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Preeklamptik gebeliği olan kadınlara verilen planlı eğitimin oksidatif stres ve anksiyete düzeylerine etkisi nasıldır?: randomize olmayan kontrollü çalışma

How is the effect of planned training given to women with preeclamptic pregnancy on oxidative stress and anxiety levels?: non-randomised controlled-study

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ÖZ

Amaç: Bu çalışma, preeklamptik gebeliği olan kadınlara verilen planlı eğitimin stres-anksiyete ve oksidatif stres düzeylerine etkisini araştırmayı amaçlamıştır.
Yöntem: Bir üniversitenin Araştırma ve Uygulama Hastanesinde yürütülen randomize olmayan kontrollü bir çalışmadır. Kontrol grubu için anket, ölçek uygulaması ve laboratuvar değerlendirmesi sadece bir kez yapılmıştır.
Bulgular: Çalışmada preeklampsi tanısı alan gebelere verilen planlı eğitimin oksidatif stres düzeylerini ve durumluk kaygı düzeylerini azalttığı belirlendi.
Sonuç: Preeklampsi hastalarına bakım ve tedavinin yanı sıra, hastalık bilgilendirme eğitimi ve psikolojik desteğin verilmesinin hastalığın tedavisinde olumlu bir gelişme yaratacağı düşünülmektedir.

Anahtar Kelimeler: Preeklampsi, Anksiyete, Oksidatif stres.

ABSTRACT

Objective: This study aimed to studying the effects of planned training given to women with preeclamptic pregnancy on stress-anxiety and oxidative stress levels.
Method: A non-randomised controlled-study, carried out in Research and Application Hospital of one university. Questionnaire, scale application and laboratory evaluation for the control group were performed only once.
Results: It has been determined in the study that the planned training given to the pregnant women who received a diagnosis of preeclampsia has decreased their oxidative stress levels and state anxiety levels.
Conclusion: In addition to care and treatment for preeclampsia patients, it is thought that providing disease information education and psychological support will create a positive development in the treatment of the disease.

Key words: Pre-eclampsia, Anxiety, Oxidative stress.

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1. INTRODUCTION

Preeclampsia is a multi-system, multi-factorial, and unexplained disease. It is only characterized by human pregnancy and affects the health of mothers and babies. This serious disease is an important cause of perinatal and maternal morbidity worldwide, affecting up to 57% of all pregnancies in developed countries and many developing countries (1-3). Worldwide, approximately 50,000 maternal mortality rates that occur once a year are related to hypertensive pregnancy disorders, especially pre-eclampsia/eclampsia (PE/E) (3).

Pregnancy is related to severe chronic stress. especially complex pregnancies, including PE, are usually related to stress, it has been suggested that mental disorders during pregnancy can cause PE by increasing cortisol levels and reducing the sensitivity of lymphocytes to glucocorticoids. They can also cause high blood pressure and endothelial dysfunction, which are characteristic of PE (4). Some studies have been conducted investigating the association between psychosocial stress and hypertension in recent year (5). Psychological events such as high stress levels, anxiety may directly or indirectly affect pregnancy and can also additionally as a result result in preeclampsia (PE). (6).

It was indicated in studies, that perceived stress during pregnancy was associated with increased rates of preeclampsia. (3,7-10).

Another factor that causes preeclampsia is oxidative stress. Oxidative stress is defined as a decrease in the antioxidant capacity against oxidants and/or as an increase in oxidant levels. Oxidative stress contributes to the pathophysiology of PE and ultimately to the development of hypertension during pregnancy (1).

There are various studies suggesting that oxidative stress, which occurs with the disorder of the balance between oxidant substances, which may lead to cell or tissue damage and antioxidants, has a significant role in preeclampsia occurrence (11-16).

It is pointed out in some studies that psychological stress in human beings may lead to oxidative stress (17-19). In the event of psychological stress, the balance between oxidative and antioxidative defense systems is disturbed, which leads to oxidative damage and an impact on tissue function(18-20).

As pointed out in the literature, it is thought that oxidative stress and psychological stress are effective on preeclampsia occurrence. It is stated that planned training given to patients significantly reduce stress levels (21-23). In the light of these results, it is thought that planned training given to women with preeclamptic pregnancy may have a positive effect on stress, anxiety and by extension on oxidative stress and on oxidative stress treatment as well. The aim of this study is to investigate the effect of planned education given to preeclamptic pregnant women on stress-anxiety levels and oxidative stress levels.

2. METHOD

Research Design

This research was carried out in an experimentally.

Research Setting and Sample

In the study, 18 preeclamptic patients matching the sampling criteria were taken as the experimental group and 12 other preeclamptic patients who also match the sampling criteria constituted the control group.

The target population of the research was the patients being treated with a diagnosis of preeclampsia in the Gynecology and Obstetrics Clinics of Research and Application Hospital of Isparta Süleyman Demirel University. Preeclamptic patients being treated in the Gynecology and Obstetrics Clinics of the Research and Application Hospital of Isparta Süleyman Demirel University were included in the research sample. Subjects matching the criteria were selected through purposeful sampling.

Moderate to moderate hypertension (systolic blood pressure 140-159 mmHg or diastolic blood pressure 90-159 mmHg, measured twice at least four hours apart) requires careful evaluation and monitoring.

Women being treated with a diagnosis of preeclampsia in the Gynecology and Obstetrics Clinics of the hospital constituted the experimental and the control group. They were patients with preeclampsia, after the 20th week of their pregnancies, non-smokers with no chronic systemic disease (hypertension, diabetes, GDM-gestational diabetes mellitus-trophoblastic) and were receiving the same type of treatment.

Patients with preeclampsia, chronic hypertension, pregnancy or previous diabetes, history of chronic systemic or trophoblastic disease, or history of systemic, endocrine, gastrointestinal or urinary tract disease, and smokers were excluded (case and control groups). All the pregnant women included in the study both from the experimental and control group received similar treatments according to our department protocol. The decision for hospitalization based on the presence of severe features of preeclampsia and was also made based on maternal and fetal status. Antihypertensive treatment was not initiated in preeclamptic patients. Antihypertensive treatment was given when the blood pressure of the patients was above 160/110 mmHg. Alpha methyl-dopa was the first-line antihypertensive drug for long-term treatment. For uncontrolled patients, nifedipine was added to the treatment. Induction of labor was performed in patients with severe preeclampsia features. Magnesium sulfate prophylaxis for eclamptic seizure was started in the prenatal and postpartum 24-hour period

Data Collection Tools

The scale and the survey form created by the researchers in accordance with the literature were employed as the data collection tool.

The STAI (State-Trait Anxiety Inventory)

STAI (StateTrait Anxiety Inventory) consists of a 40-item scale, and each item uses a Likert score from 1 to 4. The scale can be used to measure characteristic fear (the degree of a person's fear depends on time and situation) and fear state (the degree of fear a person is at this time), because it consists of two independent subscales, each 20 points (STAI-T State-Trait Anxiety Inventory-Trait and STAI-S State-Trait Anxiety Inventory-State, respectively).

STAI scores range from 20 to 80 with higher scores indicating higher levels of anxiety.

The survey form included sociodemographic data and obstetric stories related to the women, questions concerning their awareness of the disease and a daily observation form containing such vital findings as blood pressure, fever etc. The survey form and the inventory were conducted through face-to-face interviews.

Implementation of training-questionnaire-scale. State-trait anxiety inventory and survey form were applied to each of the women in both the experimental and control group. A planned training program concerning the disease and the personal care was given to the women in the experimental group. This planned patient training was about weight and edema control, nutrition, signs of hypertension and eclampsia, stress coping methods and fetal health evaluation. Following the training, a booklet containing a summary of the training program was given to each woman. The training was given one day after the initial questionnaire and inventory was performed. The laboratory evaluations and state-trait anxiety inventory were applied both before and after the training (one day after the training).

No training was given to the control group. Questionnaire, scale application and laboratory evaluation for the control group were performed only once. Thus, the scale and the laboratory evaluations for the experimental group were performed before and after the training. This condition and the fact that the control group was used is an important indicator for the effectiveness of the training activity.

TAS (Total antioxidant status)-TOS (Total Oxidant Status) analyses

In the experimental group, the laboratory analyses were done one day before and at least one day after the training. And in the control group, the laboratory analyses were done only once. Within the scope of the study, the blood samples drawn from the preeclamptic patients were collected into biochemistry tubes. On the same day, the blood samples were stored in the deep freeze at -80°C and kept until the blood analysis day. On the analysis day, the blood samples taken from the deep freeze at -80°C, were first put into the refrigerator at +4°C, then after they were melted in the hot water-bath of 37°C, spectrophotometric analyses were performed on the blood samples.

A fully automatic method developed by Erel (2004), TAS test is a method which measures the total antioxidant capacity of the body against strong free radicals. Fe2+ –o-dianisidine complex creates OH radical by forming a Fenton type reaction with hydrogen peroxide. This powerful reactive oxygen species forms yellow-brown dianisidine radicals by reacting with colorless o-dianisidine molecule at reducing low pH. Color formation increases by addition of dianisidine radicals to the advanced oxidation reactions. However, antioxidants in the samples stop the color formation by suppressing these oxidation reactions. The result is given by spectrophotometrically measuring this reaction in the automatic analyzer. Trolox, a water-soluble analogue of traditionally used vitamin E, was used as a standard and the results were expressed as mmol Trolox Equiv./L (24).

TOS measurement is a fully automatic colorimetric method again developed by Erel (2005). Oxidants existing in the sample oxidize the ferrous ion-o-dianisidine complex to ferric ion. Glycerol molecules in the medium speed up this reaction approximately tripling it. Ferric ions creates a colored complex with “xylenol orange” in an acidic medium. Color intensity, which is related to the quantity of oxidants present in the sample is measured

spectrophotometrically. Spectrophotometric analyses were performed with a Perkin Elmer brand spectrophotometer (UV/Vis spectrophotometer model lambda 20–USA). (25).

Oxidative stress index (OSI) was calculated according to the ratio of the TOS to TAS levels.

$$\text{Oxidative stress index (OSI)} = \frac{\text{TOS (μmol } H_2O_2 \text{ equivalent/L)}}{\text{TAS (μmol Trolox equivalent/L)}} \times 100$$

Data Analysis

Kolmogorov-Smirnov test was used to test the normality of the distribution, and since the result was p=0,70 it was concluded that the distribution was normal and as a result parametric tests were used. In the analysis of the data, numeric values, number and percentage distribution, arithmetic means, standard deviations, independent sample T-tests, and paired sample t-tests were used.

3. RESULTS

The average age of the experimental group and the control group are 29.72±4.26 and 30.50±4.27 respectively; the average pregnancy number of the experimental group and the control group are 1.66±0.97 and 2.91±2.15 respectively. According to pre-pregnancy BMI, the experimental and the control groups are in the over-weights group (Table 1).

Table 1. The average of several variables in the experimental and control groups

		Age	**Pregnancy week**	**Pregnancy number**	**Prenatal control number**	**Number of children living**	**Number of meal**	**Number of fruit consumption**	**Pre-pregnancy BMI**
Experimental group	M	29.72	30.22	1.66	13.72	0.11	4.27	2.27	27.11
	SD	4.26	3.84	0.97	17.29	0.32	1.36	0.89	4.77
Control group	M	30.50	31.66	2.91	16.00	0.45	3.41	2.25	27.58
	SD	4.27	4.33	2.15	10.43	0.52	0.79	0.62	5.68

While 50% of the experimental group and 41.7% of the control group in the 28th to 32th gestational week; 41.7% of the experimental group and 22.2% of the control group have had preeclampsia in their previous pregnancies. 50% of the experimental and the control group have indicated eating mainly fruit and vegetables (Table 2).

There is no statistically significant difference between the experimental and the control groups regarding the systolic (t=0.196 p=0.85) and the diastolic (t=0.226 p=0.38) average blood pressure comparisons. There is no statistically significant difference between the experimental and the control groups regarding the delivery week (t=0.24 p=0.45) and the birth weight (t=0.34 p=0.56) comparisons.

There is no statistically significant difference between the TOS (lmol H2O2 equ./L) (t=-0.33 p=0.74) and the TAS (mmol trolox equ./L) (t=-1.22 p=0.57) measurements of the preintervention experimental and control groups (Table 3).

In the experimental group, there is a statistically significant difference between the TAS (mmol trolox equ./L) (t=-9.71 p=0.00) and the TOS (lmol H2O2 equ./L) (t=6.56 p=0.00) measurements before and after the training (Table 4). After the training, while the oxidant level decreases, the antioxidant level increases. A statistically significant difference was determined between the OSI value of the control group (0.010) and that of the experimental group (0.009) (t=4.56, p=0.04).

Table 2. Descriptive characteristics of the experimental and control groups

Group	**Experimental**		**Control**	
Pregnancy week	Number	%	Number	%
23-27	4	22.2	2	16.7
28-32	9	50.0	5	41.7
33-36	5	27.8	5	41.6
Education				
Elementary-Middle School	8	43.4	3	25.0
High school	5	27.8	2	17.7
University	5	27.8	7	58.3
Having had preeclampsia in previous pregnancy				
Yes	8	41.7	3	22.2
No	10	58.3	9	78.8
Number of meal				
2-3	7	38.9	9	75.0
4-6	11	61.1	3	25.0
Diet				
Mainly vegetables	9	50.0	6	50.0
Meat products are mainly	2	11.1	4	33.3
Mixed	7	38.9	2	16.7
fruit consumption				
One a day	3	16.7	1	8.3
Twice a day	9	50.0	7	58.3
three times a day	4	22.2	4	33.4
None	2	11.1	0	0.0
Delivery type				
Vaginal	7	38.88	4	33.33
Caesarean	11	61.12	8	66.67
Total	**18**	**100.0**	**12**	**100.0**

There is no statistically significant difference between the State (t=-0.05 p=0.06) and the Trait (t=0.14 p=0.14) Anxiety Inventory of the pre-training experimental and control groups. In the experimental group, there is a statistically significant difference between the State-Trait Anxiety Inventory (t=3.64 p=0.00) before and after the training (Table 5).

4. DISCUSSION

In this experimental study, the planned training given to the pregnant women with preeclampsia in the experimental group, has decreased the TOS levels of the pregnant women in the experimental group significantly and increased the TAS levels significantly as against the the control group. At the same time, a significant decrease has been determined in the pre

Table 3. Comparison of pre-training TOS-TAS measurements in the experimental and control groups

	Group	N	Mean	SD	SE	t	*P value
TOS Measurement (lmol H_2O_2 equ./L)	Experimental	18	1.55	0.03	0.00	-0.33	0.74
	Control	12	1.56	0.04	0.01		
TAS Measurement(mmol trolox equ./L)	Experimental	18	1.53	0.05	0.01	-1.22	0.57
	Control	12	1.55	0.05	0.01		

*Significant at *P < 0.05*

Table 4. The comparison of pre-training and post-training TOS-TAS measurements in the experimental groups

	TOS-TAS measurements					
	Mean	**N**	**SD**	**SE**	**t**	***P value**
Before the training TAS(mmol trolox equ./L)	1.53	18	0.05	0.01	-9.71	**0.001**
After the training TAS(mmol trolox equ./L)	1.56	18	0.04	0.01		
Before the training TOS (lmol H_2O_2 equ./L)	1.55	18	0.03	0.00	6.56	**0.001**
After the training TOS(lmol H_2O_2 equ./L)	1.52	18	0.04	0.01		

*Significant at *P < 0.05*

Table 5. Comparison of State-Trait Anxiety Inventory in experimental and control groups

Comparison of State-Trait Anxiety Inventory in pre-training experimental and control groups							
		Mean	**N**	**SD**	**SE**	**t**	***P value**
State Anxiety Inventory measurement	Experimental	44.72	18	14.57	3.43	-0.05	**0.06**
	Control	45.00	12	9.55	2.75		
Trait Anxiety Inventory Measurement	Experimental	44.44	18	8.51	2.00	0.14	0.14
	Control	44.00	12	7.69	2.22		
Comparison of State-Trait Anxiety Inventory in pre and post-training Experimental Group							
		Mean	**N**	**SD**	**SE**	**t**	***P value**
State Anxiety Inventory measurement Before the training		44.72	18	14.57	3.43	3.64	**0.001**
State Anxiety Inventory measurement After the training		36.16	18	7.83	1.84		

* Significant at P < 0.05

and post-training state anxiety levels of the women. This positive effect towards this important and dangerous disorder in pregnancy is important in terms of preventing complications and protecting the mother's and baby's health.

It was determined that the pre-pregnancy BMIs of the pregnant women in the experimental and the control groups were slightly above the normal levels. Erer and Akan

(2008) have stated that, in the study they performed on the pregnant women with preeclampsia, 82.2% of the pregnant women were obese according to Body Mass Index.

There is no statistically significant difference between the TOS (lmol H2O2 equ./L) (p=0.74), and the TAS (mmol trolox equ./L) (p=0.57) levels of the pre-application (training) experimental and control groups. However, in the experimental group, there is a statistically significant difference between the TAS (mmol trolox equ./L) (p=0.00) and the TOS(lmol H2O2 equ./L) (p=0.00) levels before and after the training. After the training, while the oxidant level decreases, the antioxidant level increases. It is observed that the training given has positive effects on the TOS and the TAS levels. The initiatives taken helped to reduce the level of OSI. Although the cause of preeclampsia is not fully understood, there are some studies in the literature that indicate that oxidative stress plays a role in its pathophysiology (1,26-28). Markers of lipid peroxidation have been noted to be increased in the plasma of women with preeclampsia (29).

Antioxidants consisting of carotenoids, tocopherols, and ascorbic acid are decrease in girls with preeclampsia due to the fact they've the capacity to scavenge loose radicals and feature as lively oxygen inhibitors (30). There are various studies concerning the oxidative stress characterized by the failure of the balance between the substances that cause potential cell or tissue damage and the antioxidant substances that has prophylactic effects on these has a crucial role in occurrence of preeclampsia (11,12,14,31).

The effects of stress on the relevant risk factors for these diseases, immunosuppression, oxidative stress, blood pressure and blood lipid increases are well documented. Two recent human studies have also shown increased production of ROS, including lipid peroxides, during times of mental stress (32-34).

In our study, there is a statistically significant difference in the experimental group between the pre and post-training state anxiety inventories. The results of the study by Sarmasti et al. (2019) reported a significant difference in stress between pregnant women with and without pre-eclampsia, so women with pre-eclampsia have higher stress levels than women without pre-eclampsia.

In our study, a decrease in the post-training state anxiety levels has been determined. Similarly, in the study performed by Erer (2004), the difference between the anxiety levels of the pregnant women with preeclampsia before and after the training of disorder and caring, has been found to be statistically significant ($p<0.05$). In consequence of the training, knowledge points of the pregnant women with preeclampsia have increased and their state anxiety levels have decreased. The study of Erer and Akan (2008) showed that there are statistically significant differences in the anxiety scores before and after the disease and care information of women with preeclampsia. Psychological events such as high stress levels, anxiety or depression may directly or indirectly affect pregnancy and may thus lead to preeclampsia (36).

It is well established that acute stress elevates blood pressure (5). Some studies have shown that changes in the nervous, hormonal, and immune systems occur in stressed pregnant women that can lead to the development of gestational hypertension and preeclampsia (36-39).

Psychological intervention and health education can help patients with mild preeclampsia reduce anxiety and improve clinical outcomes and prognosis (23).

Healthcare providers play a key role in adapting women with preeclampsia to hospital settings, connecting with family members, and connecting with people who can provide them

with information (40). As pointed out in the studies, when information and counselling about their disorder is given to inpatient women who are in the hospital for preeclampsia treatment, their anxiety levels decrease. And according to our research results, the decrease in their anxiety levels has created a positive effect by decreasing their oxidative stress levels. By looking at the information that the oxidative stress levels are efficient in the formation of the disorder, it can be thought that it could have a positive effect on the treatment, too.

There is no statistically significant difference between the experimental and the control groups regarding the systolic (p=0.85) and the diastolic (p=0.38) average blood pressure comparisons. A difference, although not statistically significant, was found between the systolic blood pressures and diastolic blood pressures both in the control and the experimental groups. There is not a statistically significant difference between the groups regarding delivery week and birth weight. Because the interventions performed during the study were short-termed, it is thought that they may not have been effective on long term results (blood pressure, delivery week, birth weight).

5. CONCLUSION

It has been determined in the study that the planned training given to the pregnant women who received a diagnosis of preeclampsia has decreased their oxidative stress levels and state anxiety levels. The research findings are important in terms of improving the health of the mother with preeclampsia and the health of the baby, and in terms of increasing the effectiveness of treatment and care.

This article will help obstetricians and nurses assess the psychological distress that may affect preeclampsia, determine the risk factors for these conditions, and determine possible preventive measures. Besides the care and the treatment given to the patients with preeclampsia, providing disease information training and psychological support is thought to create a positive development in the treatment of the disorder. Since, as in our research findings, it will affect treatment results positively, routinely providing the patients with information about the disorder and giving them support is recommended. In addition, in the light of the findings obtained, those women with a high anxiety level may be determined during the prenatal period inspections and the essential interventions may be performed by the medical professionals. For future studies, it can be recommended in terms of supporting the findings that this study be repeated on a larger sample group. If the interventions performed are sustained until the patients are discharged from the hospital, it is thought that this will have a positive effect on the variables such as the newborn's weight, the delivery week etc.

Limitations

A limitation of the study is that it was performed in a small sample group due to the limitedness of time and facilities. For the future, studies with high power and a large sample size are required. It can be a restriction for the study that the drugs partaking in preeclampsia treatment are in different doses for the patients

Ethical Consideration of the Study

In order to the research to be done, written approvals of Akdeniz University Health Sciences Ethics Committee and the hospital where the research would be done were obtained,

and oral approvals of the women were received. (Approval number: B.30.2.AKD.0.20.05.05 Approval date: 25.01.2011).

Conflict of interest statement

The authors do not have any interest-based relationships.

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