The Effect of an Education and Counseling Program on Maternal/Neonatal Outcomes in Pregnant Women at Risk of Preeclampsia

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Objective: To evaluate, in pregnant women at risk for preeclampsia, the effect of an education and counseling program on healthy lifestyle behaviors, self-efficacy, and maternal/neonatal outcomes.

Methods: This study had a randomized controlled trial design and was conducted with 132 pregnant women at risk of preeclampsia and attending an antenatal clinic for routine care. The intervention group received education and counseling focused on preventing preeclampsia and were given a preeclampsia booklet; the control group received standard prenatal care. The members of the 2 groups were seen 4 times during their pregnancies, and once after giving birth. Data were gathered with the Health Promoting Lifestyle Profile-II, the Self-Efficacy Scale (SES), pregnant woman and fetal follow-up forms, and a postpartum data-collection form. Permission from the ethics committee was obtained for the study.

Results: Education and counseling about preeclampsia had a statistically significant effect on healthy lifestyle behaviors ($P < .008$). However, we found no statistically significant differences in the total SES scores ($P > .0125$), systolic and diastolic blood pressure averages, edema status, or feeling the baby move ($P > .05$). We found differences in terms of physical activity in the first and third follow-ups, and in terms of breathing exercises in the first, second, and third follow-ups ($P < .05$). Preeclampsia developed in 4 of the pregnant women (7.6%) in the control group but not at all in the intervention group.

Conclusion: A preeclampsia education and counseling program could help to develop healthy lifestyle behaviors in pregnant women at risk of preeclampsia.

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Key words: Pregnancy, Preeclampsia, Education, Healthy lifestyle, Self-efficacy

Preeclampsia affects 3% to 5% of pregnancies and is a pregnancy-specific syndrome (1,2); it leads to maternal, fetal, and neonatal morbidity and mortality, worldwide, especially in developing countries (1). If not treated, it can lead to serious complications, such as pulmonary edema, eclampsia, stroke, placental abruption, and acute renal diseases (3). Increased risk of low Apgar scores, neonatal encephalopathy, seizures, admission to neonatal intensive care, and neonatal death caused by preterm birth and low gestational age is observed in the babies of mothers with preeclampsia (1,3).

Since the etiology and pathogenesis of preeclampsia are unclear (4), it is very important to investigate the risk factors of preeclampsia to identify pregnant women who are at risk and ensure adequate observation, follow-up, and care (5). The following are known risk factors for preeclampsia: being of advanced maternal age, being primiparous, having a family history of preeclampsia, having had a previous preeclamptic pregnancy, having an autoimmune disease, having a history of thrombophilia, being diabetic, having had an in vitro fertilization, having had a multifetal pregnancy, and being obese (6,7).

Basic information related to health—and especially to preeclampsia—can be difficult for members of the general population to understand (7). Increased knowledge about preeclampsia could help pregnant women to recognize its early symptoms and negative signs and may lead them to seek treatment earlier in their pregnancy (2). As much as half of the serious consequences of maternal symptoms of preeclampsia might be preventable with appropriate education and counseling (8,9). Health-related quality of life is affected negatively by

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preeclampsia (1). In addition, healthy lifestyle behaviors can reduce or prevent the increased risk of preeclampsia in high-risk patients (10). Allen and colleagues (2014) stated that pregnant women might be able to reduce their risk of preeclampsia by making dietary and other lifestyle changes (11).

Many studies have investigated the effect of medical treatment in terms of improving outcomes in women with preeclampsia; unfortunately, limited studies have explored the consequences of education and counseling in pregnant women, in this context (2,3,8).

We believe that education and counseling for preeclampsia—including lifestyle modifications (increasing physical activity, learning to cope with stress, seeking out and following appropriate nutritional advice)—may contribute to the prevention of preeclampsia and may increase the awareness of at-risk pregnant women; more complete knowledge will—we believe—help these women to recognize the signs of preeclampsia and, it is hoped, encourage them to follow-up at home. The objective of this intervention was to evaluate the effects of an education and counseling program on maternal and neonatal outcomes and healthy lifestyle behaviors and determine the self-efficacy levels of the women in the at-risk group.

Methods

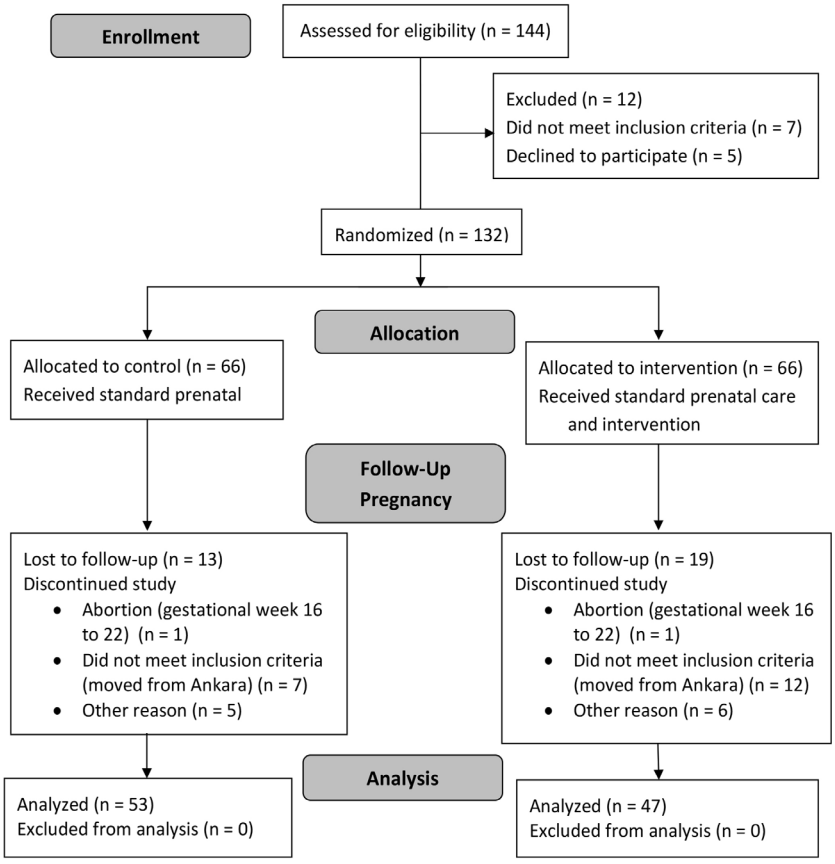
Study Design

This study was a single-center, single-blinded, parallel-group, prospective randomized controlled trial. In this study we intended to compare the effects of a "preeclampsia education and counseling" during pregnancy with "standard antenatal care".

We recruited the pregnant women, who were in their 12th to the 20th gestational weeks, at an obstetrics outpatient clinic at the Gulhane Training and Research Hospital; they were seeking routine antenatal care (May 2015 through March 2016) in Ankara, Turkey, at the previously mentioned hospital. The obstetrics department at this hospital performs about 1000 deliveries/year. The inclusion criteria were that a potential participant needed to be in her 12th to the 20th gestational week and had to have at least 1 of the following risk factors discussed in the literature (3,5,7): be experiencing her first pregnancy, be over 40 or under 18, have a history of preeclampsia, have a family history of preeclampsia (mother and/or sister/s), have a prolonged interval between pregnancies (over 10 years), have a high body mass index (35 or over), have high diastolic blood pressure (over 80 mmHg in at least 3 consecutive measurements), be experiencing a multiple pregnancy (twins+), have chronic hypertension and kidney disease, have chronic or pregnancy-related diabetes, have antiphospholipid antibodies, have systemic lupus erythematosus, be experiencing intrauterine growth retardation, be carrying a child with fetal development disorder, or having had a stillbirth of unknown cause. The exclusion criteria included being Turkish illiterate, not carrying at least 1 risk factor of preeclampsia, planning to have follow-up care and give birth in different hospitals, and not consenting to participate in the study. During the study period, some women withdrew or were withdrawn from the study for reasons such as having a miscarriage, moving to another city, changing the hospital for follow-up care, or giving birth.

We calculated the sample size using the program G*Power 3.1.7; a comparison was made of the difference between group mean scores on a self-efficacy scale (12). We found that to achieve a 95% confidence interval and a statistical power of 80% and to determine mean effect size, each of the study groups would have to consist of 64 pregnant women. The study sample included 132 pregnant women (66 each in the control and intervention groups). At the end of the study, when the post hoc power analysis was calculated with an alpha error margin of 5%, with the power being 80%, it was concluded that a sample size of 100 would have been sufficient to complete the study.

Figure 1. CONSORT Flow Diagram



Randomization and Participation

A total of 144 pregnant women were eligible at the beginning of the study. Later, 12 women withdrew or were withdrawn from the study, the reasons and numbers being as follows: 5 declined to participate and 7 decided to give birth at another hospital. A total of 132 pregnant women who met the inclusion criteria agreed to participate and were randomized, as shown in the Figure 1 flow chart.

The 132 women were randomly allocated (ratio 1:1) into either the control group or the intervention group, following an allocation concealment process that made use of a computer-generated number table. After the randomization process, 13 pregnant women in the control group and 19 pregnant women in the intervention group withdrew or were withdrawn from the study for various reasons, including moving to another city and suffering a miscarriage. The study was completed with 47 women in the intervention group and 53 in the control group (Fig. 1).

Permission was obtained from the ethics committee of the Gulhane Training and Research Hospital, with the study being assigned the code 1491-2658-13/16484-303. The study was registered with ClinicalTrials.gov and was given the number NCT04036786. All the procedures were conducted in accordance with the ethical standards of the Helsinki Declaration. The women who met the inclusion criteria and who were at risk for preeclampsia were informed of the study procedure, after which, informed consent was obtained from those who decided to participate.

Data collection

To collect the data, forms were used 5 times each.

Assessment (at 12–20 gestational weeks): To the members of both the intervention and the control groups, a personal information form (developed by the researchers), the Health Promoting Lifestyle Profile-II (HPLP-II) scale, the Self-Efficacy Scale (SES), and pregnant woman and fetal follow-up forms (developed by the researchers) were administered.

First follow-up (at 23–28 gestational weeks), second follow-up (at 29–34 gestational weeks), and third follow-up (at 35–40 gestational weeks): In both the intervention and the control groups, the HPLP-II scale, the SES, and the pregnant woman and fetal follow-up forms were administered. In the intervention group, a daily follow-up form (developed by the researchers) was employed, as well.

Postpartum follow-up: In both the intervention and the control groups, a postpartum data-collection form (developed by the researchers) was administered in the hospital before discharge. The data consisted of information given by the women and information in their files.

Measures

The personal information form that was developed by the researchers consisted of questions about the woman's age, education, work, and obstetric history; it also explored her history of chronic disease (if any) and whether she smoked or drank alcohol.

In 1987, Walker et al. developed the first version of the HPLP scale; it was revised in 1996 (13). Tested by Behar et al., the Turkish version of the HPLP-II was found to have high levels of validity and reliability. The scale contains 52 items divided among 6 dimensions and uses a 4-point Likert scale, whose responses range from 1, "never," to 4, "routinely." The HPLP-II's possible total score ranges from a low of 52 to a high of 208.

The Cronbach's alpha coefficient of the scale was .92 (14); in our study, it was .91. The HPLP-II has previously been used with pregnant women (12,15,16), pregnant women with preeclampsia (17), and pregnant women with preeclampsia risk (10).

We also used the SES, the first version of which was developed in 1982 by Sherer et al. The validity and reliability of the Turkish version of the scale were determined in 1999 by Gozum and Aksayan (18,19). This scale consists of 23 items and uses a 5-point Likert scale, with 1 indicating "doesn't describe me," and 5 indicating "describe me very well." The possible score can range from 23 to 115. The Cronbach's alpha coefficient of the scale was .89 (18); that of our study was the same. The scale has previously been used with pregnant women (15,20).

The pregnant woman and fetal follow-up forms that were developed by the researchers consisted of questions that explored blood pressure, the presence of edema, the maternal perception of fetal movement, the physical activity of the mother, and whether or not the mother used breathing exercises to cope with stress.

The daily follow-up form that was developed by the researchers consisted of questions that explored the taker's blood pressure, weight, edema (if present), perception of infant movement, and problems at home (if present).

The postpartum data-collection form that was developed by the researchers consisted of questions about maternal outcomes (preeclampsia development status, prenatal and postnatal blood pressure, and laboratory findings) and neonatal outcomes: the first- and fifth-minute Apgar scores, the baby's need (or not) for intensive care, respiratory distress (if present), birth weight, and intrauterine growth retardation (if present).

Interventions

Preeclampsia education and counseling program. We prepared a preeclampsia education booklet in accordance with the literature (3,7,8,21). The contents were guided by the opinion of 4 experts: a perinatologist who was an associate professor of obstetrics, 2 associate professors of obstetrics and gynecology nursing, and a 1 expert who was a specialist in obstetrics and gynecology nursing.

The booklet was written in simple language and contained many illustrations for ease of understanding. The booklet's contents were divided into the following sections: a definition of preeclampsia and the risk factors for its development, the possible effects of preeclampsia on the mother and the fetus,

Table 1. Descriptive characteristics of pregnant women

Age	Intervention (n = 47)		Control (n = 53)		Test value	P[a]
	n	%	n	%		
20–24	7	14.9	5	9.4	3.493	.32
25–29	18	38.3	29	54.7		
30–34	11	23.4	7	13.3		
35 and over	11	23.4	12	22.6		
Education						
Primary School	5	10.6	4	7.5	2.060	.35
Middle School	10	21.3	18	34.0		
High School/ University	32	68.1	31	58.5		
Work Situation						
Worker	18	38.3	15	28.3	1.126	.28
Unemployed	29	61.7	38	71.7		
Gravidity						
1	28	59.6	32	60.4	3.944	.26
2	8	17.0	4	7.5		
3	6	12.8	13	24.6		
4 and above	5	10.6	4	7.5		
Live Children						
0	30	63.8	33	62.3	0.026	.87
1–2	17	36.2	20	37.7		
Miscarriage						
0	42	89.4	49	92.5	0.291f	.73
1	5	10.6	4	7.5		
0	39	83.0	45	84.9	0.069	.79
1, 2, 4	8	17.0	8	15.1		
Stillbirths						
0	44	93.6	51	96.2	0.357f	.66
1	3	6.4	2	3.8		
Outcome of Previous Pregnancy						
Nulliparous	28	59.6	32	60.4	5.133	.16
Vaginal Birth	14	29.8	8	15.1		
Cesarean	4	8.5	10	18.8		
Miscarriage/D&C	1	2.1	3	5.7		
Chronic Disease						
Yes	8	17.0	6	11.3	0.672	.41
No	39	83.0	47	88.7		
Smoking						
Smoker	2	4.2	3	5.7	2.862	.23
Non-smoker	42	89.4	41	77.3		
Quit smoking during pregnancy	3	6.4	9	17.0		
Alcohol consumption						
Non-consumer	46	97.9	51	96.2	0.232f	1.00
Quit drinking alcohol during pregnancy	1	2.1	2	3.8		

X^2 = Pearson's chi-square; f = Fisher's exact test; [a]There were no significant differences between groups; P > .05

recommendations for prevention (diet, rest, study, exercise, techniques for coping with stress), how to self-monitor symptoms (blood pressure, weight, edema, counting fetal movements) at home, danger signs, basic information on hypertensive drug use during pregnancy, the risk of recurrence in subsequent pregnancies, and the sequelae of preeclampsia.

The pregnant women in the intervention group were given, in addition to the standard prenatal care, 4 training and counseling session using the preeclampsia education booklet and following the booklet's sections. The preeclampsia education and counseling program mainly aimed to promote healthy lifestyle behaviors, to increase self-efficacy levels, and to draw attention to early danger signs. The education and counseling sessions took approximately 20 minutes and took place in a private room. After the assessment, the research team made sure that there were at least 4 weeks between each of the 2 follow-ups. In the assessment and all the follow-ups in the intervention group, data were collected with the HPLP-II, SES, and the pregnant woman and fetal follow-up forms. Additionally, in the intervention group, the daily follow-up forms were collected at each follow-up, and new forms were given, with reminders about the need to fill them out regularly. Each participant in the intervention group was given a copy of the booklet, and all questions were answered during the visits. Furthermore, the researcher (MU) made her cell phone number available to the participants so that they could call for a consultation at any time. After the birth, the maternal and neonatal outcomes were collected using the postpartum data-collection form.

The pregnant women in the control group received standard prenatal care but received no counseling or training from the researchers. For the assessment and all the follow-ups in the control group, data were collected with the HPLP-II, SES, and the pregnant woman and fetal follow-up forms. Data collection took approximately 10 minutes for each session. The women in the control group were reminded that they needed to make their regular follow-up visits, and all their questions were answered. After the birth, maternal and neonatal outcomes were collected with the postpartum data-collection form.

Statistical analysis

The data were analyzed using SPSS, version 22.0 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.). The statistical significance level was set at α equals .05. Numbers and percentages (%) were used for the quantitative variables; mean±standard deviation (X±SD), median and minimum/maximum (min/max) values were used for the variables determined by measurement. The conformity of continuous variables to normal distribution was evaluated by the Kolmogorov–Smirnov test. To compare the groups, the chi-square test or Fisher's exact test was used for discrete variables; Student's t-test or the Mann–Whitney U Test was used for continuous variables. ANOVA was used for group comparisons for repeated measurements, and the Bonferroni correction test was used as a post hoc test. By using the Bonferroni correction

test in the comparison of pregnant women's HPLP-II scores (values within the group), the significance level for p was set at .008; for the comparison of temporal variation within the group, the p value was set at .0125. In the intragroup comparison of pregnant women's SES scores, we used the Bonferroni correction test, and the threshold value was set at .0125.

Results

The characteristics of the pregnant women in the 2 groups were similar at the beginning of the study, as shown in Table 1.

There were no significant differences in total and subscale HPLP-II scores between the groups in the assessment ($P > .008$) (Table 2). We found a statistically significant difference in HPLP-II total scores between the groups in the first, second, and third follow-ups ($P < .008$). In terms of HPLP-II scores, there were statistically significant differences between the groups' own follow-ups ($P < .0125$). The total HPLP-II scores of the intervention group increased in each follow-up and were higher than the control group's total scores (Table 2).

We found no significant differences in the SES scores between the groups in the assessment and all the follow-ups, as shown in Table 3. The mean SES scores of both groups were high for all the follow-ups. In terms of SES scores, there was a statistically significant difference between the groups' own follow-ups ($P < .0125$). There was a continuous increase in SES scores in both groups, except for the third follow-up of the intervention group (Table 3).

We determined that some of the pregnant women in the intervention group regularly monitored their blood pressure and weight (36.2%), edema status (29.8%), and the movements of their baby (27.7%). When we compared these women's SES scores, there were no statistically significant differences between the groups in terms of the proportions of those who regularly self-monitored ($P > .05$).

In the assessment and follow-ups, we found no significant differences ($P > .05$) between the intervention and control groups in the average systolic and diastolic blood pressures, edema status, perceptions of fetal movement, and laboratory tests; these statistics were not included on the tables.

In terms of the study's assessment, we found no statistically significant differences between groups in the amounts of physical activity (walking) or the frequency of breathing exercises ($P > .05$). We found statistically significant differences in the amounts of physical activity (walking) and the frequency of breathing exercises in women in the first and third follow-ups, but only in the frequency of breathing exercises in the second follow-up ($P < .05$). In these follow-ups, the intervention group's rates were higher than the control group's rates.

Preeclampsia occurred in 4 women (7.6%) in the control group during their pregnancies, but none of the women in the intervention group experienced it. Gestational hypertension occurred in 3 women in both groups (intervention group, 6.3%; control group, 5.7%) (Table 4).

We found no significant differences between the groups in terms of their infants' first- and fifth-minute Apgar scores or regarding any postnatal problems ($P > .05$). In the control group, 1 baby (1.8%) was born at the 26th gestational week (neonatal death occurred) and meconium aspiration was seen in 2 (3.6%) term infants. There was a need for intensive care for 1 newborn (2.1%) in the intervention group and for 6 newborns (10.9%) in the control group. Respiratory distress developed in 2 newborns (4.2%) in the intervention group and in 4 newborns (7.2%) in the control group. Intrauterine growth retardation was detected in 1 infant (2.1%) in the intervention group (Table 4).

Discussion

It has been suggested that patient education and counseling can prevent nearly one-half of the most serious outcomes of preeclampsia (9). We evaluated the effects of an education and counseling program on maternal and neonatal outcomes, healthy lifestyle behaviors, and the self-efficacy levels of pregnant women at risk of preeclampsia. In this context, we discuss, herein, our study results.

It has been stated that pregnant women who lack a clear understanding of preeclampsia tend to have poorer health behaviors than those women who possess that understanding; thus, it is very important for at-risk pregnant women to maintain healthy lifestyle behaviors (10). In Mogharab et al.'s study, it was concluded that planning and designing appropriate educational programs can improve pregnant women's quality life (22). Allen and colleagues (2014) stated that dietary and lifestyle interventions reduced risk in women with a pre-existing metabolic risk of preeclampsia (11). In our study, HPLP-II scores increased in the intervention group, and we found differences in HPLP-II total scores between the groups in all the follow-ups. Similarly, some studies found that both the general and the sub-dimension scores of HPLP-II increased with education and counseling (12,23,24).

Lin et al. stated that self-efficacy in health behaviors positively affects health-promoting lifestyles in pregnant women (15). In our study, we also aimed to develop self-efficacy effectiveness in those at risk of preeclampsia through education and counseling and to initiate and maintain health-promoting behaviors and enable the early recognition and resolution of dangerous situations. Contrary to expectations, there was no difference between the groups in terms of SES scores in our study, perhaps due to the high SES scores in both groups at the beginning of the study (intervention group, 88.73; control group, 87.87). In one of the few studies of SES that explored pregnant women at risk for preeclampsia, Sen et al. found that, after the education and counseling sessions for pregnant women with gestational diabetes mellitus, there were no differences in the SES scores of the groups between the follow-ups (12).

In our study, we found no difference in the systolic and diastolic blood pressure of the women between the intervention

Table 2. Pregnant Women's Health-Promoting Lifestyle Profile II Scores

	Intervention (n = 47) Mean ± SD	Control (n = 53) Mean ± SD	Test Value	p[1]
Assessment (A)				
HPLP-II	**134.94 ± 16.59**	**133.15 ± 14.30**	**-0.578[a]**	**.566**
Health responsibility	22.81 ± 3.90	22.72 ± 4.09	-0.607[b]	.545
Physical activity	14.87 ± 4.75	14.45 ± 3.44	-0.003[b]	.997
Nutrition	24.00 ± 3.71	23.43 ± 3.46	-0.790[a]	.431
Spiritual growth	27.11 ± 3.65	27.38 ± 3.67	0.369[a]	.713
Interpersonal responsibility	26.72 ± 3.90	26.26 ± 3.53	-0.618[a]	.538
Stress management	19.43 ± 3.91	18.91 ± 2.98	-0.741[a]	.461
First Follow-up (1st)				
HPLP-II	**148.89 ± 16.56**	**136.42 ± 17.84**	**-3.123[a]**	**.002**
Health responsibility	25.40 ± 4.32	22.87 ± 3.71	-3.157[a]	**.002**
Physical activity	17.94 ± 4.72	15.57 ± 4.21	-2.656[a]	.009
Nutrition	26.32 ± 3.75	23.38 ± 3.27	-3.722[b]	< .001
Spiritual growth	29.13 ± 3.47	23.38 ± 3.27	-1.361[a]	.177
Interpersonal responsibility	28.15 ± 3.61	26.75 ± 3.60	-1.932[a]	.056
Stress management	21.96 ± 3.39	19.75 ± 3.73	-3.076[a]	**.003**
Second Follow-up (2nd)				
HPLP-II	**149.51 ± 20.32**	**135.35 ± 18.91**	**-3.593[a]**	**.001**
Health responsibility	25.74 ± 5.15	22.56 ± 4.21	-3.383[a]	.001
Physical activity	17.94 ± 5.23	15.21 ± 4.63	-2.750[a]	.007
Nutrition	26.74 ± 4.17	24.12 ± 4.04	-3.187[a]	.002
Spiritual growth	28.90 ± 3.86	27.21 ± 3.66	-2.249[b]	.025
Interpersonal responsibility	28.15 ± 3.84	26.19 ± 3.68	-2.585[a]	.011
Stress management	22.04 ± 3.96	20.06 ± 3.51	-2.308[b]	.021
Third Follow-up (3rd)				
HPLP-II	**149.91 ± 18.89**	**136.77 ± 20.75**	**-3.241[a]**	**.002**
Health responsibility	25.87 ± 4.38	23.15 ± 4.75	-2.462[b]	.014
Physical activity	17.87 ± 5.03	14.85 ± 4.97	-2.827[b]	.005
Nutrition	26.49 ± 3.82	24.17 ± 3.97	-2.590[b]	.010
Spiritual growth	29.38 ± 4.23	27.77 ± 4.07	-2.107[b]	.035
Interpersonal responsibility	28.02 ± 3.64	26.54 ± 4.20	-1.884[a]	.068
Stress management	22.29 ± 3.81	20.29 ± 4.71	-2.276[a]	.025
	F 3726.09	3600.36		
	P[2] < .001	**< .001**		
	between A & 1st, A & 2nd, A & 3rd follow-ups	between A & 1st follow-ups		

[a]Student's t-test; [b]Mann–Whitney U test; SD = standard deviation; F: Repeated measures ANOVA; P[1]: The Bonferroni-adjusted p-value threshold was .008; P[2]: The Bonferroni-adjusted p-value threshold was .0125.

Table 3. Pregnant Women's Self-Efficacy-Scale Scores

	Intervention (n = 47) $\overline{X}$ ± SS	Control (n = 53) $\overline{X}$ ± SS	Test Value	p[1]
Assessment (A)				
Self-Efficacy Scale	**88.73 ± 8.45**	**87.87 ± 8.72**	**-0.609[a]**	.544
Starting behavior	31.18 ± 4.10	30.17 ± 4.71	-1.181[b]	.238
Maintaining behavior	28.76 ± 4.37	28.12 ± 3.65	-1.372[b]	.170
Completing behavior	20.24 ± 2.89	20.31 ± 2.84	-0.406[b]	.685
Struggle with obstacles	8.56 ± 1.85	9.27 ± 2.23	-1.563[b]	.118
First Follow-up (1st)				
Self-Efficacy Scale	**90.07 ± 9.38**	**88.48 ± 10.17**	**-0.805[b]**	.421
Starting behavior	31.16 ± 3.98	30.71 ± 4.42	-0.728[b]	.466
Maintaining behavior	28.93 ± 4.04	28.10 ± 4.13	-1.036[b]	.300
Completing behavior	20.67 ± 3.31	20.08 ± 2.85	-1.136[b]	.256
Struggle with obstacles	9.31 ± 2.16	9.60 ± 2.43	-0.955[b]	.340
Second Follow-up (2nd)				
Self-Efficacy Scale	**91.00 ± 9.82**	**88.94 ± 8.95**	**-1.508[b]**	.132
Starting behavior	31.89 ± 4.65	31.42 ± 3.81	-1.147[b]	.251
Maintaining behavior	29.27 ± 4.14	28.69 ± 3.63	-1.001[b]	.317
Completing behavior	20.20 ± 2.83	19.40 ± 3.20	-0.980[b]	.327
Struggle with obstacles	9.64 ± 2.52	9.42 ± 2.06	-0.504[b]	.615
Third Follow-up (3rd)				
Self-Efficacy Scale	**87.69 ± 12.82**	**89.63 ± 9.77**	**-0.134[b]**	.893
Starting behavior	30.22 ± 5.57	31.52 ± 3.70	-0.959[b]	.338
Maintaining behavior	27.91 ± 5.26	28.94 ± 3.80	-0.679[b]	.497
Completing behavior	20.18 ± 3.77	19.56 ± 3.16	-1.178[b]	.239
Struggle with obstacles	9.38 ± 1.92	9.62 ± 2.26	-0.377[b]	.706
	F 5010.186	5623.404		
	P[2] **< .001**	**< .001**		
	between 2nd & 3rd follow-ups	between 2nd & 3rd follow-ups		

[a]Student's t-test; [b]Mann–Whitney U test; SD = standard deviation; F: Repeated measures ANOVA; P[1]: The Bonferroni-adjusted p-value threshold was .008; P[2]: The Bonferroni-adjusted p-value threshold was .0125.

Table 4. Maternal and Fetal/Neonatal Results

	Intervention n = 47* $\overline{X}$ ± SS		Control n = 53* $\overline{X}$ ± SS		Test Value	p[1]
Newborn's weight	3190.52 ± 538.580		3231.73 ± 623.44		0.671	.50
	Median (Min–Max)		**Median (Min–Max)**		**z**	**p**
1-minute Apgar score	8 (min: 7; max: 8)		8 (min: 5; max: 8)		0.477	.63
5-minute Apgar score	10 (min: 9; max: 10)		10 (min: 6; max: 10)		0.477	.63
Neonatal Problems	**n = 48***	**%**	**n = 55***	**%**	X^2	**p**
Neonatal death	0	0	1	1.8	0.881	1.00
Aspiration of meconium	0	0	2	3.6	1.780	.49
Need of intensive care	1	2.1	6	10.9	3.152	.11
Respiratory distress	2	4.2	4	7.2	0.451	.68
Intrauterine growth retardation	1	2.1	0	0	1.157	.46
Maternal Problems	**n = 47**	**%**	**n = 53**	**%**	X^2	**p**
Preeclampsia	0	0	4	7.6	3.695	.12
Gestational hypertension	3	6.3	3	5.7	0.023	1.00
Birth Problems	**n = 47**	**%**	**n = 53**	**%**	X^2	**p**
Assisted delivery	1	2.1	1	1.9	0.007	1.00
Postpartum bleeding	0	0	1	1.9	0.896	1.00

*The number of babies vs. mothers increased because 3 sets of twins were born (intervention group: 1 set; control group: 2 sets); X^2 = Pearson's chi square

and the control groups. In the first, second, and third follow-ups, a higher rate of edema was observed in the control group than in the intervention group, but there was no statistical difference between the groups. In pregnancy, 10 to 15% of normotensive pregnant women have edema; i.e., it is not a specific or a sensitive sign of preeclampsia (7).

It has been determined that preeclampsia is associated with decreased fetal movements at night and a change in fetal movements, generally (25). Studies have shown that the decrease in fetal movements is associated with fetal growth retardation, fetal distress, and preterm delivery. Women can identify changes in the number and quality of fetal movements prior to intrauterine problems. Paying attention to the movements of one's baby is a convenient, inexpensive and valuable screening method for evaluating fetal well-being (25,26). We therefore instructed women on how to regularly monitor fetal movement. In the study, all the pregnant women except 2, (1 in each group) stated that they had felt their babies move in the first, second, and third follow-ups.

A systematic review examining the relationship between exercise and preeclampsia indicated that exercise has a protective effect (21). The ACOG recommends moderate daily physical activity for pregnant women or, if not daily, at least 3 days per week (27). In our study, we found that the pregnant women in the intervention group had a higher rate of physical activity than the women in the control group did and found differences between the groups in the first and third follow-ups.

Psychosocial interventions to reduce emotional stress during pregnancy may also reduce the risk of increasing blood pressure (28). One method of coping with stress is in the form of breathing exercises. In some studies, it was found that 10 to 15 minutes of daily breathing exercises reduced hypertensive patients' blood pressure (29–31). In our study, a regular increase in the rate at which breathing exercises were practiced was observed in the intervention group after the first follow-up. We found differences between the control and the intervention groups at the first, second, and third follow-ups.

In our study, preeclampsia occurred in 4 women (7.6%) in the control group during the pregnancy but in none of the women in the intervention group. Three pregnant women (6.3%) in the intervention group and 3 (5.7%) in the control group were diagnosed with hypertension. According to these results, the education and counseling of the at-risk pregnant women in our study positively contributed to overall maternal and fetal health. Considering the prevalence of preeclampsia in the community, larger-scale and longer-term studies are needed to evaluate the effectiveness of prevention activities.

In our study, more of the newborns born to the women in our control group experienced neonatal death that did the newborns whose mothers were in the intervention group. There were also more instances of meconium aspiration, a more frequent need for intensive care, and higher rates of respiratory distress in this group of babies. However, there were no significant differences between the groups in terms of the first- and fifth-minute Apgar scores, birthweights, or neonatal problems. Xiong et al. (2002) stated that most babies born to mothers with preeclampsia had fetal growth patterns that were similar to those born to normotensive mothers (32). In the literature, we found no other study comparing fetal and neonatal outcomes when education and counseling were given to pregnant women with a risk of preeclampsia.

Conclusion

We believe that education and counseling provided to pregnant women at risk for preeclampsia make positive contributions to the health of those women and their babies. Considering that preeclampsia affects 3 to 5% of all pregnancies,

worldwide, a rate of 7.6% in the at-risk group seems significant. Further studies should be conducted in larger populations in order to better evaluate the effects of education and counseling services on maternal and neonatal outcomes in pregnant women with a risk of preeclampsia.

Resumen

Objetivo: Evaluar el efecto de la educación y un programa de consejería en conductas de estilo de vida saludable, autoeficacia y consecuencias maternas/neonatales en mujeres embarazadas en riesgo de preeclampsia. Métodos: Este estudio tuvo un diseño de ensayo controlado aleatorio llevado a cabo en 132 mujeres embarazadas en riesgo de preeclampsia asistiendo a una clínica prenatal para controles de rutina. El grupo de estudio recibió educación y consejería enfocado a prevenir la preeclampsia y les fue suministrado un folleto sobre la preeclampsia mientras que el grupo de control recibió cuidado prenatal estándar. Los dos grupos fueron examinados cuatro veces durante el embarazo y una vez después del parto. Los formularios para la recolección de datos fueron: Cuestionario de Estilo de Vida Promotor de Salud, Escala de Autoestima (EA), formularios de seguimiento de embarazo y fetal y formulario de recolección de datos postparto. Se obtuvo el permiso del comité de ética para el estudio. Resultados: La educación y consejería sobre la preeclampsia tuvieron un efecto estadísticamente significante en la conducta de estilo de vida saludable ($P < .008$). Sin embargo, no se encontró ninguna diferencia estadísticamente significante en las puntuaciones totales del EA ($P > .0125$), en promedios de presión arterial sistólicos y diastólicos, en condiciones de edemas y en sentir movimientos del bebé ($P > .05$). Se encontraron diferencias en cuanto a actividad física en el primer y tercer seguimiento y en cuanto a ejercicios de respiración de mujeres en el primer, segundo y tercer seguimiento entre los grupos ($P < .05$). Preeclampsia fue contraída por cuatro mujeres embarazadas (7.6%) en el grupo de control, pero por ninguna en el grupo de estudio. Conclusión: Educación sobre la preeclampsia y un programa de consejería podrían ayudar a desarrollar conductas de estilo de vida saludable en mujeres embarazadas en riesgo de preeclampsia.

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