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FACTORS AFFECTING PREGNANCY STRESS AND ITS RELATIONSHIP WITH ADVERSE BIRTH OUTCOMES

Semiha Zeynep Özsaydı[1], Seçkin Özsaydı[1], Mebrure Beyza Gökçek[1]

[1]Health Directorate of Kayseri, Kayseri, Türkiye

Correspondence:
Semiha Zeynep Özsaydı (e-mail: szeynepozsaydi@gmail.com)

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Ankara Yıldırım Beyazıt University Faculty of Medicine
Department of Family Medicine

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Abstract

Objectives: This study aimed to investigate the association of some sociodemographic characteristics and pregnancy stress levels of pregnant women with adverse birth outcomes.

Materials and Methods: This study was conducted on pregnant women who applied to Hacı Nimet Köseoğlu Family Health Center (FHC) in 2022. A questionnaire was administered twice, prenatally and postnatally. Pregnancy Stress Rating Scale (PSRS) was applied in the first stage. In the second stage of the study, those who completed the first part of the questionnaire were administered the continuation of the questionnaire after delivery. Pearson's test and Fisher's Chi-Square test were used to compare categorical data, and Student's t-test was used to compare the means of two independent groups.

Results: The mean PSRS score of the participants was 97.0 ± 23.7. Those with chronic disease had a higher PSRS score than those without chronic disease ($p=0.011$). Those who experienced numbness in the hands and feet had a significantly higher PSRS score ($p<0.001$). The mean PSRS score of mothers whose babies were given formula after birth was higher than those whose babies were not given formula ($p=0.039$).

Conclusion: Pregnant women with chronic diseases and symptoms such as hand-foot numbness had significantly higher stress levels. A significant relationship was observed between postpartum formula feeding and pregnancy stress levels. Managing factors that may cause pregnancy stress may be beneficial in terms of some adverse birth outcomes, such as postpartum formula feeding.

Keywords: Pregnancy, adverse birth outcomes, pregnant women.

Introduction

Pregnancy is a vital process characterized by biological, physiological, and psychosocial changes and may be accompanied by psychiatric disorders such as stress, anxiety, and depression.[1,2] Although this process usually results in maternal adaptation, this is not always the case. There are studies in the literature showing that stress during pregnancy is associated not only with pregnancy complications such as pre-eclampsia but also with adverse birth outcomes such as miscarriage, preterm birth, and low birth weight. [3-5] There is a strong belief that stress increases adverse birth outcomes, especially in women. [6] However, it is not clear how stress during pregnancy causes these adverse birth outcomes. One leading hypothesis is that stress-induced increased cortisol levels activate corticotropin-releasing hormone to induce preterm labor. [7] Determining the stress level of pregnant individuals and making preventive and therapeutic interventions to reduce the stress level is important in reducing complications and adverse medical conditions during pregnancy, birth, and postpartum. [8,9] In our study, some sociodemographic characteristics and pregnancy stress levels of pregnant women about adverse birth outcomes were investigated.

Materials and Methods

Our study was conducted with pregnant women who were registered in Hacı Nimet Köseoğlu Family Health Center (FHC) in Melikgazi district of Kayseri province between January 1 and December 31, 2022, who applied to the FHC during and after pregnancy for reasons such as pregnancy follow-up, examination and vaccination and who agreed to participate in the study. Our study was designed in two stages. A questionnaire was administered to the participants twice under the supervision of the researchers as a data collection method before and after delivery. In the first stage, sociodemographic characteristics were questioned, and the Pregnancy Stress Rating Scale was applied. The Turkish validity and reliability study of the Pregnancy Stress Rating Scale was conducted, and it was shown to be suitable for further research in the Turkish language. The scale consists of 36 questions and five sub-dimensions. The answers to the questions in the scale are in 5-point Likert type as "absolutely no", "mild", "moderate", "serious", or "very serious", and the answers are scored as 0,1,2,3,4 respectively. The maximum score that can be obtained from the scale is 144, and there is no cut-off score. [10] In the second stage of the study, the people who completed the first part of the questionnaire were administered the continuation of the questionnaire after delivery. The birth history, health status of the baby and mother, and the experience of complications related to childbirth were questioned. Approval for our study was obtained from the Clinical Research Ethics Committee of Kayseri Training and Research Hospital (Date: 30.12.2021, Decision No: 569), and the study was conducted following the principles of the Declaration of Helsinki.

Statistical Analysis

Descriptive statistics for continuous variables were expressed as mean and standard deviation, while categorical variables were expressed as frequency and percentage. The compatibility of the continuous data of the variables with normal distribution was determined by one sample Kolmogorov Smirnov test. Pearson's test and Fisher's Chi-Square test were used to compare categorical data. Student's t-test was used to compare the averages of two independent groups that conformed to the normal distribution in continuous data. In calculations, $p<0.05$ was considered statistically significant at a 95% confidence interval, and statistical data analysis was performed using the IBM SPSS v 21.0 (IBM Corp, Armonk, NY, USA) program.

Results

Our study was completed with a total of 102 people who applied to the FHC in twelve months and agreed to participate in the study. The mean age of the participants was 25.9±4.57 years. The first part of the questionnaire was administered to 17.6% of the participants in the first trimester, 38.2% in the second trimester, and 44.1% in the third trimester. 2.0% of the participants were illiterate, 11.8% were primary school graduates, 21.6% were middle school graduates, 40.2% were high school graduates and 24.5% were university graduates. 55.9% of the participants stated that their income was close to their expenses. 89.2% of the participants did not have any chronic disease. The distribution of variables related to the prenatal, intrapartum, and postnatal histories of the participants is given in detail in Table 1.

Table 1: Distribution of variables related to prenatal, perinatal, and postnatal stories of the participants

Variables		n	%
History of miscarriage	Yes	18	17.6
	No	84	82.4
Preferred mode of delivery	Vaginal delivery	65	63.7
	C/S for medical reasons	30	29.4
	Optional C/S	7	6.9
Presence of any health problem during pregnancy	Yes	49	48.0
	No	53	52.0
Pregnancy outcome	Live birth	99	97.1
	Abortus	3	2.9
Prematurity	Yes	12	12.1
	No	87	87.9
Mode of delivery	Vaginal	39	38.2
	C/S	63	61.8
Infant feeding pattern*	Breast milk	65	65.7
	Breast milk and formula	27	27.3
	Formula	7	7.1
Use of formula	Yes	34	34.3
	No	65	65.7
Incubator status of the baby*	Yes	17	17.2
	No	82	82.8
Any problems in the baby during/after birth*	Yes	8	8.1
	No	91	91.9
Separation of mother and baby*	Yes	14	14.1
	No	85	85.9
Presence of abnormal maternal bleeding	Yes	38	37.3
	No	64	62.7
Any infection in the mother	Yes	5	4.9
	No	97	95.1
Development of any problem in the breast	Yes	31	30.4
	No	71	69.6
Presence of another birth complication	Yes	1	1.0
	No	101	99.0

C/S: Cesarean section.

Frequency analysis was performed.

*: Since the pregnancy process of 3 participants resulted in "miscarriage", they were not included in the analysis.

The most common factors causing the baby to stay in the incubator after birth were jaundice (38.5 %) and respiratory distress (23.1 %). Respiratory distress (33.3 %) and jaundice (22.2 %) were the most common reasons for separating mother and baby after birth. Among the problems seen in the breast at the end of labor, cracking was the most common (50.0 %) (Table 2).

Table 2: Problems occurring in infants and mothers and investigation of causing factors

Variables		n	%
Factors that cause the baby to stay in the incubator	Jaundice	5	38.5
	Respiratory distress	3	23.1
	Prematurity	2	15.4
	Malnutrition	1	7.7
	Spina bifida	1	7.7
Problems detected in the baby	Jaundice	3	37.5
	Meconium	1	12.5
	Spina bifida	1	12.5
	Respiratory distress	1	12.5
	Urinary tract infection	1	12.5
	Renal disease	1	12.5
Factors that cause the baby to be separated from the mother	Respiratory distress	3	33.3
	Jaundice	2	22.2
	Hospitalization of the baby	1	11.1
	Incubator needs	1	11.1
	Suture infection	1	11.1
	Prematurity	1	11.1
Problems occurring in the breast	Crack	8	57.2
	Pain	5	35.7
	Infection	1	7.1

Frequency analysis was performed.

The mean PSRS total score of the participants was 97.0 ± 23.7. The PSRS score of people with chronic diseases was higher than those without chronic diseases (p=0.011). Those who experienced numbness in the hands and feet also had a significantly higher PSRS score (p<0.001) (Table 3).

Table 3: Factors affecting the level of stress in pregnancy

		n	Mean	SD	*P*
History of miscarriage	Yes	18	98.5	20.9	0.763
	No	84	96.6	24.4	
Education	≤High school	36	96.5	26.6	0.893
	>High school	66	97.2	22.2	
Household income	Medium-Good	70	96.4	25.1	0.719
	Bad	32	98.2	20.7	
Chronic disease	Yes	11	114.0	17.9	**0.011**
	No	91	94.9	23.6	
Vaginal discharge bleeding	Yes	10	97.2	16.7	0.973
	No	92	96.9	24.4	
Low back pain	Yes	30	103.0	22.0	0.078
	No	72	94.3	24.1	
Hand-foot numbness	Yes	6	128.0	21.5	**<0,001**
	No	96	95.1	22.6	
Depression	Yes	5	119.0	13.5	0.029
	No	97	95.8	23.6	

Student's t-test was applied.

The mean PSRS scores of mothers whose babies were given postnatal formula were higher than those of mothers whose babies were not given formula (p=0.039). Although the mean PSRS scores of mothers who gave birth to premature babies were higher than those who did not, there was no statistically significant difference between the two groups (p=0.162) (Table 4).

Participants were divided into two groups: those under and over 30 years of age. The groups were compared in terms of pregnancy outcome, prematurity, mode of delivery, birth weight of the baby, postnatal formula use, postnatal incubator stay, presence of abnormal maternal bleeding, and development of infection. Those under 30 years of age had a significantly higher rate of abnormal bleeding than those over 30 years of age (p=0.029). (Table 5)

Table 4: The effect of stress level during pregnancy on adverse birth outcomes

Variables		**n**	**Mean**	**SD**	***P****
Pregnancy outcome	Live birth	99	96.7	23.9	0.506
	Abortus	3	106.0	19.1	
Birth of a premature baby*	Yes	12	106.0	10.7	0.162
	No	87	95.4	25.0	
Mode of delivery	Vaginal	39	99.1	27.2	0.471
	C/S	63	95.6	21.4	
Low birth weight*	Yes	8	98.9	15.8	0.789
	No	91	96.5	24.5	
Feeding status*	Yes	34	104.0	23.4	**0.039**
	No	65	93.1	23.6	
Postpartum incubator needs*	Yes	17	94.8	18.9	0.726
	No	82	97.1	24.9	
Separation of mother and baby*	Yes	14	94.5	19.8	0.714
	No	85	97.0	24.6	
Presence of abnormal bleeding in the mother	Yes	38	101.0	27.8	0.211
	No	64	94.7	20.9	
Development of any infection in the mother	Yes	5	98.0	16.7	0.921
	No	97	96.9	24.1	
Development of any problem in the breast	Yes	31	99.2	24.5	0.539
	No	71	96.0	23.5	

Student's t-test was applied.***:** Since the pregnancy process of 3 participants resulted in "miscarriage", they were not included in the analysis.

Table 5: Comparison of participants above and below 30 years of age according to various variables

Variables		**People under 30 years of age**		**People aged 30 years and older**		***P***
		n	%	n	%	
Pregnancy outcome	Live birth	79	79.8	20	20.2	0.503*
	Abortus	2	66.7	1	32.3	
Giving birth to a premature baby	Yes	11	91.7	1	8.3	0.450*
	No	68	78.2	19	21.8	
Mode of delivery	Vaginal	34	87.2	5	22.8	0.202**
	C/S	47	74.6	16	25.4	
Low birth weight	Yes	6	75.0	2	25.0	0.661*
	No	73	80.2	18	19.8	
Feeding status* **	Yes	26	76.5	8	23.5	0.739**
	No	53	81.5	12	18.5	
The need for a postpartum incubator	Yes	13	76.5	4	23.5	0.743*
	No	66	80.5	16	19.5	
Presence of abnormal maternal bleeding	Yes	35	92.1	3	7.9	**0.029****
	No	46	71.9	18	28.1	
Development of any infection in the mother	Yes	5	100.0	0	0.0	0.581*
	No	76	78.4	21	21.6	

***:** Fisher's exact chi-square test

****:** Chi-squared test with Yates correction

*****:** Since the pregnancy process of 3 participants resulted in "miscarriage", they were not included in the analysis.

Discussion

Pregnancy stress refers to concerns directly related to the pregnancy itself, such as fetal and maternal scans, infant health and development, changes in lifestyle due to motherhood, and fear of childbirth.[11] In a study of pregnant women attending the obstetrics and gynecology outpatient clinic at a public hospital in the Mediterranean region, the mean PSRS score of pregnant women was 94.9±7.2 (min:69-max:113). [12] Similarly, the mean score of the participants in our study was found to be 97.0±23.7.

In a study conducted on pregnant women, it was observed that there was a significant negative relationship between pregnancy stress and breastfeeding success. [13] On the other hand, a study of 594 participants suggested that inadequate management of pregnancy stress may lead to the development of postpartum depression. [14] A study by Dunn et al. showed that women with postpartum depression had higher rates of breastfeeding discontinuation. [15] Karahan et al. also found that women who exclusively breastfed their babies had lower rates of postpartum depression than those who fed their babies with formula. [16] In our study, it was observed that those with high pregnancy stress levels were more likely to give formula to their babies. Considering that breastfeeding has positive effects on both infant and maternal health according to the World Health Organization (WHO) and that WHO recommends exclusive breastfeeding for the first six months, it seems that combating prenatal stress will indirectly affect both maternal and infant health. [17]

An Australian study found that women with a history of miscarriage were more likely to experience sadness or depressed mood, anxiety, and stress during subsequent pregnancies. [18] However, in our study, there was no statistically significant difference between pregnant women with a history of miscarriage and those without a history of miscarriage in terms of the mean score of PSRS. It has been shown in the literature that stress during pregnancy may also be caused by a lack of social support. [19] The difference may be because social support elements such as family or relatives are relatively developed in our country. [20]

As the pregnancy process becomes risky, pregnant women are more affected psychologically and physiologically, and their stress levels increase. [21] Pregnant women with certain chronic diseases are known to be at higher risk of adverse pregnancy outcomes. [22] In the literature, it has been observed in some studies that pregnant women with chronic diseases have higher stress levels. [21] Our study supports this finding, and stress levels were significantly higher in pregnant women with at least one chronic disease.

Studies have found different results for the relationship between the educational level of individuals and pregnancy stress. In a study conducted by Sis and Atasever in 2020, it was observed that the educational level of individuals was a factor affecting the level of stress they had. [23] In a study conducted with pregnant women enrolled in family health centers located in the center of a province in eastern Turkey, it was observed that

women with low educational levels had higher pregnancy stress.[21] However, no significant relationship was found between educational level and pregnancy stress in our study. There are also studies in the literature that support our findings.[11,12] This difference may be due to the variability in the methods of expression or measurement of the stress level of individuals.

It is known that musculoskeletal and nervous system symptoms of negative emotions such as anxiety and worry include symptoms such as numbness and tingling. [24] In support of this, our study found that levels of pregnancy stress were significantly higher in those who experienced numbness in their hands and feet. Monitoring physical symptoms such as numbness and tingling in pregnant women may help assess pregnancy stress management and the course of the process.

In a study conducted by Zhang et al. on pregnant women, no statistically significant relationship was found between the stress level of pregnant women and C/S delivery, preterm labor, and low birth weight. [25] However, there are also publications showing that stress during pregnancy may be associated with preterm labor. [26] In a case-control study conducted by Lilliecreutz et al. in 2016, 54% of women who experienced stress during pregnancy had preterm labor. [27] In our study, although the rate of preterm labor was higher in women with higher levels of pregnancy stress, no significant relationship was found between preterm labor and pregnancy stress. The difference may be due to confounding factors that may affect preterm labor.

Although there are studies in the literature showing that excessive exposure to glucocorticoids in the mother due to dysregulation in the hypothalamic-pituitary-adrenal axis due to stress during pregnancy is associated with low birth weight, there are also studies to the contrary. [28] A Polish study showed that stress during pregnancy was not associated with low birth weight. [29] In our study, no difference was observed in terms of infant birth weight between pregnant women with and without high PSRS scores.

Although advanced age is considered a risk factor for postpartum hemorrhage, in our study, the proportion of women with abnormal postpartum hemorrhage was higher in women below 30 years of age compared to women above 30 years of age. [30] Since it is known that various external factors, such as prolonged trauma and intervention delivery, may also affect postpartum hemorrhage, the difference may be due to the confounding effect of these external factors.

As a result, pregnant women with chronic diseases and symptoms such as hand-foot numbness had significantly higher stress levels. A significant relationship was observed between giving formula to the baby after birth and pregnancy stress level. In women under 30 years of age, the rate of abnormal bleeding was significantly higher than in women over 30 years of age. Managing the factors that may cause pregnancy stress by regular follow-up of pregnant women by providing preventive health care services, especially in primary care, may be beneficial in terms of some adverse birth outcomes such as postpartum formula feeding.

Limitations

Since the population of the study consisted of pregnant women who applied to FHC, our study has limitations in representing the general population.

Ethical Considerations: Approval for our study was obtained from the Clinical Research Ethics Committee of Kayseri Training and Research Hospital (Date: 30.12.2021, Decision No: 569), and the study was conducted following the principles of the Declaration of Helsinki.

Conflict of Interest: The authors declare no conflict of interest.

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