



Using of health belief model to promote preventive behaviors against iron deficiency anemia among pregnant women

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Original Article

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Introduction

Pregnancy is one of the most critical periods in women life [1] that has a great impact on their lifestyle and dietary behavior. The nutritional status of women during pregnancy could have a significant impact on fetus

Abstract

Iron deficiency anemia is one of the most common nutritional problems during pregnancy. The aim of this study was to evaluate the effect of education based on health belief model to promote preventive behaviors against iron deficiency anemia among pregnant women. The study was performed on 80 pregnant women that were randomized equally into the experimental and control groups. A self-administered questionnaire based on health belief model constructs was applied to gather data. The experimental group received two educational sessions. The mean age of women was 27.96 ± 5.6 years and mean gestational age was 16.6 ± 1 weeks. Before the intervention, no significant differences in terms of demographic characteristics and health belief model constructs were found between the groups, while after the intervention, the scores of health belief model were different significantly between the control and experimental groups. Since the results of the study indicated the applicability of health belief model to promote nutritional behavior in regard to anemia in pregnancy, implementing health belief model based educational sessions in health centers is suggested to reduce complications of this problem.

Keywords: Anemia, Iron-Deficiency, Pregnancy, health belief model

development and health [2]. The nutritional deficiency, especially with regard to micronutrient, could adversely affect fetal development. Iron deficiency is one of the most common nutritional problems during

pregnancy [3] in most countries including Iran [4]. The World Health Organization (WHO) has reported that about 2.17 billion people worldwide are suffering anemia. The most vulnerable groups are pregnant women, elderly men, and children. These reports also reveal that the prevalence of anemia among pregnant women is 40-60 percent in developing countries [5]. The prevalence of anemia among pregnant women was reported 24 percent in Shushtar, a city in the south west of Iran. Anemia in developing countries is mainly caused by poor maternal nutrition and not taking iron supplements or even stop taking it particularly because of gastrointestinal side effects such as nausea and vomiting [4].

Anemia is a clinical disorder characterized by the decreased hemoglobin concentration [6]. Anemia has several risks for the mother and her growing baby including premature delivery, postpartum hemorrhage, intrauterine death, and low birth weight [6-8]. Therefore, iron supplementation has been a component of prenatal care in primary health care settings in our country Iran since 1983. In spite of applying this strategy, anemia during pregnancy is still a major nutritional problem [4]. The study of Khajoo Shojaaee showed that the most of women under the subject did not have desirable levels of knowledge regarding nutrition during pregnancy. Also, 69% of them had not a positive attitude toward taking iron pills during pregnancy that this might affect their practice regarding iron intake [9]. Education can lead to the improved health status by changing beliefs and subsequently behaviors [5]. The effectiveness of health education programs depends largely on the proper use of theories and models of health education [10]. Theory-based education can further improve the health behaviors [11]. Health Belief Model (HBM) is one of the interpersonal models of health education (derived from the theories of behavioral sciences) widely used for preventive behaviors [12].

According to the previous studies, the HBM

has been successfully used for educational programs on dental caries [13], unwanted pregnancy [14], urinary tract infection [15], prevention of osteoporosis [16], weight gain during pregnancy [12], and anemia prevention [17] in Iran. Yet, there was no study using the HBM to promote iron deficiency anemia preventive behavior among pregnant women. Therefore, the aim of this study was to evaluate the effect of education based on HBM to promote iron deficiency anemia preventive behavior among pregnant women referred to health care centers.

Method

A quasi-experimental since in the field of behavioral science we could not match all factors contributing to an individual behavior, the present study was considered as a quasi-experimental study despite applying randomization, having control group and intervention. study was conducted on a sample of randomly selected pregnant women referred to health centers of Shushtar, a city in the south west of Iran, from March 2014 to June 2014.

Given the power of 80%, confidence level of 95%, dropout rate of 10%, and the formula of Pococh, 40 members were assigned to each group, which means a total of 80 participants in both experimental and control groups. During the study, 2 participants from each group were excluded.

Inclusion criteria included healthy pregnant women (according to the doctors diagnosis having a low-risk pregnancy) with 16 to 20 weeks pregnancy, being fluent in Persian, having at least primary education, carrying singleton fetus, and consentaneous to participate in the study. Women were excluded from the study if they were experienced pregnancy complications (bleeding, pre-eclampsia, blood pressure during pregnancy, and preterm birth). Figure 1 shows the flow diagram of the research from selecting the participants to gathering the data.

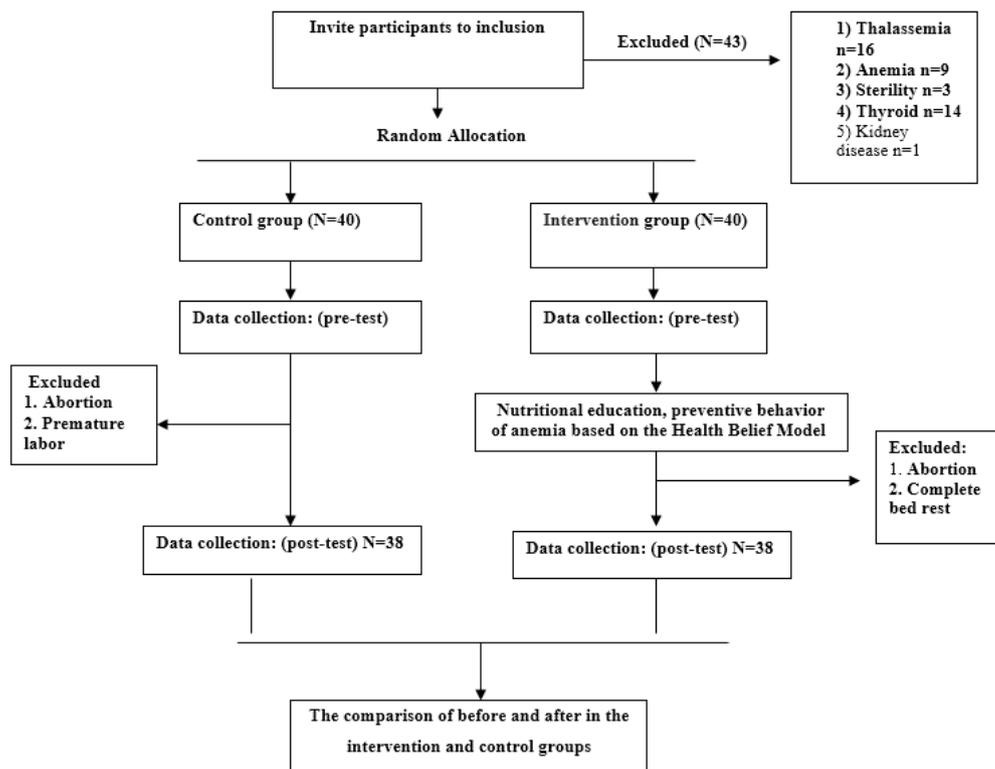


Figure 1 Flow diagram of the study participants

Data were gathered using a self-administered questionnaire, which included the following sections: The first section consisted of 26 questions regarding demographic information; the second part consisted of 11 questions of multiple options on knowledge; the third part consisted of 4 questions on perceived susceptibility, 5 questions on perceived severity, 6 questions on perceived benefits, 7 questions on perceived barriers, 6 questions on self-efficacy, and 5 questions on cues to action. The latter 33 questions were scored using a five-point Likert scale; the fourth part consisted of 13 questions regarding nutritional behavior that were designated as five-option questions.

The scores of knowledge were calculated as follows: the score of 1 for each correct answer, and the score of zero for each wrong answer. The gained score in this section was calculated as a fraction of maximum attainable score in percent. Therefore, the higher score indicates a higher knowledge. The score for each question on susceptibility, severity, benefits, barriers, and self-efficacy ranged from strongly agree (the score of 5) to strongly disagree (the score of 1). Then, the gained score was expressed as percentage. The total scores ranged from 0

to 100. Therefore, higher values for all the constructs indicated better scores except for barriers construct. The score for questions on cues to action construct was calculated as frequency. In the behavior measuring section, each item was scored on a 5-point scale ranging from always (the score of 5) to never (the score of 0) and the total score was expressed as a fraction of 100.

To assess the validity of questionnaire, the face and content validity were used. The content validity was assessed by 10 experts and the necessary modifications were applied as required. The content validity ratio (CVR) of 80.3 and content validity index (CVI) of 87% were obtained. The reliability of the questionnaire was examined on 25 pregnant women (other than the study participants) and the Cronbach's alpha coefficient of 0.71 was obtained. The reliability of each construct of the questionnaire was confirmed by attaining the following coefficients: knowledge= 0.73, perceived susceptibility= 0.75, perceived severity= 0.76, perceived benefits= 0.72, perceived barriers= 0.82, cues to action= 0.72, self-efficacy= 0.76, and behavior= 0.70. After obtaining permissions from the

authorities of the Shushtar city health center, and coordination with the health and treatment centers under the cover, a simple random sampling method was employed to select the target centers. The four selected centers were randomized equally to the intervention and control groups. Finally, 80 women (40 in each group of intervention and control) were randomly selected by referring to the inventory of pregnant women under the integrated maternal health care program. Then, the participants were invited to a common meeting by a phone call. To follow the ethical principles, after explaining the plan and stating the purpose and procedure of the study, they were asked to read and sign the informed consent form. The participants also were assured that their information will remain confidential to the researchers, and it is released unnamed and in general. Then, the pre-test was performed by administering the coded anonymous questionnaire on the participants in the intervention and control groups, and some explanations were given on how to fill out the questionnaire.

Pregnant women in the control group only received routine prenatal care in health care centers, while women in the intervention group participated in theory-based sessions, in addition to the routine prenatal care provided by the health care centers. The educational content was prepared based on the goals and needs assessed before the intervention, which had been approved by the experts. Teaching the intervention group members was performed using the methods of lecture, group discussion, question and answer, and pamphlets provided by the researchers, in groups of 8 to 12 members in two 60-90 minutes sessions over two weeks in the target centers.

The components of HBM were used in instructions. The educational content in the first session included familiarity with the food groups, recommended amounts of Iron during pregnancy, and positive change in nutrition habits and behaviors. In order to increase women motivation, they were provided with educational pamphlets on nutrition during pregnancy. In the second session, to raise

knowledge, the participants learned how to properly use supplements, vitamins, and minerals in pregnancy and nutrition tips in dealing with the effects of anemia (perceived severity), and the prevalence of anemia in pregnant women (perceived susceptibility), emphasizing the benefits and the significance of preventive behaviors of anemia (perceived benefits). Also, group discussions were conducted to overcome the barriers to healthy behaviors, and to influence the self-efficacy, verbal encouragement, direct/indirect experiences and role model were used.

At the end of the second session, women were provided with another pamphlet on anemia (iron deficiency) during pregnancy and also at the end of each session; 10 minutes were devoted to questions and answers.

3 month after the last educational session, all participants in both experimental and control groups were invited to complete the posttest questionnaire. Also, according to the principles of ethics in research, the members of the control group were provided by the educational pamphlet prepared by the researchers. It should be noted that the study gained the ethical license numbered 1626/20/8 from the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences.

Data were analyzed by the statistical package for social sciences (SPSS-19) using descriptive and analytical analyses including chi-square, sample t-test, Wilcoxon, and Mann-Whitney at significance level of 0.05. The normality of data was examined using Kolmogorov-Smirnov test. The normally distributed data were analyzed using parametric tests and non-normally distributed data were analyzed using non-parametric tests.

Results

The data analysis using chi-square test did not show a significant difference in the number of pregnancies and type of jobs between the intervention and control groups ($p < 0.05$). Some other demographic characteristics of the study sample are given in Table 1.

Table 1 Comparison of demographic characteristics in the intervention group and control group

Group	Control Group(n=40)		Intervention Group (n=40)		p-value
	Total(%)	Mean(SD)	Total(%)	Mean(SD)	
Age(year)		27.18(6.1)		28.12(3.960)	p=0.79
Gestational age (weeks)		16.65(0.80)		16.53(0.67)	p=0.59
Pregnancy order					
First time	19(47.5)		20(50)		p=0.50
Second time and more	21(52.5)		20(50)		
Mother education					
Diploma or lower	22(55)		17(42.5)		p=0.18
Academic	18(45)		23(57.5)		
Husband Education					
Diploma or lower	31(77.5)		25(62.5)		
Academic	9(22.5)		15(37.5)		p=0.11
Economic status					
Poor	4(10)		2(5)		p=0.33
Fair or Better than fair	36(90)		38(95)		

Table 2 shows mean scores and standard deviations of knowledge and HBM before and after the intervention in both groups.

The results reveal that before the education, according to the independent t-test, there was no significant differences in the mean scores of susceptibility, severity, benefits, perceived barriers, self-efficacy, cues to action, and nutritional anemia preventive

behaviors between the intervention and control groups ($p>0.05$). After the intervention, however, according to Mann-Whitney test, there was a significant difference between the intervention and control groups in HBM structures ($p<0.05$) while the highest score increased belonged to the structure of perceived susceptibility (Table 2).

Table 2 Comparison of scores of knowledge, health belief model structures, and behavior before and after the intervention

Variable	Time	Intervention group Mean (SD)	Control group Mean (SD)	p-value
Knowledge	Before intervention	56.36 (5.52)	57.7 (5.26)	p=0.347
	After intervention	100 (0)	58.37 (2.15)	p<0.0001*
Perceived Susceptibility	Before intervention	63.12 (12.84)	63.62 (54.14)	p=0.871
	After intervention	97.1 (3.7)	69.4 (1.18)	p<0.0001**
Perceived Severity	Before intervention	65.70 (13.06)	63.80 (10.48)	p=0.475
	After intervention	98.84 (2.06)	66.84 (7.66)	p<0.0001**
Perceived Benefit	Before intervention	68.41(10.21)	67/75(0.11)	p=0.780
	After intervention	98.33(2.87)	72.98(1.23)	p<0.0001**
Perceived Barrier	Before intervention	54.64(12.49)	57.14(8.98)	p=0.308
	After intervention	22.25(2.83)	55.56(1.25)	p<0.0001**
Self- efficacy	Before intervention	66.41(12.52)	63.08(12.32)	p=0.234
	After intervention	97.98(3.42)	64.12(9.56)	p<0.0001**
Cues to action	Before intervention	70.50(16.47)	68(13.38)	p=0.459
	After intervention	96.71(14.39)	71.76(1.40)	p<0.0001**
Behavior	Before intervention	63.46(9.02)	60.72(14.21)	p=0.306
	After intervention	98.93(1.52)	65.48(14.67)	p<0.0001**

*Mann-Whitney U test, **Independent t-test

Discussion

The results support the utility of education based on HBM to promote nutritional behaviors regarding iron deficiency anemia in pregnant women. The findings are similar to the findings of other studies that have indicated educational interventions can improve knowledge in the field of nutrition during pregnancy [9,15,18-20].

Kamalifard *et al.* [2] reported that the use of an educational package in two sessions for two weeks, in the form of lectures and movies, could improve the level of knowledge during pregnancy [2]. Anderson and colleagues in Scotland [21] reported similar results. Therefore, the need for increasing knowledge on nutritional behaviors regarding iron deficiency anemia in pregnant women is reaffirmed.

The results also showed that there was a significant difference between the experimental and control groups in terms of perceived susceptibility so that; women believed that they may be at the risk of anemia as a result of an unhealthy nutrition. This belief may lead to the adoption of healthy behaviors by the mother, which is similar to the previous findings [13]. Shamsi and colleagues [13] in their study stated that the HBM enhances the perceived susceptibility of pregnant women in the prevention of tooth decay, which is compatible with the present findings, as well as with the findings of Mansourian *et al* [17] in the application of Health Belief Model.

The results also indicated a significant difference in mean score of perceived severity between the intervention and control groups. An increase in the perceived severity means that the pregnant women in the intervention group realized the seriousness of the risks associated with the violation of proper nutrition and anemia, and finally understood that in the event of failure to comply with proper and balance nutrition they are at the risk of anemia complications. This result is similar to the findings of Javaher Tehrani *et al* [15].

Khorsandi and colleagues [22] in a study showed that the perceived severity increased by highlighting the complications of osteoporosis for mother and fetus, which is consistent with

the findings of the present study.

Cues to action for preventing or dealing with an illness depends on the perceived benefits. The present study showed that after the intervention the mean score of perceived benefits in the intervention group significantly increased than the control group. It means the mothers in the intervention group, after the educational program, understood the benefits of health behaviors and got motivated to do recommended behaviors. The findings are consistent with the previous studies [10,23-24].

Taghdisi [10] in a study on urinary tract infection in pregnant women, based on the HBM structures, showed that the participants gained a good score of perceived benefits to prevent urinary tract infections [10], which was consistent with the present study. Also, Hazavehie and colleagues [23] showed that the perceived benefits, calcium intake, and physical activity in the population studied were moderate, which was consistent with the results of this study. A study conducted in America showed that there was a significant relationship between the perceived benefits and performing physical activities [24].

The significant differences in the mean scores of perceived barriers between the intervention and control groups showed a positive effect of education on perceived obstacles. That is to say that the mothers in the intervention group could perceive the barriers as the major factors to prevent adoption of anemia preventive behaviors. It was revealed that the main barrier to using iron supplements was fear of the side effects and mis understanding of the use of supplements. The study of Rothman and colleagues [25] showed that unbalanced and poor diet was a part of perceived barriers that is consistent with the findings of this study. On one hand, Anderson *et al.* [26] showed that the HBM is applicable for nutrition education [26], which is in agreement with the findings of the present study. The study findings of Karimi and colleagues [14] showed no significant differences between

the groups in terms of barriers. One possible explanation for this observation might be due to the different population as in our study were pregnant women and in the Karimi's study were non-pregnant women.

Self-efficacy has a strong effect on health behaviors and the results of this study indicated an increase in self-efficacy in the intervention group compared to the control group, and the factors that increase self-efficacy, one was avoiding to drink tea immediately after a meal, and the other was using iron supplements despite the nausea, which is compatible with the results of a previous study. Khorsandi and colleagues [22] in a study on pregnant women practice in the prevention of osteoporosis found that the participants believed less in the physical activity during pregnancy and calcium intake .

This study showed that the internal operation manual encourages people to take supplements, which is consistent with Shamsi et al [13]. results. Also, we found that educational pamphlets and medical teams are the most important extrinsic operation manual for taking supplements that is in line with the previous findings [13]. The study results of Kinsler and colleagues [27] showed that after the educational intervention, self-efficacy did not significantly change that is in contrary with the results of this study, probably due to the type of studied behavior.

The results showed that educational program based on HBM was effective in improving nutritional behaviors in the prevention of anemia, so that the mean score of nutritional behavior had significant differences between the intervention and control groups after the educational intervention. Javahery Tehrani [15] in his study on pregnant women reported a similar result. A similar study by Mirmolaie and colleagues [28] on nutritional behavior of pregnant women showed that the mean scores of nutritional behavior before the education between the groups was not

significantly different, however, after the education, a significant difference in the scores was appeared.

One limitation of the present study was the loss of participants, and the other was the lack of long-term follow-up of individuals up to the time of delivery. The pregnancy situation and outcome were also not surveyed because of being time consuming.

Conclusion

The results support the utility of education based on HBM to promote nutritional behaviors regarding iron deficiency anemia in pregnant women. Implementation of nutrition educational program based on HBM is suggested for pregnant women.

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Contribution

Study design: KHB, MA, AZJ

Data collection and analysis: KHB, AM, MA

Manuscript preparation: KHB, AM, TB

Conflict of Interest

"The authors declar that they have no competing interests."

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