable age group, but have also put our country at risk of epidemics of non-communicable diseases. Adopting a healthy lifestyle can reduce the risk of non-communicable diseases such as cardiovascular diseases, diabetes, and osteoporosis (5). Many studies have reported the existence of unfavorable patterns of snacks and junk food consumption among Iranian children and adolescents (6-8). Unhealthy snacks are energy-dense and contain high amounts of salt and sugar. Thus, they can increase the risk of different diseases in adulthood such as obesity, diabetes, and cardiovascular disease (6, 9, 10).

The results of a study showed that multiple risk factors, including parental education and family income level are among the risk factors for child nutrition (11). The results of another study showed that 11.3% of the families served unhealthy snacks for their children; the study also showed a significant relationship between the consumption of junk foods and the growth of children;

accordingly, children who did not consume unhealthy snacks had a better growth status than the other children (12). Nutritional behaviors during childhood are one of the potential determinants of nutritional behaviors in other stages of life. As a result, it is important to train children about the benefits of healthy nutrition. The effectiveness of education programs for students depends on many factors. The main goal of health education theories and models is primarily to identify these factors which can be used for behavior modification. Currently, there are various theories and models in health education which are usually selected and utilized by researchers depending on the subject of training, target population, and the results of previous studies.

Studies by Hooper et al. (13), and Choi et al. (14), showed a significant positive relationship between the mean knowledge score and nutritional behavior. In addition, studies by Lotfi et al. (15), and Ghafari et al. (16), showed that nutritional behavior had a significant positive relationship with the scores of the perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and self-efficacy; another study also concluded that the increase in mothers self-efficacy and family support play an important role in improving children's nutrition (17).

According to some other studies (18-21), the use of Health Belief Model as a framework helped to increase the scores of awareness, perceived severity, and perceived benefits and reduce the score of perceived barriers, and ultimately improve nutritional performance. Taking into consideration the results of previous studies, which are suggestive of a relationship between nutritional behavior and some other factors (such as perceived self-efficacy, perceived benefits, perceived barriers, social support, perceived susceptibility, and perceived severity), and given the positive effect of educational

intervention on some of these constructs, it seems that the Health Belief Model is a suitable model for designing and implementing an intervention program in this field. Therefore, this model can be used as an appropriate framework for the study of dietary behaviors in children, especially for the study of consumption of unhealthy junk foods. Therefore, this study aimed to determine the effect of a nutrition education program (designed based on health belief model) on reducing the consumption of unhealthy snacks in female primary school students, in Qom city, Iran.

## 2- MATERIAL AND METHODS

### 2-1. Study design and population

This experimental interventional study was conducted in 2016. The study population was consisted of female sixth grade primary school students in Qom city, Iran.

### 2-2. Methods

Using multistage random sampling method, a total of 88 female students were selected and allocated to intervention group (n=44), and control group (n=44).

Using the formula  $(n = \frac{2(z_1 + z_2)^2 s^2}{d^2})$ ,

the number of samples in each group was calculated as 44 (a total of 88 students). In order to set the significance level of the minimum differences in mean values of the parameters between the two groups, we considered a confidence level of 95%, a test power of 80%, and an accuracy of 0.6.

### 2-3. Measuring tools: validity and reliability

In order to collect the required data, we used a researcher-made questionnaire which was designed based on the Health Belief Model; the questionnaire was consisted of three parts including: **A**: demographic data (5 questions), **B**: questions based on the Health Belief Model (70 questions), and **C**: questions

about behaviors related to unhealthy junk food consumption (28 questions). Demographic part of the questionnaire includes questions about age, education level of the mother and father, and job status of their parents. Questions based on the Health Belief Model included 70 items to measure knowledge, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and social support. To measure knowledge, there were 24 questions which were answered with true and false choices and they were intended to evaluate the knowledge about behaviors associated with junk food consumption. A right answer was scored 1 points and a wrong answer was given zero points. There were a total of 24 items to evaluate the constructs of perceived susceptibility, perceived barriers, self-efficacy, and social support (six questions corresponding to each construct). Moreover, 14 items were used to evaluate perceived severity and perceived benefits (seven questions corresponding to each construct); these questions were scored on a four-point Likert-type scale (completely agree to completely disagree). These questions were designed for two ranges and every item was given a score of 1 to 4 depending on the option chosen on the scale.

The third part of the questionnaire was designed to evaluate the performance related to the consumption of unhealthy snacks; it had 28 items, which were answered using a five-point Likert-type scale (always, often, sometimes, rarely, or never). Considering the abovementioned facts, knowledge scores ranged from 0 to 24 points. Perceived susceptibility, perceived barriers, self-efficacy, and social support were scored from 6 to 24 points. The scores of self-efficacy, perceived severity, and perceived benefits ranged from 7 to 28 points, and the score of performance score ranged from 28 to 140 points. In order to verify the face and

content validity of the questionnaire, it was reviewed by a panel of experts which was consisted of five faculty members of Qom University of Medical Sciences; we collected their comments on the questionnaire and utilized them to modify the questionnaire. In order to determine the reliability of the questionnaire, in a separate stage, it was completed by 20 students from the same target group and internal consistency coefficient was assessed via utilizing Cronbach's alpha coefficient; a coefficient of at least 0.7 was obtained for every construct in the questionnaire. All the questionnaires were completed by a trained interviewer (the first author) via structured interviews with all students surveyed (both intervention and control groups).

#### **2-4. Intervention**

Education intervention for the student's intervention group was carried out within four 45-minute sessions through giving lectures (accompanied with questions and answers), and using teaching aids such as pamphlets and posters (which were designed based on the Health Belief Model). The training session were held by a teacher (researcher) in schools for four weeks. Mothers and teachers also attended the training sessions. In order to consider the construct of social support, we invited mothers and teachers to attend the training sessions. During that time no educational program was implemented for students in the control group.

#### **2-5. Ethical consideration**

In order to observe ethical issues in our study, the data was collected after obtaining approval from the Ethics Committee of the University and after making coordination with authorities. In addition, before collecting the data, the objectives of the study were explained to the students and their mothers and a written informed consent was obtained. After the end of the post-test, the

intervention program designed was also administered for the control group so that they benefit from the educational content as well.

#### **2-6. Inclusion and exclusion criteria**

Inclusion criteria were the followings: physical and psychological readiness and ability to participate in the study, and being a student in public schools. Lack of desire to participate in the study and being affected by a special disease were set as the exclusion criteria.

#### **2-7. Data Analyses**

The collected data were analyzed by SPSS version 16.0 software using descriptive statistics such as mean and standard deviation (SD) and independent and paired t-test Chi-square and Mann–Whitney test. The significance level was set at 0.05. Independent t- test was used to compare the mean scores of knowledge and all the constructs of Health Belief Model and performance between intervention and control groups before and after the training intervention.

Moreover, paired t-test was used to evaluate the effectiveness of intervention and compare the abovementioned variables in each group separately before and after the intervention. Chi-square test was used to compare the two groups in terms of the frequency of parents' job status. Finally, Mann Whitney U test was used to evaluate the differences between the two groups in terms of education level.

### **3- RESULTS**

According to the results, there was no significant difference between intervention and control groups in terms of education level and job status of parents ( $P>0.05$ ). **Table.1** presents the data on these two items. In this study, the mean and standard deviation (SD) of students' score of knowledge (the score of 0- 24) before the intervention in intervention and control

groups, was  $18.61 \pm 2.18$  and  $19.00 \pm 2.12$ , respectively; the results of independent t-test showed no significant difference ( $P=0.41$ ). However, after education intervention, students' score of knowledge was changed to  $22.68 \pm 1.02$  and  $19.84 \pm 2.42$  in the intervention and control groups, respectively; the results of independent t-test showed a significant difference between the two groups ( $P<0.001$ ).

The results of independent t-test showed no significant difference between the intervention and control groups in terms of constructs of the Health Belief Model before the intervention ( $P>0.05$ ); but after conduction the education intervention, this test showed a significant difference between the two intervention and control groups ( $P<0.001$ ).

The results obtained also showed that after the intervention the mean scores of the

constructs of the Health Belief Model significantly increased in the intervention group, as compared with the control group; accordingly, paired t-test showed a significant difference ( $P<0.05$ ). **Table.2** presents the mean scores of the studied variables in the two studied groups.

In this study, the mean and standard deviation of performance (the score of 28-140) of the intervention group in not consuming unhealthy snacks was  $96.93 \pm 12.07$  before the intervention which increased to  $110.00 \pm 8.62$  after the intervention; the results of paired t-test showed a significant difference ( $P<0.001$ ).

The mean and standard deviation of performance of the control group was  $96.25 \pm 11.38$  before the intervention which changed to  $97.52 \pm 10.68$  after the intervention; it did not show any significant difference ( $P=0.17$ ).

**Table-1:** Frequency distribution of the level of education of parents of the studied students

Education level		Intervention group		Control group		P-value
		Frequency	Percentage	Frequency	Percentage	
Mother's education	Illiterate	4	9.1	2	4.5	0.25
	Primary school	16	36.4	15	34.1	
	Junior high school	9	20.5	11	25	
	High school	11	25	12	27.3	
	Academic degree	4	9.1	4	9.1	
Father's education	Illiterate	2	4.5	0	0	0.17
	Primary school	12	27.3	9	20.5	
	Junior high school	16	36.4	17	38.6	
	High school	9	20.5	12	27.3	
	Academic degree	5	11.4	6	13.6	
Mother's job status	Housewife	40	90.9	39	88.6	0.30
	Employed	4	9.1	5	11.4	
Father's job status	Civil servant	6	13.6	7	15.9	0.33
	Self employed	34	77.3	35	79.5	
	Worker	4	9.1	1	2.3	

**Table-2:** Comparison of mean and standard deviation of the health belief model constructs before and after the intervention in the intervention and control groups

Health Belief Model constructs		Intervention group	Control group	P-value
		Mean $\pm$ SD	Mean $\pm$ SD	
Perceived susceptibility, (the score of 6-24)	Before education	18.15 $\pm$ 3.34	18.50 $\pm$ 3.46	0.64
	After education	22.00 $\pm$ 2.19	18.88 $\pm$ 3.34	0.001
	Paired t-test	P<0.001	P=0.008	
Perceived severity, (the score of 7-28)	Before education	20.11 $\pm$ 4.55	20.97 $\pm$ 3.84	0.33
	After education	24.75 $\pm$ 3.47	20.47 $\pm$ 4.17	0.001
	Paired t-test	P<0.001	P=0.45	
Perceived benefits, (the score of 7-28)	Before education	20.63 $\pm$ 4.06	19.29 $\pm$ 4.60	0.15
	After education	24.36 $\pm$ 2.60	19.79 $\pm$ 4.55	0.001
	Paired t-test	P<0.001	P<0.04	
Perceived barriers, (the score of 6-24)	Before education	15.50 $\pm$ 4.07	15.90 $\pm$ 3.94	0.63
	After education	17.72 $\pm$ 3.37	15.54 $\pm$ 4.77	0.001
	Paired t-test	P<0.008	P=0.48	
Self-efficacy, (the score of 6-24)	Before education	16.84 $\pm$ 4.11	15.20 $\pm$ 4.19	0.06
	After education	19.36 $\pm$ 2.87	15.38 $\pm$ 4.11	0.001
	Paired t-test	P<0.001	P=0.73	
Social support, (the score of 6-24)	Before education	18.93 $\pm$ 3.20	18.63 $\pm$ 4.19	0.71
	After education	21.88 $\pm$ 2.54	18.59 $\pm$ 3.32	0.001
	Paired t-test	P<0.001	P=0.93	
Performance, (the score of 28-140)	Before education	96.93 $\pm$ 12.07	96.25 $\pm$ 11.38	0.78
	After education	110.00 $\pm$ 8.62	97.52 $\pm$ 10.68	0.001
	Paired t-test	P<0.001	P=0.17	

SD: Standard deviation.

#### 4- DISCUSSION

Poor nutrition is a risk factor for many diseases. People's and especially children's tendency toward unhealthy foods is alarming (22). On the other hand, eating habits are influenced by childhood experiences (23, 24).

The results of our study showed a significant increase in mean score of knowledge in the intervention group after the intervention. Studies by Kim et al. (13), and Amode and et al. (25), similarly showed significant increase in mean score of knowledge in the intervention group after nutrition education, as compared with their scores before the intervention. The findings of the two mentioned studies are consistent with the finding of the present study and confirm it.

The results of our study showed that education intervention significantly increased the score of perceived susceptibility in the intervention group after the intervention. In other words, after the intervention the intervention group after became more susceptible to the consequences of the consumption of unhealthy snacks and found themselves at risk of problems caused by the consumption of unhealthy snacks. However, after the intervention no significant difference was observed in the control group (P=0.08).

This significant increase in this construct suggests the effectiveness of the educational program which was designed based on the Health Belief Model, as it enhanced students' susceptibility to proper

nutritional behaviors. Other studies which have utilized this model suggest that education interventions increased perceived susceptibility among the studied samples; it is consistent with the result of this research (21, 26). The results of this study showed a significant increase in the score of perceived severity construct in the intervention group after the education. Perceived severity is an individual's subjective perception of the seriousness of the consequences of non-compliance with proper eating behaviors. The increase in mean scores of perceived severity in the intervention group after training has been observed in several studies, which is consistent with the result of present study (27, 28).

Moreover, in this study the mean score of perceived benefits had significantly increased in the intervention group after the intervention. This could have an important role in the prevention of harmful health behaviors. In a study by Siukiand et al. (29), after the intervention the students in the intervention group earned 82.28% of total score of perceived benefits. It is in line with the results of this study. Concerning perceived barriers construct, the mean score of the intervention group was increased after the intervention and the results of paired t-test also proved its significance. In a study by Hazavehei which investigated the prevention of osteoporosis in female students, there was a significant increase in the score of perceived barriers in the intervention group after the intervention; this finding is consistent with the result of our study (30).

In this study, students' self-efficacy was evaluated too. Self-efficacy is an individual's judgments about and confidence in its own ability to perform a particular action (5). In this study, in order to enhance the students' self-efficacy, we tried to demonstrate the practical and potential results of following a healthy diet through reducing the consumption of

unhealthy snacks; we also introduced and acknowledged healthy students which had been selected as examples and motivated other students to promote their self-efficacy as well. In this study, the mean score of self-efficacy had a significant increase in the intervention group. Hoseinnejad et al. (31), and Dehdari and Chagani (32), investigated the role of self-efficacy in predicting students' eating behaviors and the results of the mentioned studies showed a significant positive relationship between the mean scores of dietary behavior and self-efficacy.

In this study we invited the teachers and mothers of the students in the intervention group to participate in training sessions and interventions, so that students obtain a greater perception of support from the surrounding social environment, and thus develop higher levels of self-efficacy for the utilization of proper dietary behaviors. In Najimi and Ghaffari's study (2013), teachers and parents of students in the intervention group, were also involved in the intervention. After a three-month follow-up, there was a significant increase in the students' scores of self-efficacy and perceived support for the consumption of fruit and vegetables (33).

The results also showed an increase in mean score of students' performance in reducing the consumption of unhealthy snacks in the intervention group after training. As the results of paired t-test showed the increase in score was significant. However, there was no significant difference in the control group before and after the intervention. This finding is consistent with the results of studies by Sharifirad et al. (34), and Kamaliand Heidarnia (35).

#### **4-1. The limitation and strengths of study**

The required data for this study was collected via students' self-reports, thus it cannot be free from errors. In addition, in

the schools where the intervention took place, all school authorities were not involved in the program; it is one of the most important limitations of this study. Nevertheless, a trained interviewer completed the questionnaires via conducting structured interviews with the study participants; it is one of the strengths of this study.

## 5- CONCLUSION

The results of the study showed that the nutrition education program (which was designed based on health belief model) was effective in reducing the consumption of unhealthy snacks among sixth grade primary school students in Qom. With increasing the scores of health belief model constructs, the intervention had a positive impact on students' behavior and reduced the consumption of unhealthy snacks. Given the results obtained in this study and considering the impact of this model in providing appropriate trainings for the students, it is suggested to carry out similar studies to investigate

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students in other educational levels and in other parts of the country. It is also suggested to consider the role of families and their attitudes toward reducing the consumption of unhealthy snacks.

**6- CONFLICT OF INTEREST:** None.

## 7- ACKNOWLEDGMENTS

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