

ORIGINAL

Investigation of education based on self-regulation model on follow ups postpartum in women with gestational diabetes

Investigación de la educación basada en el modelo de autorregulación sobre los barbechos posparto en mujeres con diabetes gestacional

Fahimeh Khoshnejad¹ , Fatemeh Momenzadeh² 

1. MSC graduated at Midwifery, Faculty of Nursing and Midwifery, Tehran university of Medical Sciences, Tehran, Iran

2. Department of midwifery, Faculty of medical science, Qom branch, Islamic Azad University, Qom, Iran

Corresponding author:

Fahimeh Khoshnejad

E-mail: Khoshnejad96@gmail.com

Received: 25 - IV - 2022

Accepted: 6 - V - 2022

doi: 10.3306/AJHS.2022.37.04.65

Abstract

Background: Gestational diabetes as a silent disease, a phenomenon that affects pregnancy, the mother and the fetus. The prevalence of type 2 diabetes after gestational diabetes have been reported from 30 to 70 percent. This study examines the effect of education based on the self-regulation model on follow ups postpartum in women with a history of gestational diabetes.

Materials and methods: Current study is an experimental study. The sampling is a multi-stage. method in this study was that of the urban areas Qom (4 area), Region 2 Qom was selected as the research community. Then the community health centers in the area between two randomly (as a test and the other one as a control) were selected. In each center by referring to the case of pregnant women, 46 patients were randomly selected and their phone calls were invited to participate in study. After selecting subjects, while acquiring informed consent and provide a full description of the purpose of this study, questionnaires were given to them in the (demographic, self-regulation, Psychometric Study of the Exercise Procrastination Scale, Healthy Diet Procrastination Scale) Baseline information was taken from them.

Results: Overall, 92 subjects with mean age 29.93 ± 4.9 participated in the study. More participants had secondary and high school education (46.7 percent), housewives (77.2 percent), overweight (52.2 percent), with 2 children (43.5 percent) and middle-income status (62 percent). Friedman test result showed that the experimental group, the average of all three measures have changed significantly, while there was no significant change in the control group.

Conclusions: According to the findings of this study, education based on models of self-regulation training enhances physical activity and nutritional status of women with Gestational Diabetes.

Key words: Self-regulation model, gestational diabetes, on follow ups postpartum.

Resumen

Antecedentes: la diabetes gestacional como enfermedad silenciosa, fenómeno que afecta al embarazo, a la madre y al feto. Se ha informado que la prevalencia de diabetes tipo 2 después de la diabetes gestacional es del 30 al 70 por ciento. Este estudio examina el efecto de la educación basada en el modelo de autorregulación en los barbechos posparto en mujeres con antecedentes de diabetes gestacional.

Materiales y métodos: El estudio actual es un estudio experimental. El muestreo es de varias etapas. El método en este estudio fue el de las áreas urbanas Qom (área 4), la Región 2 Qom fue seleccionada como la comunidad de investigación. Luego se seleccionaron los centros de salud comunitarios en el área entre dos al azar (como prueba y el otro como control). En cada centro al referirse al caso de las embarazadas, se seleccionaron aleatoriamente 46 pacientes y se invitó a sus llamadas telefónicas a participar en el estudio. Luego de seleccionar a los sujetos, mientras se obtenía el consentimiento informado y se brindaba una descripción completa del propósito de este estudio, se les entregaban cuestionarios en el (demográfico, autorregulación, Estudio psicométrico de la Escala de procrastinación del ejercicio, Escala de procrastinación de dieta saludable) Se tomó información de referencia de ellos.

Resultados: En total, 92 sujetos con una edad media de $29,93 \pm 4,9$ participaron en el estudio. Más participantes tenían educación secundaria y preparatoria (46,7 por ciento), amas de casa (77,2 por ciento), sobrepeso (52,2 por ciento), con 2 hijos (43,5 por ciento) y situación de ingresos medios (62 por ciento). El resultado de la prueba de Friedman mostró que en el grupo experimental, el promedio de las tres medidas ha cambiado significativamente, mientras que no hubo cambios significativos en el grupo de control.

Conclusiones: De acuerdo con los hallazgos de este estudio, la educación basada en modelos de entrenamiento de autorregulación mejora la actividad física y el estado nutricional de las mujeres con Diabetes Gestacional.

Palabras clave: Modelo de autorregulación, diabetes gestacional, en barbechos posparto.

Introduction

The increasing prevalence of type 2 diabetes in the young population in particular has led to an increase in the number of pregnancies complicated by diabetes. Many women with gestational diabetes already have type 2 diabetes that has not been diagnosed before. Pregnant patients with diabetes can be divided into two categories: people whose diabetes is diagnosed before pregnancy and people whose disease is diagnosed during pregnancy. 59% of all deaths in the world and 46% of diseases are due to non-communicable diseases and statistics show an increase in the prevalence of these diseases. The damage caused by these diseases and their staggering costs to health systems have always been a serious and powerful stimulus for the design and implementation of prevention programs at various levels. Meanwhile, diabetes is one of the predominant goals of preventive policies as a disease with debilitating effects that is initially contagious. Especially in the case of diabetes (type 2) there are effective and useful methods of prevention^{1&2}. In this regard, due to the high sensitivity of the health care system to prevention programs in Iran, many procedures have been taken to prevent it by the health networks of the Islamic Republic of Iran. Control of diabetes and its problems has been a priority since 1991.

Today, chronic diseases are one of the main causes of disability and mortality in many countries of the world. Diabetes is one of the most serious non-communicable diseases worldwide and is classified as a disease with a global epidemic³. The number of people with diabetes worldwide in 2010 is estimated at 285 million⁴. By 2030, the number of people with diabetes is expected to double, and this "diabetic epidemic" includes pregnant women⁵.

Decreased insulin secretion, decreased glucose uptake due to insulin resistance, and increased glucose uptake to varying degrees are involved in each type of diabetes. Diabetes causes premature and late changes that result in disability, cost of treatment, and ultimately increase mortality. Diabetes is the fifth leading cause of death in the world and the number one cause of chronic renal failure, non-traumatic amputation and blindness in many societies⁶.

In the past, diabetes-related deaths were estimated at 800,000 per year; However, it has long been known that this estimate is much lower than the actual amount. A more reasonable estimate is that 4,000,000 deaths from the disease occur worldwide each year. Diabetes is the leading cause of 9% of all deaths worldwide⁷. The prevalence of diabetes has increased significantly in the last two decades. Although the prevalence is seen in both types of diabetes, the increase in the prevalence of type 2 diabetes has been far greater than in type 1 diabetes. In the 21st century, the prevalence of type 2 diabetes and

impaired glucose tolerance (IGT) has become epidemic due to decreased physical activity and weight gain and obesity⁸. The incidence of type 1 diabetes is lower than that of type 2 diabetes, and is generally between 3 and 35 per 100,000 people per year. The incidence of type 1 diabetes in Canada and the United States is reported to be between 8 and 20 per 100,000 people. In general, type 1 diabetes is rare in people in Japan, China, the Philippines, as well as in Asian Indians, African Africans, and Eskimos, and is more common in whites. Type 1 diabetes is difficult to diagnose per 100,000 people in a year, and therefore many studies are incomplete in terms of defining indicators and their results should be considered with caution⁹. The prevalence of type 2 diabetes in the general population is between 1 to 4% and in people over 40 years between 5 to 10%. Given the growing prevalence of type 2 diabetes in the world, the World Health Organization declared it a latent epidemic and since 1993 has called on all countries to fight diabetes¹⁰.

The types of diabetes are divided according to its pathological process. The most common types of diabetes are types 1 and 2, which differ in etiology, epidemiology and many other dimensions. In addition to type 1 and type 2 diabetes, diabetes may appear for other reasons such as genetic disorders, some diseases, etc. Gestational diabetes is different from type 1 and type 2 diabetes because it is diagnosed for the first time in a pregnant woman. The side effects for mothers and fetuses are similar to those who already have diabetes and then become pregnant, and may become completely normal after termination of pregnancy. There are three ways to diagnose type 2 diabetes today:

1. The venous plasma glucose concentration is equal to or greater than 200 mg / dL two hours after ingestion of 75 g of glucose.
2. Venous plasma glucose concentration in a random sample equal to or greater than 200 mg / dL with a clear sign of diabetes
3. Intravenous plasma glucose concentration in two fasting sessions equal to or greater than 126 mg / dL.

Normal plasma glucose levels in the fasting state and 2 hours after eating 75 g of glucose are 100 and 140 mg/dL, respectively. The American Diabetes Association prefers fasting plasma glucose levels because it is more practical, more proportionate, and more reproducible. If fasting plasma is between 100. 125 It is called " Impaired fasting glucose (IFG)". If the glucose concentration is between 140 and 200 two hours after glucose consumption, it is called "g Impaired glucose tolerance (IGT)". In these two groups, the incidence of diabetes is higher. Although two-thirds of them may not always have the symptoms of diabetes, they are more likely to have cardiovascular complications. Lifestyle changes can reduce the risk of developing diabetes in these groups¹¹.

Hemoglobin A1C is closely related to blood sugar levels, but is not currently used as a diagnostic test for diabetes because its normal nature cannot rule out impaired glucose tolerance or mild diabetes.

Literature of Review

The articles reviewed in this study include two Persian articles and one English article. By searching for terms such as: postpartum diabetes, self-regulation, postponement, in Iran Doc, Magiran, SID databases and searching for terms such as, screening, diabetes, type 2 diabetes, follow up, postpartum, procrastination, Gestational diabetes was obtained in PubMed, science direct, ProQuest, ISI databases in the period 2016-2005. The following studies are sorted by the closest time.

Rashidi et al. (2013), a cross-sectional study entitled Factors related to postpartum screening in women with a history of gestational diabetes in Kermanshah and performed on 150 subjects. The objectives of this study included determining the frequency of referrals for postpartum diabetes screening in women with a history of gestational diabetes and determining the relationship between demographic and reproductive characteristics, diabetes profile, and how to provide health services with individual referral for postpartum diabetes screening in women. She had a history of gestational diabetes. Personal and fertility characteristics: age, occupation, education, number of pregnancies and deliveries and abortions, number of children, number of household members, type of last pregnancy, income, receiving maternity care, smoking, having insurance, type of insurance, place of delivery, History of high birth weight (more than 4000 g), abnormal birth history, recent live birth and recent baby weight. Characteristics of diabetes: Age of onset of gestational diabetes, Diagnostic test for gestational diabetes, Gestational age, onset of insulin use, type of insulin, diet use, history of diabetes in previous pregnancies, type of diabetes in the family, family history, hospitalization history in pregnancy to control blood sugar. The research sample included 150 women who had given birth with a history of gestational diabetes in a recent pregnancy who had passed at least 6 months from the date of their delivery and were under pregnancy care in Kermanshah clinics and had a health record. Had no pre-gestational diabetes and at least 6 months from the date of delivery. The researcher, by referring to the files of the research units, obtained their telephone numbers with the permission of the University Ethics Committee and made telephone calls to them. And completed the questionnaire. In the end, the authors concluded that due to the low rate of female referral for screening for postpartum diabetes, it is necessary to identify the factors associated with female referral for screening, remove the barriers and with timely diagnosis, an opportunity to Prevent or delay the onset of type 2 diabetes in the future¹².

The methodology of this study and its expression is helpful in advancing the objectives of our study, but the innovation of the present study is the implementation of an educational intervention based on the self-regulatory model, the effect of which on postpartum follow-up in women with a history of gestational diabetes.

Peyman et al. (2012) conducted a study in 2012 to determine the effect of self-regulatory education on physical activity in women with type 2 diabetes. This study was a randomized controlled trial. The study population was women with type 2 diabetes referred to health centers in Mashhad. Inclusion criteria include: type 2 diabetes based on the evidence in the health record, age 35 to 65 years, not having any of the complications of diabetes, willingness to participate in the study, ability to read and write, physical activity and no treatment with It was insulin. Exclusion criteria included: suffering from complications of diabetes during the implementation of an educational intervention that restricts physical activity and absence of more than two sessions in theory sessions. The results showed that the mean age of participants was 49.07 years. In the intervention group, there was a significant difference in goal setting ($P < 0.001$), planning ($P = 0.001$) in the intervention evaluation courses; Knowledge ($P < 0.001$) and physical activity ($P < 0.001$) were observed. Also, there was a significant decrease in fasting blood sugar and body mass index at follow-up compared to before the intervention, which was not observed in the control group. At the end of the training, the researchers concluded that the educational intervention, using self-regulatory strategies, increases physical activity, improves blood sugar and body mass index in type 2 diabetic women¹³.

Safarzadeh et al. (2014) conducted an experimental study entitled "The effect of training on postpartum sports activities using the health belief model" in women referring to health centers in Bandar Abbas. It turned out that 191 women referring to selected health centers in Bandar Abbas during the years 91 to 92 were selected. Then, these women were randomly divided into three groups: test, first control and second control. The above study refers to the effectiveness of educational intervention based on health belief model, but since the structures of self-care model as well as gestational diabetes are different categories to answer the question of whether self-regulatory model education can improve the level of physical activity Whether or not women with a history of gestational diabetes need a separate study is the subject of this study.¹⁴

Coppola et al. (2013) conducted a cross-sectional study of 6770 pregnant women at Pugliese-Ciaccio Hospital in Caucasian, southern Italy. The statistical population of this study included women who participated in gestational diabetes screening from January 2004 to December 2011. The aim of this study was to "accurately determine

the prognostic factors in performing postpartum glucose tolerance test in women with a history of gestational diabetes". Out of 1159 women diagnosed with gestational diabetes, 374 (32.3%) were screened for postpartum participated, attended, took part in. A significant increase in referral rates was observed following counseling. Other predictive factors included: previous history of gestational diabetes, higher education, and insulin therapy during pregnancy. Also, there was no significant difference between body mass index, family history of type 2 diabetes and number of deliveries with the rate of participation. Overall, the data of this study showed that the intervention as a counseling is an effective, inexpensive, and simple tool in increasing the rate of oral glucose tolerance test for women with a history of gestational diabetes. However, despite counseling, some women still do not participate. Polycystic ovary syndrome was also a strong predictor of women's participation in the postpartum diabetes test. The authors conclude that further studies are needed to determine whether their findings are common to other populations.¹⁵

Material and Methods

The present study is a quasi-experimental study. The study population in this study included all women with a history of gestational diabetes in District 2 of Qom. The research samples in this study include women with a history of gestational diabetes in the second region of Qom who have been pregnant for at least 6 weeks and have the characteristics of the research units. The following formula was used to determine the sample size. This formula is used to determine the sample size in intervention studies where the dependent variable is quantitative. Here, too, the dependent variables are the values of self-regulation, procrastination in physical activity, and procrastination in diet, all of which are quantified. According to previous studies¹⁵, the alpha value was 5%, the beta value was 20%, and the average difference was 10 acceptable. In addition, some studies show that the average score of self-regulation in Iranian women is 112 and its standard deviation is 16.7.

Taking into account the 10% drop, the sample size of 46 people for each group (92 people in total) was determined.

$$n = \frac{2\sigma^2(Z_{1-\beta} + Z_{1-\alpha/2})^2}{u1 - u2}$$

$$n = \frac{2 * 16.7^2 (Z_{\beta} + Z_{\alpha/2})^2}{u1 - u2}$$

$$n = \frac{2 * 278.89 (1.96 + 0.8)^2}{10^2} = \frac{4250.28}{100} = 42.50$$

$$n = 42.50$$

The sampling method in the present study is multi-stage. The research method in the present study was that among the urban areas of Qom (4 regions), region 2 of Qom city was selected as the research community. Then, from the health centers of this region, two centers were randomly selected (one as a test and the other as a control). Then, in each center, referring to the files of pregnant women, 46 people were randomly selected and they were invited to participate in the research project by phone. If a case did not wish to participate in the study or did not meet the inclusion criteria, the next case number would be selected as an alternative. After selecting the subjects, while obtaining informed consent and providing complete explanations of the purpose of the study, the relevant questionnaires were provided to them (demographic information, self-regulatory questionnaire, postpartum physical activity postponement questionnaire, diet postponement questionnaire). After delivery) and information was obtained from them before the intervention.

In the next step, the intervention group underwent training based on self-regulatory model. The trainings were held in 4 sessions during one month and the duration of each class was 60 minutes. The trainings were held in the form of classes of 5-10 people, in other words, the intervention group was divided into 6 class groups and all the same trainings were provided by fixed people (researcher and nutrition expert). Immediately after the full implementation of the educational intervention and also 6 weeks after the intervention, both experimental and control groups were evaluated again and questionnaires were administered.

Inclusion criteria include:

1. Having gestational diabetes based on the documents in the health record
2. Women with a history of gestational diabetes who are at least 12 weeks old
3. The identity of the landline or mobile phone in the health record
4. Willingness to participate in the study
5. Ability to read and write

Exclusion criteria include:

1. Reluctance to cooperate
2. Absence from a training session
3. History of receiving training in this field

Using the demographic information questionnaire (age, level of education, employment status, number of children, family income, previous history of gestational diabetes), the main research tools included three self-regulatory questionnaires, Miller and Brown, physical activity delay questionnaire and diet delay questionnaire. Mourning. Due to the fact that procrastination questionnaires had not been localized before, so in the present study, the validity and reliability of these tools were assessed, and the steps of its preparation are as follows. The same

method was used in the process of preparing and determining the validity and reliability of the deferrals. While obtaining the consent of the main designers of the questionnaires, the Forward-Backward method was used for the translation process of the questionnaires. In this method, first the questionnaire was translated into Persian by two people with a focus on midwifery and fluent in English, then a Persian version was prepared while comparing the two translated versions. This Persian version was provided separately to two other translators to be translated into English. Finally, in a meeting with the presence of midwifery experts and health education and health promotion, the necessary corrections were made in terms of appropriateness and compliance with the original text.

In order to assess the content validity index (Content Validity Index), the questionnaire was given to 8 specialists (4 midwives, including 1 master and 3 PhDs, 2 epidemiologists and 2 PhDs in health education). In order to determine the content validity index, three criteria of "simplicity and fluency", "relevance" and "clarity or clarity" were used using a 4-point Likert spectrum for each item (58, 59), which in this method Due to the number of experts, questions with a score less than 0.80 are eliminated. Face validity of the questionnaires was provided to 8 women with a history of gestational diabetes and the reported ambiguities were resolved.

In the next step, cronbach's alpha coefficient method was used to determine internal consistency and stability and Test-Retest method was used to confirm time reliability. In this method, questionnaires were given to 20 women with a history of pregnancy and Cronbach's alpha was determined. Then, ten days later, the questionnaires were given to the same people again and the correlation between the scores obtained from the two studies was determined by calculating Pearson correlation coefficient and coefficient internal correlation.

Material analysis

Descriptive statistics (frequency, percentage and mean) are used to describe the status and frequency of the subject in terms of demographic variables. So that each structure in both groups were compared. Chi-square test was also used to compare the two groups in terms of demographic variables. Analysis of variance was used to compare the means in the two independent groups and also to compare the means in the multiple procedures. To compare the mean structures of the self-regulatory model, the mean deferral of physical activity and the mean deferral of diet in three-time stages (before intervention, immediately after intervention and 6 weeks after intervention), repeated measures analysis of variance was used.

Findings

A total of 92 patients with a mean age of 29.93. 4.9 participated in the study. Most participants had middle and high school education (46.7%), housewife (77.2%), were overweight (52.2%), had 2 children (43.5%) and had an average income status (62%). The mean number of deliveries in the participants was 2.20. 0.92. Regarding the insurance status, 85.9% of the participants had at least one type of insurance, 90.2% had no history of gestational diabetes in the previous delivery, 90.2% reported their recent delivery to public hospitals and no One participant did not use the glucose test at home during pregnancy.

In the evaluation of participants before the intervention, the results showed that the mean SRQ scale in all subjects was 147.7 34 34.7 n = 92. The mean of acceptance, evaluation, commissioning, review, planning, implementation and measurement structures was Respectively 24/47 ; 4, 24 ± 22/24, 21/32 2 2.5, 20/67 7 5.7, 17.57 4 5.4, 13.82 5 5.5 and 8/5 It was 22.4 , 4 and it can be said that the acceptance structure and the implementation structure were the best and the weakest means, respectively. On the other hand, the mean postponement of physical activity and postponement of diets were 23.26 , 3.3 and 3.3, respectively. It was 20.93.

The mean of SRQ scores was directly and significantly related to education (P 00 001) and income (P = 0.001). In women with higher education and higher family income, the average SRQ status was also better.

There was a significant relationship between the mean scores of physical activity delay (EPS) at different levels of education (P≥001) and income (P = 0.001). The mean EPS was lower in women with higher education and higher family income (Table 4-4). The mean scores of diet postponement (HDPS) were also significantly different at different levels of education (P = 0.003) and the mean HDPS was lower in people with higher education. Although the mean HDPS was lower in people with higher income, but the difference was not significant at the level of 0.05 (P = 0.07).

Prior to the intervention, different statistical tests showed that the experimental and control groups were equal in terms of demographic variables as well as the mean scores of SRQ, EPS and HDPS and no significant differences were observed between the two groups.

In Pearson correlation analysis, the results showed that there was a significant inverse correlation between SRQ scores and EPS and HDPS instruments that Pearson coefficient was $r = -0.58$ and $r = 0.79$, respectively (P <0.0001)). Also, all SRQ constructs were found to have a direct and significant relationship with the whole

SRQ scale, which Pearson correlation coefficients are. No significant correlation was found between start-up structures ($P = 0.15$) and evaluation ($P = 0.07$) with acceptance structures.

Immediately after the intervention and also 6 weeks after the intervention, the scores of SRQ scale and its structures, the mean of EPS and HDPS in the experimental and control groups were re-measured. The result of Friedman test showed that in the experimental group, the mean of all three scales changed significantly, so that at the level of $P = 0.01$, the mean SRQ scores both immediately after the intervention (168.41 45 45.7) and at 6 weeks after the intervention (164.43 42 42.4) was more than before the intervention (149.15 33 33.8). On the other hand, the mean SRQ in the control group did not show a significant change.

The mean scores of EPS and HDPS were also significantly reduced so that the mean scores of EPS were significantly in the stage immediately after the intervention (15.54 8 5.8) and 6 weeks after the intervention (15.76 5 5.5). It was lower than before the intervention (23.11 \pm 3.1). There was a significant change in Haykeh in the control group ($P = 0.14$).

Also, the mean of HDPS scores was significantly ($P < 0.001$) in the immediate stage (14.48 \pm 3.1) and 6 weeks after the intervention (14.83 3 3.1) lower than the pre-intervention stage (3.3). 20.96 3), while no significant change was observed in the control group ($P = 0.17$). In addition to the above scales, the two groups of test and control were compared in terms of performing screening tests after the intervention and the results showed that the rate of screening in the experimental group was significantly ($P = 0.002$) higher than the control group. In the experimental group, 40 women participated in screening tests, while only 27 in the control group).

Discussion and conclusion

The aim of this study was to evaluate the effectiveness of self-regulatory model-based education on postpartum follow-up in women with gestational diabetes. Diet and postpartum screening test.

Findings and evaluations before the intervention showed the unfavorable status of SRQ scale scores, its structures, mean EPS and HDPS scores. The score obtained from the SRQ scale in the total number of participants was 46% of the total score. The scores obtained by the participants in the admission and evaluation structures were 53% of the total score, which obtained an average score from these two structures, but in the scores of the commissioning, review, planning, implementation and assessment structures, 47, 44, 40, 31 and 48%, respectively. The total score was possible, which in this

regard, the situation of the participants is unfavorable and weak. The lowest score of the participants was related to the execution structure.

It seems that the self-efficacy of these people in performing self-care and health behaviors is low and this issue causes the poor scores of these people in the implementation structure. On the other hand, the level of education of most participants in middle school and high school is (47%), which can be one of the main reasons for low scores in various structures of self-regulatory scale, especially in the construction structure. Santiago et al. Showed that pregnant women with Higher education levels have a more favorable self-regulatory status¹⁶. Education is directly related to the level of health literacy, responsibility for health, self-efficacy and health attitudes of individuals, and people with higher education have more self-care behaviors than people with lower education. On the other hand, the economic situation is directly related to receiving and benefiting from health services, regular visits, performing diagnostic tests and using medical services. In the present study, only 6.5% of the participants had a good income, and 31.5% reported a low income and 62% reported a moderate income. Economic factors seem to be among the determining factors in the health status of people and the group of pregnant women. The results of the present study showed the unfavorable status of the scores of the Physical Delay and Diet Delay scales. The mean scores of participants' physical activity delay before the intervention were 77% of the total possible score, while on this scale, a higher score means an unfavorable situation. It can be said that women with a history of diabetes in the present study were in a very unfavorable position in terms of physical activity. It seems that cultural and economic factors, the level of awareness and attitude of individuals play an important role in performing physical activities. These findings are consistent with the study of Shakeri et al.¹⁷

Regarding the average score of diet postponement, the situation was better than the postponement of physical activity, but the status of this item was also unfavorable, so that the average score of the participants was 70% of the total score. It seems necessary to provide more education and remove existing barriers to adopting healthy eating programs in women with gestational diabetes, and it is necessary to pay more attention to this issue in the programs of the Ministry of Health.

Prior to the intervention, the results of correlation analysis between the variables of self-regulatory scale, physical activity delay scale and diet postponement scale in all participants ($n = 92$) showed a strong and significant relationship between them. Pearson correlation coefficient between self-regulation scale and physical activity delay was -0.58, which indicates that people with higher self-regulation score have lower physical activity delay score and therefore are in better condition. On

the other hand, the relationship between self-regulation scale and diet postponement was statistically stronger as the Pearson correlation coefficient was -0.79, indicating that individuals whose scores were higher than the self-regulation scale were firmly on the diet scale scores. They are less, in other words, they have a better diet. This important finding is consistent with the study of Jalili et al., So that in the study, the mean of self-regulatory scores was recognized as one of the most important predictors of healthy eating behaviors¹⁸.

On the other hand, all structures of the self-regulatory model, with the exception of the acceptance structure, were inversely and significantly correlated with the scales of physical activity and diet. It seems that the acceptance construct as the first construct of the self-regulatory process does not have a significant correlation with the deferral scales, although due to the small sample size (92 participants) this can be attributed to random error. The results of the analysis 6 weeks after the intervention showed that the mean scores obtained from the self-regulatory scale in the experimental group increased by 15 points, in other words, before the intervention, the mean scores of participants was 47% of the total score of the scale, while 6 One week after the intervention, the participants' mean scores were 52% of the total self-regulatory scale. In addition, all structures of this model were associated with a significant increase.

The results of the present study showed that the educational intervention based on the self-regulatory model improves the mean scores of physical activity delay in women with a history of gestational diabetes. The statistical comment is very significant. However, no change was observed in the control group. On the other hand, the educational intervention based on the self-regulatory model had reduced the mean scores of the participants in the diet delay scale so that in the experimental group a decrease of 6 points was observed in the mean of this scale but in the control group no change was observed.

It seems that self-regulatory model training allows a person to consciously define and set goals and be able to control their emotions and thoughts in order to achieve

goals. The trained person interprets and examines his behaviors in terms of alignment with his goals, and if he sees the desired behavior as positive, he acquires it or continues it, but if he does not find a behavior that fits his goals, he cuts it off. This ability and skill were presented to the study group in the present study through training based on self-regulatory model and the results of analysis 6 weeks after the intervention show the effectiveness of these trainings. In the present study, 6 weeks after the intervention, all participants were screened for postpartum screening tests and the results showed that 40 (87%) of the experimental group had performed screening tests, but in the control group had only 27 patients (59%) who had taken the necessary steps to perform screening tests. In the control group, individuals probably received routine follow-up in health centers performed by health personnel, and in the intervention group, in addition to receiving these routine services, they underwent model-based training. In general, according to the findings of the present study, training according to the self-regulatory model improves the physical activity and nutritional status of women with a history of gestational diabetes and it is recommended that this model in the programs of the Ministry of Health and at different levels of Use clinical centers and provide training packages based on this model to the health team, especially midwives, nurses, health workers and even doctors.

Declaration

Hereby I declare that the present thesis is exclusively my own work, based on my research in the department Maternal and Health Child of at the Faculty of Nursing and Midwifery, Tehran University of Medical Sciences Tehran, Iran. I also declare that no part of this thesis has been submitted in this form to any other university or Institution of higher education for an academic degree. Information delivered from the published or unpublished work of others has been acknowledge in text and a list of references is given. All thesis is reserved for the Tehran University of Medicine Sciences. Criticism by mentioning the source is allowed.

Conflict of interest

The authors declare that there is no conflict of interest.

References

1. Beaglehole R, Bonita R, Horton R, Adams C, Alleyne G, Asaria P, et al. Priority actions for the non-communicable disease crisis. *The Lancet*. 2011;377(9775):1438-47.
2. Murray CJ, Lopez AD. Alternative projections of mortality and disability by cause 1990–2020: Global Burden of Disease Study. *The Lancet*. 1997;349(9064):1498-504.
3. Currie SL. Applying the Theory of Planned Behaviour to persons with prediabetes and diabetes: An examination of intention and behaviour for healthy eating and physical activity: Library and Archives Canada=Bibliothèque et Archives Canada; 2011.
4. Didarloo A, Shojaezadeh D, Ardebili HE, Niknami S, Hajizadeh E, Alizadeh M. Factors influencing physical activity behavior among Iranian women with type 2 diabetes using the extended theory of reasoned action. *Diabetes & metabolism journal*. 2011;35(5):513-22.
5. Ghazanfari Z, Niknami S, Ghofranipour F, Hajizadeh E, Montazeri A. Development and psychometric properties of a belief-based Physical Activity Questionnaire for Diabetic Patients (PAQ-DP). *BMC medical research methodology*. 2010;10(1):104.
6. Group UPDS. Tight blood pressure control and risk of macrovascular and microvascular complications in type 2 diabetes: UKPDS 38. *BMJ: British Medical Journal*. 1998;703-13.
7. Morris AP, Voight BF, Teslovich TM, Ferreira T, Segre AV, Steinthorsdottir V, et al. Large-scale association analysis provides insights into the genetic architecture and pathophysiology of type 2 diabetes. *Nature genetics*. 2012;44(9):981.
8. Gray A, Raikou M, McGuire A, Fenn P, Stevens R, Cull C, et al. Cost effectiveness of an intensive blood glucose control policy in patients with type 2 diabetes: economic analysis alongside randomised controlled trial (UKPDS 41). *Bmj*. 2000;320(7246):1373-8.
9. Redekop WK, Koopmanschap MA, Stolk RP, Rutten GE, Wolffenbuttel BH, Niessen LW. Health-related quality of life and treatment satisfaction in Dutch patients with type 2 diabetes. *Diabetes care*. 2002;25(3):458-63.
10. Norris SL, Engelgau MM, Narayan KV. Effectiveness of self-management training in type 2 diabetes. *Diabetes care*. 2001;24(3):561-87.
11. Panzram G. Mortality and survival in type 2 (non-insulin-dependent) diabetes mellitus. *Diabetologia*. 1987;30(3):123-31.
12. Rashidi k VRF, Pakgohar M. Factors associated with postpartum diabetes screening in women with GDM. Theses of Master, medicine tehran university. 2014.
13. Peyman N, Taghipour A, Mahdizadeh M, Esmaeely H. The effect of educational intervention based on self-regulation strategies on physical activity in women with type 2 diabetes. *Evidence Based Care*. 2013;2(4):7-17
14. Safarzade S, Behboodi MZ, Safari M. The Impact of Education on Performing Postpartum Exercise Based on Health Belief Model. 2014.
15. Capula C, Chiefari E, Vero A, Iritano S, Arcidiacono B, Puccio L, et al. Predictors of postpartum glucose tolerance testing in Italian women with gestational diabetes mellitus. *ISRN endocrinology*. 2013;2013.
16. Aghaie Meybodi HR, Azizi F. The assessment of relation between lipid distribution and weight change with diabetes incidence in a group of Tehran, district 13 population. *Research in Medicine* 2008, 32(2): 105-113
17. Shakeri M, Fekri S, Shahnavaz A, Shakibazadeh E. Effectiveness of a Group-based Educational Program on Physical Activity among Pregnant Women. *Hayat*. 2012;18(3):1-9.
18. Jalily M, Barati M, Bashirian S. Using social cognitive theory to determine factors predicting nutritional behaviors in pregnant women visiting health centers in Tabriz, Iran. *Journal of Education and Community Health*. 2015;1(4):11-21.