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Educational Intervention on Preventive Behaviors on Gestational Diabetes in Pregnant Women: Application of Health Belief Model

Zahra Khiyali[1], Mahin Manoochri[1], Ali Khani Jeihooni [1], Akbar Babaei Heydarabadi[2], *Farzaneh Mobasheri [3]

[1]Department of Public Health, School of Health, Fasa University of Medical Sciences, Fasa, Iran.
[2]Department of health education and health promotion, School of Public Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.
[3]Department of Social Medicine, School of Medicine, Fasa University of Medical Sciences, Fasa, Iran.

Abstract

Background

Unfortunately, gestational diabetes with its demanding health cares and increasing economic costs is globally prevailing. Therefore, preventive measures against this difficulty are highly significant. The aim of the present study was to evaluate the effects of training interventions on behaviors of pregnant women for prevention of gestational diabetes.

Materials and Methods

This quasi-experimental study was conducted on 91 pregnant women (n=45 in intervention group, n=46 in control group), whom were chosen through multi-stage random sampling, and three training sessions with weekly intervals were offered for the intervention group. The data was collected in two stages including before the intervention and three months after intervention through interview as well as filling in questionnaire forms. The collected data was analyzed through independent sample t-test and paired t-test by considering 0.05 confidence level using SPSS software (version19.0).

Results

The results of present study showed a direct and significant correlation between age and preventive behaviors (r=0.22, P<0.05), and also between body mass index (BMI) with perceived susceptibility (r=0.26, P<0.05). In addition, the mean scores of all constructs of Health Belief Model in intervention group, three months after intervention, were significantly higher compared with the control group (P<0.05).

Conclusion

Due to the fact that the results of the present study suggested the effectiveness of training interventions on enhancing the preventive behaviors against gestational diabetes through Health Belief Model and considering the significance of prevention of this disease, it is suggested to codify essential plans for performing training interventions.

Key Words: Health Belief Model, Gestational diabetes, Prevention, Women.

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Corresponding Author:

Farzaneh Mobasheri, Department of Social Medicine, School of Medicine, Fasa University of Medical Sciences, Fasa, Iran.

Email: farzane.mobasheri@yahoo.com.

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1- INTRODUCTION

Gestational Diabetes is a globally increasing health problem and one of the most prevalent complications of pregnancy (1). The pregnant women with this disease might be divided into two groups: women with explicit diabetes whose disease has been diagnosed before pregnancy, and women with gestational diabetes whose disease starts during the pregnancy and is diagnosed for the first time. Gestational diabetes refers to different intensities of non-toleration of carbohydrates. However, the American College of Obstetricians and Gynecologists (ACOG), recommends that for the diagnosis of this disease, three-hour glucose tolerance test should be carried out after consuming 100grams (gr) of glucose after overnight fasting. If two or more values of plasma glucose concentration are abnormal, the diagnosis of this disease is a certainty (2). Unfortunately, the prevalence of gestational diabetes is increasing globally, and it is accompanied with high health cares and significant economic costs (3-5). In Iran, the prevalence of this disease is estimated to be 10.2 percent (6).

Despite numerous developments, gestational diabetes causes a high risk for threating consequences against mother and child during recent years. Fat infants, risk of injuries during delivery, shoulder dystocia, fetal death in the uterus, respiratory distress syndrome, hypoglycemia and polypectomy, hyper bilirubinemia, cardiomyopathy, perinatal mortality due to unexplained anomalies as well as unjustified mortality are among the risks that threaten the infant. In addition, certain symptoms such as high blood pressure, premature delivery, infectious complications, hydramnios, pre-eclampsia and higher likelihood of incidence of type II diabetes in postpartum period could involve the mother (6, 7). The risk of type II diabetes is also high in mothers (20 to 50 percent) (8). On the other hand, the results of different studies suggest that the need for insulin during pregnancy, the intensity of impaired glucose tolerance during pregnancy, history of abortion, high body mass index and sedentary lifestyle, are the most significant predictors of postpartum diabetes (9). Therefore, considering these factors might be effective in early identification of individuals facing the risk of type II diabetes (10, 11). One of the ways of paying attention to predictors of each disease and prevention from that disease is training (12). In different studies, the efficiency and effectiveness of training interventions on changing preventive behaviors such as blood glucose test, controlling the glucose (13), reducing the need for insulin (14), increased levels of nutritional knowledge (15), and reducing consumption of carbohydrates (16), were generally confirmed. International Association of Diabetes and Pregnancy Study Groups (IADPSG) believes that with proper training, can be up to 80% of diabetes be prevented (17).

It should be noted that effectiveness of training depends on proper use of theories of behavioral science (18). One of the significant theories of health education is the health belief model (HBM), which considers behavior as a function of knowledge and attitude of individuals. The aim of this model is increasing the perception of individuals about a health threat and directs their behaviors towards health (19). This model is a comprehensive pattern which represents the association between beliefs and behaviors, and plays a significant role in prevention of the disease (20). Therefore, understanding individuals' viewpoints and beliefs is essential for developing the strategies of controlling diabetes (21). So, for many studies have been conducted on achieving this knowledge and even evaluating the effect of training interventions on changing the behavior of different population groups at national and international level. The study

conducted by Kim et al. (2007), is one of these studies that showed that training interventions is successful in executing diabetes screening plan before delivery, but fails in modifying the lifestyle of individuals (22). In another study, one-year implementation of a training program increased the level of knowledge, and self-care behaviors of diabetic patients (23). Farrara et al. (2011), reported that training intervention does not affect the effective nutrition and physical activity (24). In Iran, a study suggested that education based on Health Belief Model significantly improved diabetic patients' attention to observation of behavioral jogging (25), Kaveh et al. (2011), observed a significant change in mean level of knowledge and blood sugar of patients one and two hours after eating meal (26). Also, Hesari Nejad et al. (2013), suggested the favorable and significant effect of training intervention on post-natal diet and physical activity of women (27).

Considering the fundamental role of mothers' health in the health of family and community, and considering the fact that diabetes is found in a large number of pregnant women which may continue in postnatal period as type II diabetes, it is obvious that design and execution of essential preventive measures are needed. Among the most influential preventive plans, one could point to offering organized and purposeful trainings for women. But unfortunately, the pregnant women do not properly receive the essential trainings based on the standard program of cares during and after pregnancy. As suggested in previous studies, their knowledge on preventive behaviors against type II diabetes was in low to moderate level (8). The previous studies dealt less frequently with pregnant women and they reported different results about the effect of training interventions on preventive behaviors against gestational diabetes. The present study aimed to evaluate the effects of educational intervention on preventive behaviors on gestational diabetes in pregnant women based health belief model.

2- MATERIALS AND METHODS

2-1. Study Design and Population

This is interventional analytic study was performed on the pregnant women who referred to Health Centers in Fasa city, Fars province, South West of Iran for receiving pregnancy cares during 2016.

2-2. Methods

By consideration of 5 standard deviation (SD) to estimate the model structures, the maximum acceptable difference between the two groups of constructions score 4, to have 90% power of detecting this difference (at 5% significance level, two-tailed), approximately 64 pregnant women (32 patients per group) estimated for the study (according to the following formula).

$$n = \frac{2(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2\sigma^2}{d^2}$$

Among pregnant women referring to Health Centers, 90 pregnant women were chosen through multi-stage random sampling. Among 12 Health Centers in Fasa city, eight centers were selected based on the according to urban areas, number of people referring to the centers at the time of performing the investigation, geographical proximity, proper setting for holding training sessions, and uniformity of typical educations, and also cooperation of personnel. For reducing the associations of individuals of the two groups, these Health Centers were divided into two control and intervention groups through random assignment (4 centers in intervention group and 4 centers in control group).

2-3. Measuring tools

The instrument used in the present study was the questionnaire designed by Mazloomi et al. (2010); and whose validity was verified through content validity and organizing a panel composed of 8 endocrinologists, health education experts and people at risk of type II diabetes. The reliability of this instrument was also measured and its Cronbach's alpha was reported to be higher than 0.7 (28). The questionnaire included 63 questions of which 11, 8, 4, 7, 11, 12, and 6 questions were regarding knowledge, perceived susceptibility, perceived severity, perceived benefit, perceived barriers, perceived self-sufficiency and preventive behaviors, respectively. With regard to questions on knowledge, each correct answer was assigned 1 and the false answer was assigned 0. Consequently, the score for an individual's knowledge might be ranged between 0 and 11.

The questions of the constructs of Health Belief Model were measured through Likert scales ranging between 1 and 4. As a result, each correct question (completely agree), got 4 and incorrect answers received 3, 2 and 1 depending on selecting "agree", "disagree" and "completely disagree".

Of course, in the case of some questions which expressed incorrect beliefs, the scoring was reversed so that higher score was assigned to the choice "completely disagree".

2-4. Intervention

Then, essential coordination with individuals in intervention group was done for participation in training courses. Training intervention in this study included: 6 training sessions with weakly intervals and through adaptation of Health Belief Method during pregnancy which was held by researcher in Health Centers. In addition, both groups received routine cares in health centers by healthcare personnel. Data collection was done in two stages through interview and filling in some questionnaires. The first stage was at the beginning of study and the second stage started three months after conducting the training intervention. The details of the training sessions show in **Table-1**.

2-5. Ethical consideration

For consideration of moral principles, before completing the questionnaire, the aim of the study was presented for the participants and the informed consent was obtained from them.

2-6. Inclusion and exclusion criteria

For sampling the selected health centers, certain indicators were considered forselection and inclusion of individuals in the study such as gestational age of 25 weeks or lower at baseline, literacy at reading and writing level, having telephone number for contacting, ability to understand speech and communicate effectively with others, no known mental disorder, lack of speech and hearing problems, and no history of employment as health staff and students. In addition, those patients who were participating in any other relevant training program or were experiencing stressful events were excluded from the study.

2-7. Data Analyses

The data were analyzed using SPSS software version 19.0 with independent t-test for comparison of continuous demographic variables and score of each Health Belief Model`s structure between groups, paired t-test for assessing differences of scores in each group before and after intervention. Chi-square test for relationship between categorical variables and Pearson correlation coefficient for correlation between Health Belief Model`s structures with mother`s characters at the significant level 0.05.

Table-1: The Details of the Training Sessions

Sessions	Details
First session	Introduction to gestational diabetes and its symptoms, complications and diagnosis.
Second session	A women diagnosed with gestational diabetes was invited as a model, and talked to the subjects about gestational diabetes and its risk factors, symptoms, complications, and diagnosis with the help of a physician.
Third and Fourth sessions	The role of nutrition in preventing gestational diabetes, benefits and barriers of diet, following dietary recommendations and recording activities in the specified forms.
Fifth and Sixth sessions	The role of exercise, and appropriate exercises, the role and importance of exercise, its benefits, barriers types, and recording the duration of walking in specified forms. The previous sessions were reviewed and the subjects were provided with educational pamphlets.

3- RESULTS

In general, 91 pregnant women (n=46 in control group and n=45 in intervention group), were included in the present study. With regard to mean, age, weight, body mass index (BMI), and age of pregnancy at the time of inclusion in the study, no significant difference was found between the two groups. In addition, the characteristics including educational levels, occupational status, and history of previous pregnancy, the method of previous delivery, and the history of diabetes in relatives and rank of delivery, were compared between the two groups through Chi-square tests and Fisher test. **Table-2** shown that with the exception of history of previous delivery which had higher frequency in intervention group (64.4% versus 43.5%; P=0.045), other characteristics did not suggest a significant difference. The mean scores of different constructs of Health Belief Model before and after the intervention were compared. The results suggested that mean scores of all constructs in before the intervention did not reveal significant difference between the two groups, but in after the intervention, the means for intervention group was significantly higher than the control group (**Table-3**). Results showed that there was a direct and significant correlation between age and Preventive behaviors (r=0.22, P=0.037), and between BMI with Perceived susceptibility (r=0.26, P=0.040). Other variables were not associated with Health Belief Model`s structures (**Table-4**).

Table-2: Compare quality variables between intervention and control groups before intervention

Variables		Intervention group (n=45)		Control group (n=46)		P-value
		Number	Percent	Number	Percent	
Level of education	≤ 12th (grade)	7	15.60	11	23.90	0.58
	>12th (grade)	26	57.80	23	50	
Job	Housewife	5	11.10	4	8.70	0.73
	Employee	40	88.90	42	91.30	
History of previous delivery	No	29	64.40	20	43.50	0.04
	Yes	16	35.60	26	56.50	

Previous delivery type diabetes Family	Normal delivery	6	13.30	12	26.11	0.11
	Section delivery	10	22.20	14	30.40	
	No history previous delivery	29	64.40	20	43.50	
Rank delivery	0	29	64.40	20	43.50	0.19
	1	11	24.40	15	32.60	
	≥ 2	5	11.10	11	23.90	
History of diabetes in first-degree relatives	No	31	68.90	36	78.30	0.31
	Yes	14	31.10	10	21.70	

Table-3: Comparison of the Mean Scores of HBM Constructs in the Intervention and Control Groups before and after the Intervention

Before the Intervention (Mean ± SD)				After the Intervention (Mean ± SD)		
Variables	Intervention group	Control group	P-value*	Intervention group	Control group	P-value*
Knowledge	4.02±2.10	4.15±1.90	0.76	7.40±1.60	4.43±1.90	<0.001
Perceived susceptibility	24.19±2.6	24.08±2.80	0.87	25.70±3.2	23.28±2.80	<0.001
Perceived severity	11.87±2.30	11.50±2.60	0.50	13.15±2.03	11.70±2.10	<0.001
Perceived benefit	21.89±3.50	22.30±3.03	0.59	25.15±2.60	21.38±2.70	<0.001
Perceived barriers	30.65±3.80	31.43±4.30	0.40	35.22±4.60	30.47±4.70	<0.001
Self-efficacy	38.30±5.80	38.02±6.70	0.83	42.20±5.10	39.57±5.60	<0.001
Preventive behaviors	13.66±2.60	13.78±2.90	0.84	15.20±2.50	13.65±2.70	<0.001

*Independent Sample t-test; SD: Standard deviation.

Table-4: The coefficient for correlation between Health Belief Model`s structures with mother`s characters at the beginning of the study (Pearson correlation)

Variables		Knowledge	Perceived susceptibility	Perceived severity	Perceived benefit	Perceived barriers	Self-efficacy	Preventive behaviors
Age	r	0.15	0.18	0.10	0.12	0.04	0.10	0.22
	p-value	0.160	0.151	0.392	0.277	0.706	0.377	0.037*
Weight	r	0.09	0.24	0.05	0.22	0.04	-0.00	0.06
	p-value	0.410	0.052	0.655	0.056	0.714	0.948	0.579
Body Mass Index	r	0.01	0.26	0.05	0.20	-0.00	0.00	0.03
	p-value	.887	0.040*	.645	.143	.959	.972	.799
Gestational age	r	0.06	-0.06	0.01	0.07	0.14	-0.15	0.10
	p-value	0.575	0.644	0.891	0.556	0.248	0.167	0.353
Delivery Rank	r	0.09	0.23	0.08	0.18	0.01	0.14	0.08
	p-value	0.401	0.057	0.453	0.119	0.910	0.204	0.463

* P-value<0.05.

4- DISCUSSION

Health training is one of the most efficient methods of intervention for prevention of disease, because they contribute to enhancement and maintenance of health due to improving health-related behaviors (29). On the other hand, women with gestational diabetes (GD), are at higher risk of developing type 2 diabetes (DM), after delivery compared to those without GD (30), the present study intends to answer the question "Does offering health training for pregnant women affects their preventive behaviors against gestational diabetes?"

In the present study, the individuals in both groups (control and intervention groups), did not suggest significant difference in mean age, weight, body mass index and age of pregnancy at the time of inclusion in the study. In comparison, with exception of history of previous delivery which was higher in the intervention group, the characteristics including educational level, occupational status, and history of diabetes in relatives and rank of pregnancy had no significant difference in two groups (64.4% vs. 43.5%; P=0.045). Sadeghi et al. (2015), suggested that the two intervention and control groups had relatively similar personal characteristics such as age, gender, education, job and history of diabetes among relatives and did not show significant differences (31).

Lack of difference between the two groups in regard to these potential disruptors is one of the positive points of present study which suggests the relatively good confidence in comparability of these two groups, and this plays a significant role in random assignment of health centers to control and intervention groups.
The importance of gestational diabetes mellitus knowledge among women is vital in reducing birth complications and outcomes. This is because mothers are the most vital component to reducing health complications and birth outcomes through gestational diabetes mellitus knowledge (32, 33). Despite the fact that the post-intervention score for knowledge increased for both groups, this increase was solely significant for intervention group. Holanda et al. (2012), emphasize on superficial knowledge about the gestational diabetes which can influence the promotion of self-care, treatment and disease control (34). Studies of Amason (30), Tawfik (35), Sadeghi et al. (31), Gerayloo et al. (36), Fallah et al. (37), Taghdisi et al. (38), Sharifirad et al. (18), and Beranth (39), also found a significant increase in level of knowledge for intervention group.

Kaveh et al. (2012), conducted a study on women with gestational diabetes and suggested that the mean level of knowledge increased significantly after training intervention (26). Although more than 90% of women with history of gestational diabetes acknowledged that history of gestational diabetes as a risk factor for future diabetes, but less than 10% these women believe that they were at high risk for the future diabetes (22).
Increased perceived susceptibility and severity of predictive factors, are dependent to the Health appropriate behaviors (40). The results of the present study showed a significant increase in the mean scores of perceived susceptibility and severity in the experimental group compared to the control group after the intervention. Taghdisi et al. (40), Hassani et al. (41), Ahmadpoor et al. (42), Ghahremani et al. (43), Shamsi et al. (19), Safarzadeh et al. (44), Javaheri Tehrani (45), and Tawfik (35), in agreement with results of our study. The results of the present study showed a significant increase in the mean scores of perceived benefits in the experimental group compared to the control group after the intervention. In study by Tang et al. (46), women with gestational diabetes who perceived strong benefits to engaging in preventive measures.

Perceived benefits and improving preventive behaviors have a strong correlation and a better perception of the benefits of a behavior way to provide an appropriate action (41). Tawfik (35), conducted a study entitled "The Impact of Health Education Intervention for Prevention and Early Detection of Type 2 Diabetes in Women with Gestational Diabetes" and reported that perceived benefits could enhance motivation to perform Prevention and screening for type 2 diabetes mellitus, which is consistent with the findings of the present study. Also, Taghdisi et al. (38), Ahmadpoor et al. (42), Shamsi et al. (19), Safarzadeh et al. (44), and Javaheri Tehrani et al. (45), reported increased perceived benefits after the intervention. The negatively high perception of women about barriers would frequently preclude their ability to make lifestyle changes, even if they perceived strong benefits to engaging in health behaviors (46).

Therefore, perceived barriers constitute the most influential factor upon performance of women (44). The results of the present study showed a significant increase in the mean scores of perceived barriers in the experimental group compared to the control group after the intervention. In previous studies, the significant difference in the mean score of barriers between the two groups was due to positive effect of training on dealing with perceived barriers (19, 38, 42, 44), which is consistent with the findings of the present study. Enhance diabetes self-efficacy and adherence to preventive behaviors under stress (28).

According to the study's Amason, self-efficacy was the only significant predictor for adopting healthy lifestyle behaviors for pregnant women with Gestational Diabetes (30). The results of the present study showed a significant increase in the mean scores of perceived self-efficacy in the experimental group compared to the control group after the intervention. This result is also in the same line with some previous studies (19, 38, 41- 44). Increasing self-efficacy associated with adherence to diabetes prevention activities (28), and change in beliefs can lead to changes in health behaviors (45), therefore expected to improve preventive behaviors on gestational diabetes in women. The results of the present study showed a significant increase in the mean scores of Preventive behaviors in the experimental group compared to the control group after the intervention. Previous studies reported improved behavior after the intervention (19, 28, 31, 43, 45), which similar to this study. Generally the results of this study showed the effectiveness of the educational intervention based on HBM on knowledge and performance of pregnant women. In the studies by Hassani et al. (41), Shamsi et al. (19), Mazloomy et al. (28), Sadeghi et al. (31), Safarzadeh et al. (44), and Javaheri Tehrani et al. (45), was confirmed the effectiveness of this training model.

4-1. Limitations of the study

This study was conducted on the women covered by urban health centers. Thus, HBM based educational interventions are recommended to be performed for other community members, such as teachers, and villagers. Since men are great contributors to women's health, training programs should be developed for men, as well.

5- CONCLUSION

This study showed that the health education programs designed based on HBM could positively effect on preventive behaviors on gestational diabetes in pregnant women by improving their knowledge level and HBM components. Since the information provided for early intervention to reduce the negative effects of gestational diabetes among babies and their mothers is effective, more attention should be paid to the educational design

and planning based on educational theories and models.

6- CONFLICT OF INTEREST

There was no conflict of interests in this article.

7- ACKNOWLEDGMENTS

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