ORIGINAL PAPER

The Effect of Gestatıonal Dıabetes Mellıtus Traınıng upon Metabolıc Control, Maternal and Neonatal Outcomes

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Abstract

Background: Gestational Diabetes Mellitus is observed nearly 3-7% of all the pregnancies.
Objective: This article is a report of the effect of Social-Cognitive Theory and Health Promotion Model (HPM)-based patient education on metabolic control, maternal and neonatal outcomes of pregnancies who have gestational diabetes.
Methodology: The study adapted a quasi-experimental design, with a comparison between an intervention group and usual care group. The study was conducted in Obstetrics and Gynecology Clinic of Ege University Hospital in Turkey. Sixty pregnant women with gestational diabetes participated in this study. The data were collected between 01 February 2010-15 October 2010. The data collection tool compraised an Patient Identification Form, Metabolic Control Follows-up Form, Postpartum Evaluation Form and Gestational Diabetes and Management Achievement Test. The intervention group received Social-Cognitice Theory and Health Promotion Model-based oral education, while the usual care group received a routine follow-up. Data were analysed with Chi-square analysis, independent samples t test and Mann-Whithney-U test.
Results: There was no significant difference found in the pre and post-test mean value baseline of the Achievement Test score in the usual care group, however there was significant difference found in the pretest and post-test mean value baseline of the Achievement Test score in the intervention group. Also, there was no significant difference between the groups for postpartum maternal and neonatal outcomes, first and fifth minute apgar scores and lenght staying at hospital of the baby and mother ($p>.05$).
Conclusions: The results of the study have shown that Social-Cognitive Theory and HPM-based education increase knowledge level of the women with GDM.

Keywords: Gestastional diabetes, Health Promotion Model, maternal and neonatal outcomes, nursing, education

Introduction

Gestational Diabetes Mellitus; it is described as "the glucose tolerance disorder in different degree that firstly appear or recognized during pregnancy" (ACOG, 2001; ADA 2003). Gestational Diabetes Mellitus is observed nearly 3-7% of all the pregnancies. In the United States of America 7% of all the pregnancies, anually more cases than 200,000 are complicated by gestational diabetes (ADA, 2003). In Australia it is estimated that GDM rate is between 5.2% and 8.8% (Cheung & Byth, 2003).However the studies made in our country about GDM is limited, prevalence of GDM in the studies was determined between 1.23% and 9.2% (Akış, Pala & Seçkin, 2008; Erem et al., 2003; Gürel et al., 2009; Akbay et al., 2010; Turgut et al., 2011; Özyurt et al., 2013).

The detectionof GDM is important because ofits associated maternal and fetal complications. Treatment with medicalnutrition therapy, close monitoring ofglucose levels, and insulin therapy ifglucose levels are above goal canhelp to reduce these complications (Setji, Brown & Feinglos, 2005). Fetal complications include macrosomia, neonatal hypoglycemia, perinatal mortality, congenital malformation, hyperbilirubinemia, polycythemia, hypocalcemia,and respiratory

distress syndrome (Dang, Homko & Reece 2000; Sheffield et al., 2002; Schmidt et al., 2001). Maternal complications associatedwith GDM include hypertension,preeclampsia, and an increased risk ofcesarean delivery (Setji, Brown & Feinglos, 2005; Schmidt et al., 2001).

The results of a resent study showed a two-fold increase in the frequency of macrosomia among infants of mothers with GDM compared with the non-diabetic controls (Wahabi et al., 2013). Another study that included 25 505 pregnant women at 15 centers in nine countries has confirmed that hyperglycemia at levels even lower than that for diabetes mellitus is associated with adverse pregnancy outcomes in a linear relationship (Metzger et al., 2008). Outcomes of pregnancy in women with GDM in other study showed significantly raised incidences of hypertensive disorders, CS, LGA neonates, macrosomia and NICU admissions for >24 hours compared with the non-diabetic mothers who delivered at the hospital (Gasim, 2012).

Conceptual Framework

Bandura's Social-Cognitice Theory and Pender's Health Promotion Model (HPM) guided the present study's design. The social cognitive approach works on the demand side by helping people to stay healthy through good self-management of health habits. If people lack awareness of how their lifestyle habits affect their health, they have littlereason to put themselves through the misery of changing the bad habits they enjoy. They arelectured more than they want to hear about their unhealthy practices. Applications of theories ofhealth behavior have tended to assume adequate knowledge of health risks. It is usually high. Knowledge creates the precondition for change. But additional self-influences are needed toovercome the impediments to adopting new lifestyle habits and maintaining them (Bandura, 1998; Bandura, 2004).

The health promotion model notes that each person has unique personal characteristics and experiences that affect subsequent actions. The set of variables for behavioral specific knowledge and affect have important motivational significance. These variables can be modified through nursing actions. Health promoting behaviors should result in improved health, enhanced functional ability and better quality of life at all stages of development (Pender et al, 2002). The studies to promote health aim to provide people with the conscious to improve and control their own health and give them the ability to have a whole health potential. So it contains the improvement of conscious of healthy life, to make them be aware of the fact that it is their duty to save their health by developing self-efficiency perception and as a result applying the behaviours that saves and improves health by avoiding risky behaviours. Therefore, to initiate and maintain behavior change in the individual's the planning of nursing interventions to related improve perception of self-efficacy is important (Pender et al., 1992).

Gestational diabetes diagnose is generally established in third trimester and a specific and timely treatment is required. It is asserted that to encourage lifestyle changes including training and family support in the care of diabetic pregnant a multidisciplinary approach must be accepted. The studies showing nursing attempt efficiency in improving diabetic patient results are gradually increasing. However much more studies are required about this subject.

Purpose

The aim of this study was to examine the effects of Bandura's Social-Cognitive Theory and Pender's Health Promotion Model-based patient education on metabolic control, postpartum maternal and neonatal complications of pregnants of with gestational diabetes. It tested the following hypotheses:

H1: Giving Social-Cognitive Theory and HPM-based education to the intervention group will provide a statistically increase Gestational Diabetes and Management Achievement Test mean scores than that of the usual care group.

H2: Giving Social-Cognitive Theory and HPM-based education to the intervention group will provide a statistically significance decrease metabolic control follows-up mean scores than that of the usual care group.

H3: Giving Social-Cognitive Theory and HPM-based education to the intervention group will provide decrease maternal and neonatal complications than that of the usual care group.

Methodology

Design

The study adapted a quasi-experimental design, with a comparison of two groups of pregnant women with GDM – an intervention group and usual care group.

Setting and samples

The study was conducted in the Obstetrics Clinic of a university hospital in western Turkey. The inclusion criteria were at least primary school graduate, between 28-32. pregnancy weeks, having singular pregnancy, aged between 18-40, diagnosed with gestational diabetes and willings to collaborate in the study. The exclusion criteria were diagnosed with diabetes prepregnancy, having multiple pregnancy, treated for steroid, having chronic hypertension requiring medicine during their pregnancy. To prevent selection bias, according to the order of hospitalizaton before usual care group after intervention group were included in the study. Intervention and usual care groups have been matched in terms of age (age group), education, level of income (income group), working condition, number of pregnancy, week of pregnancy, pre-pregnancy BMI (classification), diabetes story in family and diabetes classification (A1,A2). Dependent variables of the study are Gestational Diabetes and Management Achievement Test mean scores, metabolic control follows-up scores and postpartum maternal and neonatal outcomes scores. Independent variables: age, educational status, working status, income level, the number of pregnancies, body mass indeks, family history of diabetes.

10 pregnants in their 28-32. pregnancy week suitable for the criteria of the study and diagnosed with gestational diabetes and admitted to the Obstetrics Clinic of Ege University Hospital were taken respectively into the usual care group and ten pregnants were taken into the intervention group. The sample size determined based on an analysis of test power before the study began. The two-sided Mann-Whitney test was used for the power analysis (Özdamar, 2004; Sümbüloğlu & Sümbüloğlu, 2000). The parameters used were alpha (0.05) and power level (83%). The results showed that the sample size (n) must be nine for each group. Sixty pregnants have been taken into the study sample by taking into consideration the parametric test measures.

Measures

The data reported in this study were collected between 01 February 2010-15 October 2010 using a pregnant women with GDM identification form to determine socio-demographic and obstetric characteristics, Gestational Diabetes and Management Achievement Test, Metabolic Control Follows-up Form and Postpartum Evaluation Form.

Patient Identification Form

Patient identification form consisting of the questions related to women's socio-demographic situation (age, education condition, income level, working condition, year of marriage), obstetric characteristics has been prepared by the researchers in line with the literature and it is totally 40 questions.

Metabolic Control Follows-up Form

This form has been formed according to the literature information in order to examine metabolic control values such as preprandial and postprandial blood glucose levels.

Gestational Diabetes and Management Achievement Test

This test has been developed by the researchers according to the literaure to determine the level of knowledge of pregnants about gestational diabetes (Şirin, 2005; Olds et al., 2004; Özeren, 2007; Ladewig, London & Davidson, 2006; Çoban, 2008; Evrüke, 2008; Ergeneli, 2008; Taşkın, 2009).

Training Manual about Gestational Diabetes and Management

"Training Manual about Gestational Diabetes and Management" is a training book prepared by the researcher in line with the literature. It includes the defining of diabates mellitus and its types, definition of gestational diabetes, its prevelance, its pathophysiology, risks factors, maternal risks, fetal-neonatal risks, antepartum care (nutrition and diet, exercise, self blood glucose follow-up, applying insulin, hypoglycemia and defining hypoglycemia, following fetal actions), intrapartum care, postpartum care, healthy lifestyles behaviours (health response, moral care, relationship between individuals, stressmanagement) (ADA, 2003; Şirin, 2005; Olds et al., 2004; Özeren, 2007; Ladewig, London & Davidson, 2006; Çoban, 2008; Evrüke, 2008; Ergeneli, 2008; Taşkın, 2009).

Postpartum Evaluation Form

In this form there are questions including neonatal results (the first minute apgar score, fifth minute apgar score, the condition of the baby's being taken to intensive care unit,

congenital malformation, respiratory distress syndrome, macrosomia, neonatal hypoglycemia, neonatal hyperbilirubinemia, obstetric trauma, the length of the baby's and mother staying at hospital).

Nursing intervention

The patient data were collected using the face-to-face interview technique. Information related to the study objective and the gestatioanl diabetes trainig programme was provided during the individual interview. The GDM patients received patient education in light, noiseless room (patient trainig room) of theObstetrics and Gynecology Clinic. Their questions were answered after they had received the educational booklet and an explanation of its contents.

In the baseline collections, intervention group were applied Patient Identification Form, Metabolic Control Follows-up Form and about Gestational Diabetes Management Achievement Test (pre-test). Contrary to usual care group, participants in the intervention group weregiven Training Manual about Gestational Diabetes and Management. GDM education programme that was two sessions in a day (four days period of base-line training)was applied by the investigators using both oral education and an education booklet and metabolic control follows-up levels were recorded during pre-test and post-test. The investigators prepared the educational booklet distributed to the participants, following GDM and published literature. In the fist interview, usual care group were applied Patient Identification Form, Metabolic Control Follows-up Form and Gestational Diabetes and Management Achievement Test (pre-test). Usual care given by nurses to pregnants with GDM in ObstetricsClinic consists of blood glucose monitoring, insulin use, assessment of adaptation to diet. After fifteen days in the second interview, both intervention and usual care group were applied Gestational Diabetes and ManagementAchievement Test(post-test). In birth (final colections) was applied Postpartum Evaluation Form. After final collections usual care group was given Education Booklet about Gestational Diabetes and Management.

Ethical considerations

To carry out the study; permission of Scientific Ethic Institute of Nursing Academy of Ege University has been gotten. Official permission has been gotten from Obstetrics Clinic of Ege University where the study has been planned to be applied. Besides, an explanation about the study was made to the pregnants taken into the scope of the study by the researcher and their inscribed consent has been taken.

Statistical Analysis

Data were analysed using Statistical Package for the Social Sciences Version11.5 (SPSS Inc., Chicago, IL, USA). Percentage, frequency distribution, mean, and standard deviation were used to describe demographic variables. Chi-square tests were employed to detect the differences between the intervention and usual care group for socio-demographic, obstetric characteristics and postpartum evaluation results. *t*-test in independent groups (independent samples t test) were used to compare the means of continuous variables (i.e.,pre and post-training FBG and TBG values of the pregnants, pre and post-test mean scoresin the intervention and usual care groups (Sümbüloğlu & Sümbüloğlu, 2000; Özdamar, 2007). Level of significance was set at $p < .05$.

Results

The pregnants in each group were comparable in age group, educational status, working condition, income level and year of the marriage. Comparison of intervention and usual care groups in accordance with the identifying characteristics of pregnants are presented in Table 1. Significantdifference was found between the two groups for the working condition ($p < .05$).

Nostatistically significant difference was found in usual care group (p=.063), while there has been found statistically a significant difference inintervention group (p=.001) in terms of pre and post-test (Table 2).In Talbe 3, it is determined that while statistically significant difference was found pre-education and post-education preprandial blood glucose valuesin the

intervention group, no statistically significant difference was found in usual care group.

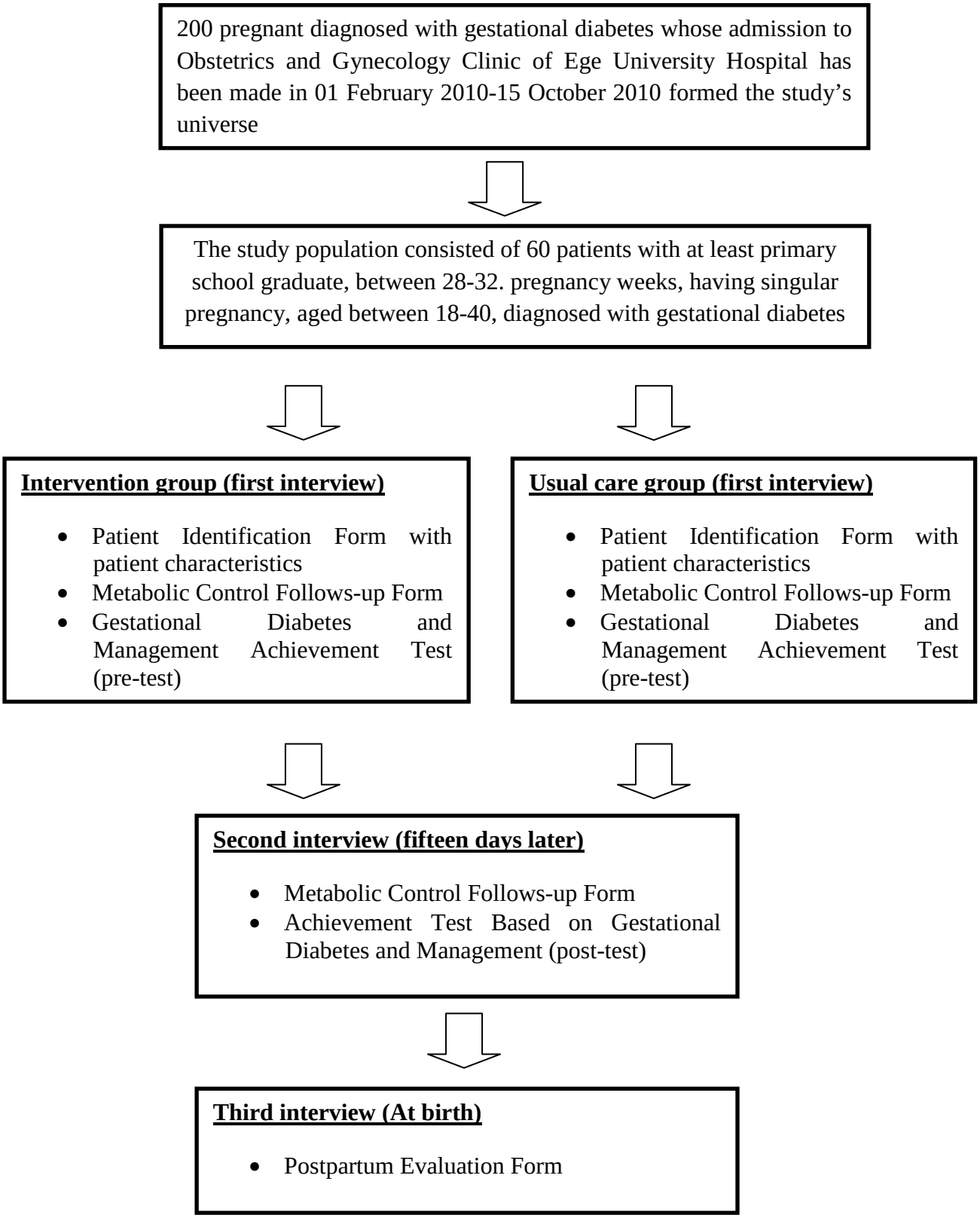

Figure 2.Study management flow chart

Table 1. Comparison of Demographics Characteristics in Intervention and Usual Care Groups (n=60)

	Intervention group	%	Usual care group	%	χ^2	p
Age group						
25-29 age	8	26.7	8	26.7		
30-34 age	15	50.0	14	46.6		
35 and over	7	23.3	8	26.7	0.101	.951
Educational status						
Primary school graduate	5	16.7	6	20.0		
Secondary school graduate	5	16.7	2	6.6		
High school graduate	7	23.3	11	36.7	2.432	.488
Faculty/academy graduate	13	43.3	11	36.7		
Working condition						
Working	9	30.0	9	30.0	0.000	.000
Not working	21	70.0	21	70.0		
Income level						
Income is less than expense	6	20.0	7	23.3		
Income is equal to expense	18	60.0	19	63.3		
Income is much than expense	6	20.0	4	13.4	0.504	.777
Year of the marriage						
1-5 years	15	50.0	14	46.7		
6-10 years	7	23.3	7	23.3		
11-15 years	5	16.7	6	20.0	24.800	.099
16 and over	3	10.0	3	10.0		

Table 2. Intervention and Usual Care Group Pregnants' Gestational Diabetes and Management Achievement Test Pretest and Posttest MeanValues and Comparison of Point Difference Means (n=60)

Group	Pre-test X± SS	Post-test X± SS	t	p
Intervention group	10.83±3.72	16.96±2.93	-15.778	.001
Usual care group	10.86±3.01	11.66±3.44	-1.934	.063

Table 3. Intervention and Usual Care Group Pregnants' Pre-education and Post-education Preprandial Blood Glucose Follows-Up and Comparison of Point Difference Means (n=60)

Pre-education and Post-education Blood Glucose Follows-up	Intervention group		Usual care group	
	t	p	t	p
Preprandial	2.728	0.011	0.183	0.856
Postprandial	2.887	0.007	0.329	0.745

Table 4. The Distribution of Intervention and Usual Care Group Pregnants' Apgar Score and Length of Staying at Hospital Means of Mothers and Babies

	Intervention group	Usual care group	Z	P
	Median± IR	Median± IR		
First minute Apgarscore	7.00±1.00	7.00±2.00	-1.198	0.231
Fifth minute Apgars core	9.00±2.00	9.00±1.00	-1.708	0.088
Lenght of staying at hospital of babies	3.00±1.00	3.00±4.00	-0.695	0.487
Lenght of staying at hospital of mothers	3.00±1.00	3.00±4.00	-0.654	0.513

Table 5. Intervention and Usual Care Group Pregnants' Postpartum Maternal and Neonatal Complications and Comparison of Point Difference Means (n=60)

	Intervention group	%	Usual care group	%	χ^2	p
Congenital malformation						
Yes	1	3.3	2	6.7	0.351	1.000
No	29	96.7	28	93.3		
Respiratory distress syndrome						
Yes	8	26.7	11	36.7	0.693	0.405
No	22	73.3	19	63.3		
Macrosomia						
Yes	1	3.3	2	6.7	0.351	1.000
No	29	96.7	28	93.3		
Neonatal hypoglycemia						
Yes	9	30.0	14	46.7	1.763	0.184
No	21	70.0	16	53.3		
Neonatal hyperbilirubinemia						
Yes	3	10.0	1	3.3	1.071	0.612
No	27	90.0	29	96.7		
Obstetric trauma						
Yes	0	0.00	1	3.3	1.017	1.000
No	30	100.00	29	96.7		
Preeclampsia						
Yes	1	3.3	2	6.7	0.351	1.000
No	29	96.7	28	93.3		

The first and fifth minute apgar mean scores of the babies were found as 7.00±1.00, 9.00±2.00 in intervention group and 7.00±2.00, 9.00±1.00in usual care group. The average length of staying of the babies is 3.00±1.00 day in intervention group and 3.00±4.00 dayin usual care group. No statistically significant difference was found between intervention and usual care groups in terms of the first minute apgar (p>.05), fifth minute apgar (p>.05), and the length of baby (p>.05) and mother's (p>.05) staying at hospital (Talbe 4).

Intervention and usual care groups are examined for postpartum maternal and neonatal outcomes. There has not been found a significant difference between groups in terms of congenital malformation (χ^2=0.351, P>.05), respiratory distress syndrome (χ^2=0.693, p>.05), macrosomia (χ^2=0.351, p>.05), neonatal hypoglycemia (χ^2=1.763, p>.05), neonatal hyperbilirubinemia (χ^2=1.071, p>.05), obstetric trauma (χ^2=1.017, p>.05) and preeclampsia (χ2=0.351, p>.05) (Talbe 5).

Discussion

This study, performed with the objective of characterizing the effect of patient education according to HPM and Social-Cognitice Theory in pregnants with GDM, showed patient education contributed to a major improvement in Gestational Diabetes and Management Achievement Test mean scoresand metabolic control follows-up scoresin intervention group, hovewer didn't contribute in usual care group. This resultconfirms the hypothesis of the study. Starting from these findings, it is believed that the education given to intervention group is effective in the blood glucose regulation and to increase the level of knowledge about GDM of the pregnants.

In this study, no statistically significant difference was found for the first minute and fifth minute apgar scores between intervention and usual care group. Research findings show similarities with literature. In the study conducted on 58 pregnant women by Homko et al. (2002),

no statistically significant difference was found for the first minute and the fifth minute apgar scores between self-monitoring of blood glucose group and periodic monitoring group.

In ourstudy, a statistically significant difference was not found the lenght of stayingat hospitalof baby and mother.The literature supports the results of the research. This finding compares favorably with that of Mendelson et al. (2008), who reported the length of staying athospital has been determined as 3.4 daysof baby and as 3.3 days of mother in the Parish Nurse Intervention Programme group, in the Care as Usualgroup has been determined as 3.2 days of baby and as 3.2 days of mother. American Academy of Pediatrics and American Gynaecology and Obstetric Association has offered to stay at hospital for 48 hours after deliveries without complication, and for 96 hours after cesarean delivery (Eaton, 2001). However, World Health Organization has declared that maternal and neonate should be discharged from hospital to be protected from hospital infections in the earliest period (WHO, 1998).Nonetheless, in Turkey there is no a standard application related to the lenght of hospital stay of maternal and neonate after delivery, early period discharge understanding is adopted.

The results of this study showed that the frequencies of maternal and neonatal complicationsdid not differ betweenthe two groups. This result don't confirm the hypothesis of the study.Social-Cognitive Theory and HPM based education given to intervention groupdon't decrease on their maternal and neonatal outcomes. In one study, it is determined that a statistically significant difference was not found for neonatal hypoglycemia, hyperbilirubinemia, respiratory complications, IUFD, NICU admission between self-monitoring of blood glucose group and periodic monitoring group (Homko et al., 2002). According to the another study, no statistically significant difference was found for preeclampsia, macrosomia, hyperbilirubinemia, hypoglycemia and admission to NICU between groups (Fan et al., 2006). In the study by Crowter et al. (2005) were not found statistically significant differencein terms of hypoglycemia and respiratory distress syndrome between intervention and routine care group, hovewer for macrosomia statistically significant difference was found between intervention and routine care group. Macrosomia, respiratory distress syndrome, hypoglycemia, shoulder dystocia, and the associated birthinjuries are the main neonatal morbidities associated withGDM.The management of GDM has altered markedly in recent years. It is based on universal screening of blood sugar and to establish a tight control of serum glucose levels round the clock in these patients through serial measurements of blood glucose by home monitoring. Adequate control of blood sugar has been associated with improved perinatal outcome (Şendağ et al., 2001). There is strong evidence which suggests thatthe reduction of complications can be significantly achieved byaggressive treatment of GDM.

Limitations

There are several limitations to our study, namely that (a) pregnants were not randomized to the intervention and usual care groups, (b) before usual care group after intervention group were included in the study to exposure to each other the same clinic.

Conclusion

The current study promotesthe effect of patient education according to HPM and Social-Cognitice Theory in pregnants with GDM. According to Pender in the training consider all these factors is possible to give healthy lifestyle behaviors (Damrosch, 1991). The healthy lifestyle has been defined as individual's controlling of all of his or her behaviours effecting health, choosing and regulating the suitable behaviours to their own health status (Pender et al., 2002). According to Pender healthy lifestyle behaviours can be defined as spiritual improvement, health responsibility, exercise, nutrition, interpersonal relations and stress management. Metabolic control of pregnants with GDM had been increased patient education according to HPM and Social-Cognitice Theory, too. On the other hand, it is determined that education according to HPM and Social-Cognitice Theory is not effective on postpartum maternal and neonatal outcomes. It is thought that many factors which affect mother and fetus health in pregnancy together GDM are present.

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