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The Effectiveness of an Educational Intervention Based on the Health Belief Model in Preventing High-Risk Behaviors Among Pregnant Women

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Abstract

Background: Pregnancy and delivery are among the leading causes of mortality, morbidity, and disability worldwide. This study aimed to analyze the effectiveness of an educational intervention based on the health belief model in preventing high-risk behaviors among pregnant women.

Methods: This randomized controlled field trial was done in 2015 on 88 pregnant women who referred to two main healthcare centers in Sarbisheh, Iran. Women were purposively recruited and randomly allocated to an intervention and a control group. For data collection, a questionnaire was developed based on the components of the health belief model. Participants completed the questionnaire both before and three months after the intervention. Women in the intervention group were offered three educational and counseling sessions on high-risk pregnancies, prenatal care, and high-risk behaviors during pregnancy. The SPSS software (v. 22) was used to analyze the data by running the Wilcoxon, the Mann-Whitney U, and the Chi-square tests.

Results: The age mean values in the intervention and the control groups were 27.66 ± 5.30 and 26.6 ± 5.33, respectively ($P = 0.2$). At baseline, groups did not differ significantly from each other regarding the mean scores of knowledge, health belief model components, and behavior ($P > 0.05$). However, three months after the intervention, the scores of knowledge, health belief model components, and behaviors were significantly better in the intervention group than in the control group ($P < 0.05$). Moreover, in the intervention group, there were significant differences between the pretest and posttest mean scores of knowledge, health belief model components, and behaviors ($P < 0.001$).

Conclusions: Health education programs based on the health belief model can effectively prevent high-risk behaviors among pregnant women.

Keywords: Health Belief Model, High-Risk Pregnancy, Education

1. Background

In developing countries, pregnancy and delivery are among the leading causes of mortality, morbidity, and disability worldwide. About 23% - 25% of deaths and 18% of disease burden among women aged 15 - 44 are due to pregnancy and delivery. Improving women's access to healthcare services and broadening their health knowledge through prenatal, perinatal, and postnatal education and counseling can prevent death in these periods (1). Statistics show that more than 40% of pregnancies in Sarbisheh county, Iran, are high-risk (2).

Healthcare specialists believe that planned and effective education can prevent maternal and fetal complications through reducing pregnant women's high-risk behaviors such as cigarette smoking, failure to intake folic acid and iron supplements, and limited consumption of vegetables, fruits, and dairy products, (3). However, the effectiveness of health education and high-risk behavior prevention programs largely depends on the use of appropriate theories and models and the identification of attitudes, beliefs, and context (3).

Health belief model (HBM) is one of the models for explaining health-related behavior modification. This model holds that behavior is affected by knowledge and attitude. It motivates people for behavior modification through promoting their perceived susceptibility and severity to high-risk behaviors and managing perceived barriers and benefits. The great popularity of HBM is due to its great predictive power.

In this study, we used HBM to improve pregnant women's attitudes and knowledge about perinatal care, modify their misconceptions, and prevent their high-risk behaviors. The aim of the study was to analyze the effectiveness of an educational intervention based on the HBM in preventing high-risk behaviors among pregnant women.

2. Methods

This randomized controlled field trial was conducted in 2015 on pregnant women who lived in Sarbisheh, Iran. The women were purposively recruited. At the time of the study, there were two main healthcare centers in Sarbisheh; one was randomly considered as the control and the other as the intervention group. Eligibility criteria were basic literacy skills, informed consent for participation, and the ability to attend educational sessions. Participants who were absent in more than one session, migrated to other cities, or had an abortion, stillbirth, or delivery were excluded.

Initially, a list of eligible women purposively was created and then, 44 women were randomly recruited from each healthcare center-88 in total. Based on the formula of sample size calculation for comparing two means and the results of a local study (4), the sample size was determined to be 40 for each group. However, the sample size was increased to 44 in order to compensate any probable exclusion.

A two-part researcher-made instrument was used for data collection. The first part contained twelve items on women's demographic characteristics such as age, pregnancy rank, and educational status. The second part was on women's knowledge and attitude about high-risk pregnancy. This part was developed based on the HBM and it contained three main dimensions, namely knowledge, behavior, and HBM components. The knowledge dimension contained ten questions, wrong and right answer to each was respectively scored 0 and 10. Thus, the total knowledge score was 0 - 100. The behavior dimension also comprised fifteen items; each was scored on a Likert-type scale from 1 to 7, resulting in a total behavior score of 15 - 105. Finally, the HBM components dimension contained 27 items on perceived susceptibility (8 items), perceived severity (10 items), perceived benefits (4 items), and perceived barriers (5 items). Each item of this dimension was rated from 1 (Completely disagree) to 5 (Completely agree), yielding the total perceived susceptibility, perceived severity, perceived benefits, and perceived barriers scores of 8 - 40, 10 - 50, 4 - 20, and 5 - 20, respectively. The questionnaire was developed based on the results of a literature review and then, five nursing instructors assessed and approved its face and content validity. For reliability assessment, we recruited twenty pregnant women to complete the questionnaire and then, calculated Cronbach's alpha. The Cronbach's alpha values of all dimensions were greater than 0.8.

Initially, the questionnaires were distributed to participants and information about how to complete them was provided. Then, the participants were asked to complete the questionnaires. Next, women in the intervention group were offered three educational sessions on high-risk pregnancies, prenatal care, and high-risk behaviors during pregnancy. Educations were provided through the lecture and the question-and-answer methods. The contents of the sessions were as follows. The first session was on the motivation for maternal and fetal health based on the HBM. The focus of this session was on promoting participants' perceived susceptibility and motivation for health. The second session was on improving knowledge and promoting perceived susceptibility and severity respecting high-risk behaviors during pregnancy. Finally, the third session was held to assess and reduce perceived barriers to prenatal care, explain the benefits of prenatal care, and promote self-efficacy. Women in the control group received no HBM-based educations. Three months after the intervention, all participants in both groups recompleted the questionnaires.

Collected data were entered into the SPSS software (v. 22). Variable distribution was assessed via the Kolmogorov-Smirnov test. Given the non-normal distribution of the study variables, the Wilcoxon, the Mann-Whitney U, and the Chi-square tests were used for between- and within-group comparisons. P values lower than 0.05 were considered statistically significant. The Ethics Committee of Yazd University of Medical Sciences approved the ethical considerations of the present study under No Ir.ssumedicine.REC.1395.30.

3. Results

The study was conducted on 88 women-44 in each group. Age mean values in the intervention and the control groups were 27.66 ± 5.30 and 26.6 ± 5.33, respectively. Statistical analysis revealed that women in the intervention group did not significantly differ from their counterparts in the control group concerning their age, between-pregnancy time interval, the number of children, educational and employment status, and place of residence (P > 0.05).

At baseline, between-group differences regarding the scores of knowledge, HBM components, and behavior were not statistically significant (P > 0.05). However, three months after the intervention, all between-group differences were statistically significant (P < 0.05). Moreover, in the intervention group, the posttest scores of knowledge, HBM components, and behavior were significantly better than the corresponding pretest scores (P < 0.05) while in the control group, none of the pretest-posttest differences were statistically significant (P > 0.05; Table 2).

Table 1. Pregnant Women's Demographic Characteristics[a]

Variable	Group		P Value (Chi-Square Test)
	Intervention	Control	
Educational status			0.8
Primary	11 (25)	10 (22.7)	
Guidance school	10 (22.7)	14 (31.8)	
High school	20 (45.5)	18 (40.9)	
University	3 (6.8)	2 (4.5)	
Number of children			0.97
0	16 (36.4)	15 (34.1)	
1	17 (38.6)	19 (43.2)	
2	8 (18.2)	6 (13.6)	
3 and more	3 (6.8)	4 (9.1)	
Age			0.38
Less than 18	0 (0)	2 (4.5)	
18 - 25	11 (25)	16 (36.4)	
25 - 30	19 (43.2)	15 (34.1)	
30 - 35	7 (15.9)	7 (15.9)	
35 - 40	7 (15.9)	4 (9.1)	
Between-pregnancy time interval			0.97
First pregnancy	15 (34.1)	14 (31.8)	
Less than 3 years	13 (29.5)	13 (29.5)	
More than 3 years	16 (36.4)	17 (38.6)	

[a] Values are expressed as No. (%).

Table 4 shows sources of health information for pregnant women at baseline. Table 4 shows that healthcare providers were the most important source of health information for participating pregnant women.

4. Discussion

Study findings showed that HBM-based educational intervention caused significant changes. At baseline, there was no significant difference between the groups regarding the score of knowledge about high-risk and preventive behaviors, while three months afterward, the knowledge score was significantly greater in the intervention group than in the control group. Moreover, the within-group pretest-posttest difference in the intervention and the control groups regarding knowledge score was respectively significant and insignificant. All these findings support the hypothesis that HBM-based educational intervention significantly improves knowledge. In line with our findings, Yakhforooshha et al. (2008) found HBM-based education effective in improving the knowledge of women participating in a Pap smear screening program (5). Hazavehei et al. (2007) also reported the effectiveness of the HBM-based educational intervention in improving osteoporosis-related knowledge (6).

We also found that the posttest-pretest mean difference of knowledge score was significantly greater in the intervention group than in the control group (P < 0.001). This finding also supports the effectiveness of HBM-based educational intervention in improving pregnant women's knowledge about the prevention of high-risk behaviors during pregnancy. Educational interventions enable people to compare the outcomes of their current behaviors with the positive outcomes of recommended behaviors. A person who has strong positive beliefs about the outcomes of a behavior would have positive evaluation and intention of doing that behavior.

At baseline, the between-group difference regarding the mean score of perceived susceptibility was not statistically significant while three months after the intervention, the score in the intervention group was significantly higher than that in the control group. Moreover, in the control group, there was no significant difference between the pretest and posttest mean scores of perceived susceptibility while in the intervention group this difference was statistically significant. Besides, the posttest-pretest mean difference of perceived susceptibility score in the intervention group was significantly greater than that in the control group. Aminshokravi (2012) and Pirzadeh and Mazaheri (2012) also found that HBM-based education significantly improved women's perceived susceptibility about the Pap smear screening test (7, 8).

We also found that although there was no statistically significant difference between the groups regarding the pretest mean score of perceived severity, the between-group difference at posttest was statistically significant. Moreover, in the control group, there was no significant difference between the pretest and posttest mean scores of perceived severity while in the intervention group this difference was statistically significant. In addition, the posttest-pretest mean difference of perceived severity in the intervention group was significantly greater than that in the control group. These findings confirm the positive effects of the HBM-based educational intervention on perceived severity to high-risk behaviors during pregnancy.

Table 2. Within- and Between-Group Comparisons Regarding the Mean Scores of Knowledge and HBM Components[a]

HBM Components	Time		P Value (Wilcoxon Test)	Posttest-Pretest Mean Difference
	Before	After		
Knowledge				
Intervention	55 ± 11.9	87.3 ± 11.3	< 0.001	32.3 ± 16.7
Control	54.6 ± 19.3	54.3 ± 19.5	0.32	-0.32 ± 1.5
P value (Mann-Whitney U test)	0.91	< 0.001	-	< 0.001
Perceived severity				
Intervention	19.8 ± 5.5	35.2 ± 5.1	< 0.001	5.45 ± 7.3
Control	30.2 ± 5.1	28.6 ± 5.5	0.17	-0.68 ± 5.4
P value (Mann-Whitney U test)	0.72	< 0.001	-	< 0.001
Perceived susceptibility				
Intervention	30.2 ± 4.6	35.9 ± 4.9	< 0.001	5.68 ± 6.2
Control	32.2 ± 5.03	30.2 ± 5.1	0.38	-0.68 ± 5.4
P value (Mann-Whitney U test)	0.07	< 0.001	-	< 0.001

[a]Values are expressed as mean ± SD.

Table 3. Within- and Between-Group Comparisons Regarding the Mean Scores of Knowledge and HBM Components[a]

HBM Components	Groups	Time		P value (Wilcoxon Test)	Posttest-Pretest Mean Difference
		Before	After		
Perceived benefits					
	Intervention	14.3 ± 6.6	19.4 ± 4.9	< 0.001	5.1 ± 8.5
	Control	16.2 ± 5.5	15.1 ± 5.1	0.32	-1.14 ± 7.5
	P value (Mann-Whitney U test)	0.32	< 0.001	-	< 0.001
Perceived barriers					
	Intervention	19.2 ± 6.6	15.7 ± 7.1	< 0.001	-3.5 ± 6.8
	Control	16.8 ± 7.7	18.9 ± 7.5	0.26	2.04 ± 11.3
	P value (Mann-Whitney U test)	0.26	< 0.001	-	< 0.001
Self-efficacy					
	Intervention	17.95 ± 5.1	23.4 ± 4.8	< 0.001	5.45 ± 6.6
	Control	18.9 ± 4.4	17.9 ± 4.1	0.32	-0.91 ± 6
	P value (Mann-Whitney U test)	0.32	< 0.001	-	< 0.001
Behavior					
	Intervention	12.5 ± 5.3	17.9 ± 4.1	< 0.001	5.45 ± 6.9
	Control	11.1 ± 4.9	12.1 ± 4.1	0.37	0.91 ± 6.7
	P value (Mann-Whitney U test)	0.37	< 0.001	-	< 0.001

[a]Values are expressed as mean ± SD.

Hazavehei et al. (2007), Yakhforooshha et al. (2008), and Rakhshani et al. (2013) also used HBM to promote the Pap smear screening and found that HBM-based educational intervention was effective in improving perceived severity to the complications of cervical cancer (5, 6, 9).

Study findings also revealed that at baseline, there was no significant between-group difference regarding the mean score of perceived benefits, while three months af-

Table 4. Pregnant Women's Sources of Health Information[a]

Source	Group		
	Intervention	Control	Total
Healthcare providers	20 (45)	20 (45)	40 (45)
Mass media	9 (20)	12 (27)	21 (23)
Family members	10 (22)	20 (45)	30 (34)
Peers and friends	10 (22)	18 (40)	28 (32)

[a]Values are expressed as No. (%).

ter the intervention, the perceived benefits mean score in the intervention group was significantly greater than that in the control group. Moreover, although pretest-posttest within-group difference regarding the perceived benefits mean score in the control group was not statistically significant, the posttest mean score of perceived benefit in the intervention group was significantly greater than the pretest score. Furthermore, the posttest-pretest mean difference of perceived benefits score was significantly greater in the intervention group than in the control group. Shojaeizadeh et al. (2011) also found HBM-based education effective in significantly improving perceived benefits mean score and increasing the rate of doing the Pap smear test from 0% to 81.4% (10). Karimy et al. (2012) also found that HBM-based education significantly improved perceived benefits mean score from 11.49 to 19.95 (11). Several studies showed the positive correlation of perceived benefits with engagement in high-risk pregnancy preventive behaviors as well as the positive effects of HBM-based education on the perceived benefits of preventive behaviors (9-11).

The findings of the present study also showed no significant between-group difference at baseline regarding the mean score of perceived barriers. Yet, three months after the intervention, the perceived barriers mean score was significantly lower in the intervention group than in the control group. Moreover, although the pretest-posttest within-group difference in the control group was statistically insignificant, the posttest mean score of perceived barriers in the intervention group was significantly lower than the pretest score. In addition, the posttest-pretest mean difference of perceived barriers scores in the intervention group was significantly different from that of the control group. All these findings support the effectiveness of HBM-based education in decreasing perceived barriers mean score. Similarly, Rakhshani et al. (2013) found that HBM-education significantly decreased perceived barriers mean score (9). Jalilian et al. (2011) reported perceived barriers as a significant predictor of undergoing Pap smear screening test and recommended strategies for reducing perceived barriers to undergoing the test (12). The results of a cross-sectional study by Reimers et al. (2009) also showed that appropriate educational programs could reduce barriers to the Pap smear test through improving women's knowledge about the test (13). Schulmeister and Lifsey (1999) also concluded that appropriate educational interventions are needed for reducing the barriers to the Pap smear test (14).

We also found no significant between-group difference regarding the mean score of perceived self-efficacy at baseline. However, three months after the intervention, this difference was statistically significant. Moreover, although in the control group, the pretest-posttest within-group difference regarding the mean score of perceived self-efficacy was not statistically significant, the posttest mean score of perceived self-efficacy in the intervention group was significantly greater than the pretest score. Additionally, the posttest-pretest mean difference of perceived self-efficacy score was significantly greater in the intervention group than in the control group. Earlier studies also showed the effectiveness of educational interventions in improving the mean scores of perceived self-efficacy (14-16). Educational interventions help people understand that they are able to engage in a given behavior.

Finally, study findings indicated that after the educational intervention, the mean score of practice or behavior in the intervention group significantly increased from 12.50 to 17.95, while it did not change significantly in the control group. Ramazankhani et al. (2008), Kamali and Heydarnia (2008), and Arland (2013) also reported the same finding (15-17). Aminshokravi (2012) also found that HBM-based education significantly increased the number of women who underwent the Pap smear test from 30% to 53.9% (7).

The findings of this study might have been affected by factors such as the shortage of educational facilities in the study setting, pregnant women's different personal and cultural characteristics, and their reluctance to participate in some courses of the educational program due to the lack of public transportation facilities in Sarbisheh.

4.1. Conclusion

Study findings show that HBM-based educational intervention is effective in increasing the rate of high-risk pregnancy preventive behaviors from 12.5% to 18%. Moreover, it significantly improves pregnant women's knowledge and perceived susceptibility, severity, benefits, and barriers with respect to preventive behaviors.

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References

1. Heston A, Summers R, Aten B. Penn World Table Version 6.3, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania August 2009.
2. Pasdar Y, Heidari N, Safari Y, Safari Faramani R, Izadi N, Jamshidpour M. Prevalence of some risk factors in pregnant women. *Iran J Obstet Gynecol Infertility.* 2012;**15**(21):14–23.
3. Karimy M, Hasani M, Khorram R, Gafari M, Niknami SH. The effect of education, based on8health belief model on breast self examination in the Health volunteer in Zarandieh [In Persian]. *Tabibe Shargh; J Zahedan Univ Med Sci.* 2008;**10**(4):79–87.
4. Bayati A, Shamsi M, Mohammadbeygee A, Tajic R. The effect of education based on health belief Model (HBM) on situation self-medication in mother refer to health centers in Arak city [In Persian]. *J Shahid Beheshti Univ Med Sci.* 2010;**14**(6):331–24.
5. Yakhforooshha A. Effect of health education on knowledge and attitude of the volunteers through the health belief model on pap smear urban centers of Qazvin, Mamayy martyr Beheshti University College of Nursing [In Persian]. *Midwifery Nurs J.* 2008;**18**(63):62.
6. Hazavehei SM, Taghdisi MH, Saidi M. Application of the Health Belief Model for osteoporosis prevention among middle school girl students, Garmsar, Iran. *Educ Health (Abingdon).* 2007;**20**(1):23. [PubMed: 17647187].
7. Aminshokravi F. The effect of education on women's practice based on the health belief model about papsmear test [In Persian]. *J Zarandiyeh Univ Med.* 2012;**10**(1):53–9.
8. Pirzadeh A, Mazaheri MA. The Effect of Education on Women's Practice Based on the Health Belief Model About Pap Smear Test. *Int J Prev Med.* 2012;**3**(8):585–90. [PubMed: 22973490].
9. Rakhshani F, Jalilian F, Mirzaei Alavijeh M, Zinat Motlagh F, Aghaei A, Ahmadi-Jouibari T. Pap smear test among women: An educational intervention based on health belief model [In Persian]. *J Birgand Univ Med.* 2013;**20**(2):136–43.
10. Shojaeizadeh D, Hashemi SZ, Moeini B, Poorolajal J. The Effect of Educational Program on Increasing Cervical Cancer Screening Behavior among Women in Hamadan, Iran: Applying Health Belief Model. *J Res Health Sci.* 2011;**11**(1):20–5. [PubMed: 22911943].
11. Karimy M, Montazeri A, Araban M. The effect of an educational program based on health belief model on the empowerment of rural women in prevention of brucellosis [In Persian]. *Arak Med Univ J.* 2012;**14**(7):85–94.
12. Galilian F, Mirzaei Alavijeh M, Emdadi S, Barati M, Nasirzadeh M, Hatamzadeh N. Predicting factors related with pap smear results among women based on health belief model [In Persian]. *J Health Syst Res.* 2011;**7**(6):1226–34.
13. Reimers LL, Anderson WF, Rosenberg PS, Henson DE, Castle PE. Etiologic heterogeneity for cervical carcinoma by histopathologic type, using comparative age-period-cohort models. *Cancer Epidemiol Biomarkers Prev.* 2009;**18**(3):792–800. doi: 10.1158/1055-9965.EPI-08-0965. [PubMed: 19258470].
14. Schulmeister L, Lifsey DS. Cervical cancer screening knowledge, behaviors, and beliefs of Vietnamese women. *Oncol Nurs Forum.* 1999;**26**(5):879–87. [PubMed: 10382186].
15. Ramazankhani A, Heydarnia AR. Measuring the impact of health education based on hbm modelon knowledge and preventive behaviors of smoking [In Persian]. Tarbiat Moddares University; 2008.
16. Kamali M, Heydarnia AR. The effect of health belief model on student body status [In Persian]. Tarbiat Moddares University; 2008.
17. McFarland DM. Associations of demographic variables and the Health Belief Model constructs with Pap smear screening among urban women in Botswana. *Int J Womens Health.* 2013;**5**:709–16. doi: 10.2147/IJWH.S50890. [PubMed: 24179380].