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Effect of Education Based on the Health Belief Model (HBM) on Anemia Preventive Behaviors among Iranian Girl Students

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Abstract

Background

Iron deficiency is the most prevalent nutritional problem and one of the main reasons of anemia especially in girls. This study was designed to determine the effect of combined educational inference based on HBM model about preventing iron deficiency anemia on the enhancement of knowledge, attitude and behavior of high school girls in the Faridan city of Isfahan province.

Materials and Methods: This quasi experiential study was conducted on 128 high school girls (divided into 64 cases and 64 controls) that was selected by the cluster random sampling method in 2015. The instrument of data collecting was a researcher-made questionnaire including demographic, knowledge, attitude, and behavior questions based on HBM model. The data were analyzed using SPSS software version16.0 software.

Results

The mean age of intervention and control groups were 16.3 ±0.81 and 16.3 ±0.66, respectively. The knowledge, attitude and behavior of control and intervention groups had no significant difference before the education (P>0.001). But three months after the education, the mean score of knowledge, perceived susceptibility, perceived benefits, perceived barriers, perceived severity, perceived self-efficacy, cues to action and performance had significant difference (P<0.001).

Conclusion

Results of this research indicated that the education based on HBM model is effective on the enhancement of knowledge, attitude and behavior of students in the field of preventing iron deficiency anemia. So this pattern can be used as a framework for designing and performing education interventions to prevent iron deficiency anemia among high school girls.

Key Words: Anemia, Educational Intervention, HBM model, Iran, Students.

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1- INTRODUCTION

Anemia is one of the most important and most widespread public health topics in the world (1). Anemia has been negative effects on the health of women and children in developing countries, so that more than 30 % of the people in world are suffering from anemia (2). Anemia develops when hemoglobin reduces less than the standard amount and its definition is different according to age and gender (3). Iron deficiency plays the most important role in anemia and it is the cause of the 50% of anemia in the world (1). According to the World Health Organization (WHO), 25 % of students suffer from iron deficiency anemia (4), and the prevalence of iron deficiency anemia (IDA), have been reported 29.2% to 79.6% in developing countries among students and young adults (5).

The prevalence of iron deficiency anemia increases among girls after puberty due to menstrual period. These individuals suffer from iron deficiency after marriage and pregnancy, and their babies born with low weight or preterm. In addition, IDA has irreversible effects on children's brain development in the first two years of life and leads to low intelligence quotient (IQ) of children (2). IDA impairs the concentration of adolescent girls and reduces the academic achievement, self-efficacy and physical strength and increases the risk of infections (6). The extent of the economic and social consequences of anemia is a huge challenge for our country (7-9). Therefore, considering the ascending trend of anemia in our country, it is essential to perform models for behavioral changes, then it should be noted that educating the public about preventive behaviors and lifestyle changes associated with anemia is greatly needed (10). The results of some studies show that the nutritional has reduced the prevalence of diseases such as anemia in many European, North America, Japan and Australia countries (11). Therefore, dietary recommendations with implementation of nutrition education programs, is necessary to reduce anemia among adolescent girls (12). Given the importance of the role of schools in the field of education, nutrition education programs are raised in schools as a way to intervene in order to increase nutritional knowledge (13). The health belief model (HBM), is one of the main models to train preventive behaviors. Educational interventions can be designed and implemented in order to prevent diseases using HBM (8). The effectiveness of the model has been reported on issues such as breast cancer screening behaviors (14), adolescent health and prevention of risky behaviors in adolescents (15, 16), and the prevention of smoking (17).

According to this model, if people find themselves talented and sensitive against especial behavior (perceived sensitivity), and have the belief that by doing a series of measures can reduce the side effects and hazards of especial behavior (perceived benefits), and do these actions and measures that their benefits are more than barriers of especial behavior such as time and cost (perceived barriers), they will select a preventive behavior to be out of risk. The existence of such stimuli can trigger to act as a guide and stimulus (cues to action), and the individual feel adequacy in order to overcome the barriers (self-efficacy) (13). Considering the importance of the problem of iron deficiency anemia in adolescent girls as mothers in the future, this study aimed to determine the impact of an educational intervention based on Health Belief Model on preventive behaviors of iron deficiency anemia in the second grade of female high school students.

2- MATERIALS AND METHODS

2-1. Study Design and Population

The present study was quasi-experimental and interventional. The

sample size of this study was the second grade of female high school students in Faridan city, Isfahan province, in 2015. The number of sample size determined 64 subjects in each group using the following formula:

$$n = \frac{(z_1 - \alpha/2)(s)^2}{(d)^2}$$

Where, confidence interval (CI) of 95%, standard deviation (s), and estimating error (d) and Z shows standard normal distribution. It should be noted that throughout the study, two- subjects of the intervention group and one subject of the control group were lost.

2-2. Methods

In this study, a multi-stage random sampling method was used and in order to achieve samples, two schools were selected randomly among the secondary grade of governmental high schools (a school for the intervention group and a school for the control group), four classes were selected from each schools and as well as sixteen students were randomly selected from each class. Because of avoiding from bias resulted in previous information of students, all participants were selected from same major (Experimental Sciences). Four high schools out of six high schools of the Faridan city were randomly selected (two high schools for intervention group and two high schools for control group). In the next stage, a second grade class of experimental sciences major from each selected school was selected. Also, Faridan city is small and has no region.

2-3. Measuring tools

The data collected using a research made questionnaire based on the Health Belief Model that was designed in four parts. The first part of questionnaire included 8 questions about demographic information, the second part included 16 questions about knowledge (the correct answers score two, I do not know scores 1 or incorrect scores zero), the third part included 36 questions related to structures of HBM that was determined by five Likert scale from strongly agree to strongly disagree and included 6 questions about perceived susceptibility (with a minimum score of 6 and a maximum score of 30), 6 questions about perceived severity (with a minimum score of 6 and a maximum score of 30), 6 questions about perceived benefits (with a minimum score of 6 and a maximum score of 30), 6 questions about perceived barriers (with a minimum score of 6 and a maximum score of 30), 6 questions about cues to action with low to high range (with a minimum score of 6 and a maximum score of 30) and 6 questions about self-efficacy in the field of prevention from IDA (with a minimum score of 6 and a maximum score of 30), respectively. Content validity through panel of experts was used to assess the validity of questionnaire, the questionnaire was sent to ten experts (including one hematologist, two nutritionist, two preventive medicine specialist, two pediatrician and three experts in education and health promotion system), and all comments of them were considered in the questionnaire.

To determine the reliability of the method, Cronbach's alpha was used for direct measurement of structures. For this purpose, the questionnaire was given to 30 girl's students who had eligibility to participate in the study. The Cronbach's alpha for knowledge (75 %), attitude (75 %), behavior to prevent anemia (79 %), perceived susceptibility (82 %), perceived severity (70 %), perceived benefits (83 %), perceived barriers (89 %), cues to action (87 %), and for self-efficacy (85%), were observed. Given the level of reliability that was obtained acceptable in the pilot study, the main study was carried out. Five sessions of 45 minutes was considered to

train. In the first session of the training program, the students were familiar with the role of red blood cells and iron in the body, symptoms and prevalence of iron deficiency anemia in adolescent girls, the reason to use iron and iron frequency in foods. In order to raise knowledge and motivation, the lecture and question and answer method were used. In the second session the students were introduced with the prevalence of iron deficiency anemia in adolescents, risk factors and the consequences of iron deficiency. In the third session, group discussion method was used to investigate the effect of rich food regime in mirthful life and improvement of learning. In the fourth session, brainstorming method was used to activate the participants in the field of education and all factors were investigated which students considered as barriers (such as economic factors, incorrect cooking, lack of inclusion of foods containing iron in the family basket and other obstacles), in adoption of preventive behaviors.

At the fifth session, some subjects were trained such as how to play a role of film in relation to the strategies of resolving, the barriers and self-efficacy of students about food cooking, replacement of the iron-rich foods with low cost rather than high cost solutions, the method of presenting strategies for bad habits and believes about taking iron pills in schools and other things. While these five educational sessions, required information was used and as well as at the second session, a patient spoke about suffering from iron deficiency anemia and complications associated with the burden of disease in life. After the implementation of the educational programs and with the passage of three months from the intervention, the effects of health educational programs were determined using the same questionnaire in both the groups.

2-4. Inclusion Criteria

Inclusion criteria included having a written consent on behalf of the parents (legal age for taking written consent is at least 18 years old), not having the genetic blood diseases such as thalassemia, being in the second grade of high school, having the address and phone number and availability to follow up.

2-5. Exclusion Criteria

Exclusion criteria included unwillingness to participate in the study and the absence in training sessions or transfer a student from school.

2-6. Ethical Considerations

This paper was extracted from a Master thesis in the field of health education prepared by Mr. Hamed Mirzaei. To take ethical considerations into account, first permission was received from Tehran University of Medical Sciences and then the required coordination's were performed with the Esfahan province's Education Department, Faridan city, and the managers at the selected high schools. Before completion of the questionnaire, the aim of the research was explained to the students and their consent was taken writing. Further, it was announced that inclusion of these participants in this study was absolutely voluntary, with the anonymity of the questionnaire being emphasized to ensure them that their information would be collected and kept confidentially.

2-7. Data Analyses

Independent variables as education based on nine dimensions of Health Promoting Schools (HPS), were described as mean ± standard deviation (SD) and dependent variable as anemia were expressed as number of individuals and percentages. Statistical analysis was carried out using SPSS version 16.0 software and descriptive statistics, Chi square, independent t-test and paired t-test were used. P-value less than 0.05 were considered significant.

3-RESULTS

The results of this study showed students who their family income were less than 5,000,000 Rials, had parents with low level of education in both groups. The majority of fathers (67.1%) and mothers (94.3 %) were self-employment and housewives, respectively. There was no significant difference between intervention and control groups in terms of monthly income, father's education, mother's education, father's occupation, mother's occupation, and birth order. Also there was no significant differences between two groups based on age and other demographic variables (**Table.1**).

The mean age of participants was 16.03±0.786 years old. Also, the knowledge, perceived susceptibility, perceived barrier, perceived severity, perceived benefits, cues to action, self-efficacy and performance of control and intervention groups had no significant difference before the education (P>0.001), but after intervention, independent t-test showed that there was a significant difference in all mentioned variables in the intervention and control groups (**Table.2**). So that paired t-test was used to check the influence of educational intervention 3 months after intervention and according to the findings, the mean score of knowledge after the intervention was changed from 59.9% to 89.4%, this difference was statistically significant (P<0.001), as well as mean score of the perceived severity in the intervention group was changed from 75.64% to 92.39% which showed the effect of education on the perception of anemia complications in students in order to be aware from the complications of this disease. The increase of HBM constructs shows the promotion in health issue. Also, other constructs changed to high scores compared to before educational intervention such as perceived benefits changed from 79.29 to 91.93, perceived barriers from 68.78 to 89.15, self-efficacy from 56.03 to 61.64, cues to action from 56.08 to 89.15 and performance from 74.35 to 89.15, which the increase of these constructs were statistically significant (P<0.001).

Table-1: The Frequency distribution of demographic characteristics in the interventional and control groups

Variables		Control Group (N=63)		Intervention Group (N=62)	
		Frequency	Percent	Frequency	Percent
Age, year (Mean±SD)		63	16.3 ± 0.66	62	16.3 ± 0.81
Mean income of family (Rial)	Less Than 5,000,000	34	52	32	50.8
	5,000,000 to 10,000,000	25	44	22	35.4
	More than 10,000,000	4	4	8	13.8
Father's education level	Illiterate	20	30	11	23.1
	Under Diploma	34	55.7	31	52.3
	Diploma	8	12.9	8	15.4
	College education	1	1.4	12	9.2
Maternal education level	Illiterate	21	30	15	23.1
	Under Diploma	33	55.7	31	52.3
	Diploma	8	12.9	10	15.4
	College education	1	1.4	6	9.2
Father's Occupation	Employee	12	20	13	21.5
	Self-employed	42	67.1	39	63.1
	Unemployed	6	8.6	8	12.3
	Retired	3	4.3	2	3.1
Mother's	Employee	2	2.9	8	12.3

Occupation	Non-Employee	1	1.4	2	3.1
	Housewife	59	94.3	53	84.6
	Retired	1	1.4	0	0
Birth order	First	18	25.7	19	29.2
	Second	24	34.3	22	33.8
	Third And More	28	40	24	36.9

Table-2: The mean score of HBM constructs (knowledge, perceived susceptibility, severity, benefits, barriers, self-efficacy and health performance) before and 3 months after intervention in two groups

Variables		Mean ± SD		P-value
		Before Intervention	After Intervention	
Knowledge	Intervention	59.9±12.045	89.4±7	< 0.001
	Control	±13.48 60.9	13.97±64.5	0.121
Significance Level Of Paired t-test		0.626	< 0.001	-
Perceived Susceptibility	Intervention	8.10±56.28	7.66±65.27	< 0.001
	Control	9.47±57.78	59.78±7.85	0.127
Significance Level Of Paired T-Test		0.326	< 0.001	-
Perceived Severity	Intervention	13.68±75.64	8.58±92.39	< 0.001
	Control	14.17±79.10	15.62±78.92	0.970
Significance Level Of Paired T-Test		0.153	< 0.001	-
Perceived Benefits	Intervention	11.45±79.29	8.62±91.93	< 0.001
	Control	12.66±76.69	13.81±76.50	0.789
Significance Level Of Paired T-Test		0.215	< 0.001	-
Perceived Barriers	Intervention	15.31±68.78	14.40±89.15	< 0.001
	Control	20.25±66.96	19.76±81.28	0.589
Significance Level Of Paired T-Test		0.562	< 0.001	-
Cues To Action	Intervention	14.95±56.08	14.40±89.15	< 0.001
	Control	20.33±56.74	18.04±59.31	0.319
Significance Level Of Paired T-Test		0.833	< 0.001	-
Perceived Self-Efficacy	Intervention	19.86±56.03	15.91±61.64	< 0.001
	Control	22.91±55.59	22.85±53.62	0.154
Significance Level Of Paired T-Test		0.905	< 0.001	
Performance	Intervention	15.95±74.35	14.40±89.15	< 0.001
	Control	19.86±73.50	17.62±74.15	0.721
Significance Level Of Paired T-Test		0.784	< 0.001	-

4- DISCUSSION

This study aimed to determine the effect of educational intervention based on Health Belief Model in adopting preventive behaviors for iron deficiency anemia. In this regard, anemia caused by iron deficiency is a serious health problem and affects the psychological and physical growth, behavior and ability to work. Adolescent girls are one of the most susceptible to iron deficiency anemia (18). Based on the findings after the intervention, mean scores of knowledge, perceived susceptibility, perceived severity, perceived benefits, cues to action, self-efficacy and iron deficiency anemia and preventive behaviors in the interventional group compared to the control group, significantly increased and the average score of perceived barriers showed a significant reduction.

In this study, after the educational intervention, knowledge of the subjects in the interventional and control groups, were different and the difference was statistically significant. The results showed the effect of education in increasing knowledge among school students in the prevention of iron deficiency anemia. Similar to this study, Fathizadeh et al.(19) determined the effect of educational program based on precede pattern on knowledge, attitude and nutritional performance related to iron deficiency anemia, the results showed statistically significant increase in mean score of knowledge, attitude (predisposing factors), training classes, participation in educational programs and the use of educational resources (enabling factors), encourage teachers and parents and peers (reinforcing factors) and performance of the experimental group compared to the control. Contrary to our study, they didn't intend aspects of health belief model. Knowledge was the common aspect in this study that had increased by intervention.

Prisa et al. reported that 25 % of students suffer from iron deficiency anemia indicating the general malnutrition or low iron in their diet. These findings were consistent with our study which the mean scores of knowledge, attitude toward behavior, subjective norm, enabling factors and preventive behaviors of iron deficiency anemia and ferritin levels had significantly increased in the interventional group (20). In the study of Vakili et al. (21), and Montazeri et al. (22), the results showed a significant increase in the perceived susceptibility in the interventional group compared to control group. So, these studies reported that education can increase susceptibility to disease that were consistent with our obtained results. Mansourian et al. (23), reported that there was a significant difference in regard to the perceived severity after education between two intervention and control groups. Çapık et al. (24), evaluated the effect of education on health beliefs, knowledge and early detection behaviors. Contrary to our study, they considered these aspects for prostate cancer. So, after educational intervention in their study, perceived susceptibility of prostate cancer and prostate cancer screening increased; but, the perceived barriers had fallen.

The mean score of self-efficacy after education in the present study and in the study of Mehri et al. (25), was significantly increased in interventional group. It seems that believes are related to the ability to perform accurate health behaviors associated with iron deficiency anemia that it can increase the self-efficacy of subjects. Various studies have shown that self-efficacy has a strong effect on health behaviors and high self-efficacy enhanced ability, merit and competence (16, 17, 27). In the study of heydari et al. (27), after the implementation of the educational program, self-efficacy had increased for diabetic children, which was

consistent with our study. In the study of Baharzadeh et al. (28), which aimed to use the Health Belief Model to promote the preventive behaviors of anemia caused by iron deficiency among pregnant women, subjects had two educational sessions. Before the intervention, there was no significant difference between the intervention and control groups based on the demographic characteristics and structure of health belief model. But after education, there was significant differences in terms of health belief model score between two groups. The results of this study, was consistent with our study and the usability of Health Belief Model was effective to improve nutritional behavior in pregnant women (28).

4-1. Limitations of the study

The small sample size of include studies are potential limitation of this study. There is still need to further studies to access additional information about iron deficiency anemia in adolscent girls. Another limitations of the current study, were low of the same study in this field and low of the schools surveyed in Faridan city of Isfahan province, Iran. Self-reporting mthod to complete questionnaire was another potential limitation in this study.

5- CONCLUSION

The educational programs based on Health Belief Model had positive impact on the enhancement of the perceived susceptibility, perceived severity, perceived benefits, cues to action and self-efficacy. It was showed a reduction in the perceived barriers in the intervention group. HBM can help to increase the preventive behaviors of iron deficiency anemia in the intervention group. In general, the results of the present study showed HBM was able to increase the preventive behavior of iron deficiency anemia and confirmed that educational programs based on HBM has been effective on the adoption of preventive behaviors of iron deficiency anemia.

6-AUTHORS CONTRIBUTIONS

- Study design: MA, NS, NG.
- Data Collection and Analysis: NG, MA.
- Manuscript Writing: NS, NG.
- Critical Revision: NG, MA

7- CONFLICT OF INTEREST: None.

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