

EFFECTS OF STRESS IN PREGNANCY ON PRENATAL ATTACHMENT, AND CONTRIBUTING FACTORS

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SUMMARY

Background: The mother's having good mental health during pregnancy is important for the mother's and fetus's health. Stress experienced during pregnancy can also affect prenatal attachment. In this study, it was aimed to determine the effect of the stress level of pregnant women on prenatal attachment and the factors affecting prenatal attachment.

Subjects: In this descriptive cross-sectional study conducted in the obstetrics outpatient clinic of a training and research hospital, 276 healthy primiparous pregnant women whose gestational age was ≥ 20 weeks were included. To collect the data, the Descriptive Characteristics Form, Pregnancy Stress Rating Scale (PSRS), and Prenatal Attachment Inventory (PAI) were used.

Results: The mean scores the participants obtained from the Pregnancy Stress Rating Scale and Prenatal Attachment Inventory were 40.13 ± 31.22 and 46.87 ± 16.62 respectively. A moderately statistically significant negative correlation was determined between pregnancy stress and prenatal attachment ($r = -0.42$, $p = 0.000$). In the study, it was observed that pregnancy stress level of the participating pregnant women decreased as the age increased ($r = -0.13$, $p = 0.026$), but that it increased as their education and income levels increased ($\chi^2 = 8.150$, $p = 0.043$ - ($\chi^2 = 6.785$, $p = 0.034$). The participants' attachment levels were not correlated with variables such as age, education, baby's sex and gestational age, but prenatal attachment levels of the participants who received social support while they did house hold chores were statistically significantly higher ($U = 7872.500$, $p = 0.025$).

Conclusions: It was observed that as the prenatal attachment level of the participating pregnant women decreased, as their stress level increased, that their stress level decreased as their age increased, that that their stress level increased as the education and income levels increased, and that the prenatal attachment of the participants who received social support when they did household chores was higher. It is thought that health personnel can improve prenatal attachment by taking necessary steps to reduce the stress levels of pregnant women in this process.

Key words: pregnancy - pregnancy stress - prenatal attachment

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INTRODUCTION

Pregnancy is not only a physiological process for women, but also a period in which they undergo important biological and psychosocial changes and the possibility of facing risk factors that can cause stress and anxiety is high (Virrit et al. 2008). In some studies conducted to investigate the prevalence of psychological stress in pregnant women demonstrated that 13-25% of the women experienced clinically significant episodes of psychological stress (Gavin et al. 2005, Priest et al. 2003). Good mental health during pregnancy is of importance for maternal and fetal health. The psychological changes experienced by pregnant women during the prenatal period may also affect prenatal attachment (Kumcagiz et al. 2017).

Increased stress during pregnancy activates the mother's hypothalamic-pituitary-adrenal axis. Thus, the secretion of corticotropin-releasing hormone (CRH) from the hypothalamus increases. CRH secreted from the hypothalamus stimulates the release of adrenocorticotrophic hormone (ACTH) from the pituitary which increases the release of cortisol and norepinephrine from the adrenal gland. This increase in cortisol and norepinephrine levels reduces blood flow to the uterus

and thus causes significant obstetric and neonatal complications (Usta & Balıkçı 2012). Chronic exposure to stress hormones during pregnancy can lead to spontaneous abortion, low birth weight, and postpartum mood disorder on one hand, and can cause developmental problems in the newborn and personality and behavior problems in childhood on the other hand (Aksoy et al. 2019). Stress is a crucial problem which should be handled with care, and be diagnosed and treated early due to negative effects it causes during pregnancy.

The attachment between the mother and fetus was first demonstrated based on the intense grief experienced by mothers who lost their baby during childbirth (Dereli Yılmaz 2013). Cranley defined maternal-fetal attachment by talking about the woman who established a close relationship and interacted with her unborn child through her behaviors (Cranley 1981). Muller, on the other hand, defined prenatal attachment as the only relationship that develops between the mother and her unborn baby (Muller 1993). The bond that will be established between the mother and baby has a great effect on the social and emotional development of the baby. The most important part of the attachment between the mother and baby begins just before birth, which continues to develop in the month right after birth (Muller

1993). Being primiparous, planned pregnancy, intended pregnancy, accepting pregnancy, feeling movements of the fetus, accepting the fetus as an individual, socio-economic and cultural status of the family, spousal support and stress are among the factors affecting prenatal attachment (Kartal & Karaman 2018, Dağlar & Nur 2014, Yılmaz & Beji 2010). In several studies, it is indicated that there is a relationship between a strong mother-baby attachment during pregnancy and variables such as exhibiting positive health behaviors during pregnancy, avoiding tobacco, alcohol and illegal drugs, receiving and participating in care before birth, healthy eating and sleeping habits, doing appropriate exercises, using seat belts, pregnancy, and trying to obtain more information about birth and baby care (Lingren 2001-2003).

The first step in preventing pregnant women from suffering stress, and achieving a positive prenatal attachment is to identify women who are at risk. Early identification of women at risk will make it possible to early perform preventive interventions in this regard. Thus, the negative effects of stress on pregnancy and prenatal attachment will be prevented or reduced. Therefore, it was aimed to determine the effect of stress levels of pregnant women on prenatal attachment and affecting factors.

SUBJECTS AND METHODS

Design and Participants

This descriptive cross-sectional study was conducted in the outpatient obstetric clinic of a education and research hospital. The study population comprised 983 primiparous pregnant women who presented to the hospital in the previous year. The study was completed with 276 of them. The power of the study was calculated as 99% in the statistical program G-Power 3.0.1. Of the primiparous pregnant women, those whose gestational age was ≥ 20 weeks were included in the study. Of the primiparous pregnant women, those who were under the age of 18, those who became pregnant after infertility treatment, those who were multiparous, those who had risky pregnancies (such as gestational diabetes, eclampsia and preeclampsia, threatened preterm birth, premature rupture of membranes), those who had psychiatric diseases and those who were not living with their spouses were not included in the sample.

The study population determined according to a finite universe sample calculation formula:

$$n = \frac{N t^2 p q}{D^2 (N - 1) + t^2 p q}$$

$$n = \frac{983 \cdot 1.96^2 \cdot 0.5 \cdot 0.5}{0.05^2 \cdot 982 + 1.96^2 \cdot 0.5 \cdot 0.5} = 276$$

N = Number of individuals in the research population = 983

p = Frequency of the event examined = 0.5

q = (1-p) = frequency of non-occurrence of the event examined = 0.5

D = Effect size = 0.05

t = t value for error margin at 95% confidence level, which is the theoretical value in the table t at a certain degree of freedom and at the determined error level: 1.96

Measures

To collect the data, the Descriptive Characteristics Form, Pregnancy Stress Rating Scale (PSRS), and Prenatal Attachment Inventory (PAI) were used.

Descriptive Characteristics Form

The form consists of items questioning the participants' socio-demographic (age, education, employment, economic status, family type, etc.), obstetric and current pregnancy characteristics (number of pregnancies, planned pregnancy, current gestational age etc.).

Pregnancy Stress Rating Scale (PSRS)

The 30-item scale was developed by Chen et al. in China in 1983 to measure perceived stress levels of women during pregnancy. The scale, which was finalized in 2015, has five sub-dimensions. The validity and reliability study of the Turkish version of the scale was performed by Aksoy et al. (2019) The scale whose Cronbach's alpha coefficient was 0.94 was highly reliable. All the items of the scale are positively keyed and are rated on a 5-point Likert type scale ranging from 0 to 4: Definitely no (0), mild (1), moderate (2), severe (3), very severe (4). The sum of all item scores yields the prenatal stress score. The minimum and maximum possible scores to be obtained from the scale are 0 and 144 respectively. The higher the score is the higher the level of perceived prenatal stress (Aksoyet al. 2019).

The Prenatal Attachment Inventory (PAI)

The PAI was developed by Mary Muller in 1993. The validity and reliability study of the Turkish version of the scale was carried out by Dereli Yılmaz & Kızılkaya Beji (2013). The 21-item inventory was developed to explain the thoughts, feelings and situations experienced by women during pregnancy and to determine their level of attachment to the baby in the prenatal period. Responses given to the item sare rated on a four-point Likert type scale ranging between 1 and 4. The minimum and maximum possible scores to be obtained from the scale are 21 and 84 respectively. As the score obtained from the inventory by the pregnant woman increases so does her level of attachment. The Cronbach's alpha reliability coefficient of the scale was 0.84 (Dereli Yılmaz & Kızılkaya Beji 2013).

Data Collection

Data were collected through face-to-face interviews between March 2020 and December 2020. The study data were collected from the participating pregnant women who were admitted to the obstetrics outpatient clinics after their health examination. Their verbal and written consent was obtained after they were informed about the study in the waiting room.

Statistical Analysis

Statistical analysis of the data was performed using the Statistical Package for Social Sciences (SPSS) 22.0. Frequency, percentage and arithmetic mean \pm standard deviation values were given as descriptive statistics. In the analysis of the data, Kolmogorov Smirnov test was used to check whether the continuous variables had normal distribution. The comparison of the data without normal distribution was performed with the Mann Whitney U test if there were two independent groups, and the Kruskal Wallis test was used if there were more than two independent groups. The p-value of <0.05 was accepted for the significance level of statistical tests.

Ethical Consideration

Institutional permissions were obtained from the relevant hospital and the Non-Interventional Ethics Com

mittee of a relevant research university (09-2019/49). Written and verbal consent was obtained from all the women who participated in the study.

RESULTS

The mean age of the pregnant women participating in the study was 25.75 ± 4.71 years and their mean gestational age was 30.72 ± 5.18 weeks. Of them, 15.9% were primary school graduates, 22.1% had primary school graduate husbands, 72.5% were unemployed, 26.4% had an income less than their expenses, 87% had a nuclear family, 99.3% chose their spouse of their own free will, 43.1% had nobody to help them do household chores such as cleaning, shopping etc. (Table 1).

There was a moderately statistically significant negative correlation between pregnancy stress and prenatal attachment levels of the participants ($r = -0.42$, $p = 0.000$),

Table 1. Socio-demographic and obstetric characteristics of pregnant women

Characteristics	\bar{x}	SD	min	max	n	%
Age	25.75	4.71	18	40		
Gestational age (weeks) (n:276)	30.72	5.18	22	41		
Educational Status (n:276)						
Primary School					44	15.9
Secondary School					90	32.6
High School					55	19.9
University/ Postgraduate					87	31.5
Educational Status of the Spouse (n:276)						
Primary School					61	22.1
Secondary School					96	34.8
High School					55	19.9
University/ Postgraduate					64	23.2
Employment Status (n:276)						
Employed					76	27.5
Not employed					200	72.5
Income Status (n: 276)						
Income less than Expenses					73	26.4
Income Equal to Expenses					169	61.2
Income more than Expenses					34	12.3
Family Type (n:276)						
Nuclear Family					240	87.0
Extended Family					36	13.0
Did you get married to your husband of your own free will?						
Yes					274	99.3
No					2	0.7
Does anybody help you do household chores such as cleaning, shopping etc.?						
Yes					157	56.9
No					119	43.1
Is your pregnancy an intended one?						
Yes					250	90.6
No					26	9.4
What is your baby's sex?						
Girl					124	44.9
Boy					152	55.1
What would you like the sex of your baby to be?						
Girl					74	26.8
Boy					21	7.6
It does not matter					181	65.6

which suggests that the level of prenatal attachment decreases as the pregnancy stress level increases (Table 2). In the present study, pregnancy stress decreased as the participant's age increased ($r=-0.13$, $p=0.026$) but it was

not affected by the gestational age ($r=-0.04$, $p=0.447$). However, the participants' education level affected their stress levels. The further analysis demonstrated that the stress level of the participants who graduated from

Table 2. Mean scores the participants obtained from the Pregnancy Stress Rating Scale (PSRS) and Prenatal Attachment Inventory (n=276)

	$\bar{x}\pm SD$	min	max	r*	p
Pregnancy Stress Rating Scale	40.13±31.22	0	140	-0.42	0.00**
Prenatal Attachment Inventory	46.87±16.62	21	84		

* Spearman correlation test; ** $p<0.05$

Table 3. Factors affecting the scores the participants obtained from the Pregnancy Stress Rating Scale

Characteristics	Pregnancy Stress Rating Scale Score			
			r	p
Age			-0.13	0.026*
Gestational age (weeks) (n:276)			-0.04	0.447
	\bar{x}	SD	χ^2	p
Educational Status (n:276)				
Primary School	35.52	33.33		
Secondary School	40.37	29.69	8.150	0.043*
High School	33.61	28.09		
University/ Postgraduate	46.34	32.81		
Educational Status of the Spouse (n:276)				
Primary School	42.86	35.12		
Secondary School	34.93	30.77	7.146	0.067
High School	39.40	28.49		
University/ Postgraduate	45.96	29.54		
Income Status (n: 276)				
Income less than Expenses	45.28	32.81		
Income Equal to Expenses	36.32	29.90	6.785	0.034*
Income more than Expenses	48.02	32.00		
			U	p
Employment Status (n:276)				
Employed	43.76	33.31	6936.500	0.263
Not employed	38.76	30.77		
Family Type (n:276)				
Nuclear Family	38.96	30.50	3715.000	0.175
Extended Family	47.94	35.14		
Did you get married to your husband of your own free will?				
Yes	40.09	31.28	222.000	0.644
No	46.00	29.69		
Does anybody help you do household chores such as cleaning, shopping etc.?				
Yes	42.33	32.26	8669.000	0.306
No	37.23	29.68		
Is your pregnancy an intended one?				
Yes	41.24	31.65	2560.500	0.075
No	29.53	24.85		
What is your baby's sex?				
Girl	41.41	29.93	8774.500	0.325
Boy	39.09	32.30		
			χ^2	p
What would you like the sex of your baby to be?				
Girl	50.70	30.36		
Boy	25.19	32.00	19.206	0.000*
It does not matter	37.55	30.38		

* $p<0.05$

primary or high school was significantly lower than was that of the participants who had university and higher education ($\chi^2=8.150$, $p=0.043$). While there was no correlation between the participants' working status and their stress level, the participants whose income was higher than their expenses had a higher stress level than did those whose income was equal to their expenses ($\chi^2=6.785$, $p=0.034$) (Table 3).

There was no correlation between the participants' prenatal attachment levels and the variables such as

age ($r=0.048$, $p=0.431$) and gestational age ($r=-0.035$, $p=0.557$). There was no correlation between the participants' and their husbands' education level and the level of prenatal attachment either. However, prenatal attachment levels of the participants who received social support for doing household chores were statistically significantly higher ($U=7872.500$, $p=0.025$). The sex of the baby had no effect on prenatal attachment ($U=8520.000$, $p=0.170$) (Table 4).

Table 4. Factors affecting the Prenatal Attachment Inventory score of pregnant women

Characteristics	Prenatal Attachment Inventory score			
			r	p
Age			0.048	0.431
Gestational age (weeks) (n:276)			-0.035	0.557
	\bar{x}	SD	χ^2	p
Educational Status (n:276)				
Primary School	48.27	17.76		
Secondary School	46.25	15.62	6.943	0.074
High School	50.83	16.59		
University/ Postgraduate	44.31	16.79		
Educational Status of the Spouse (n:276)				
Primary School	47.40	17.68		
Secondary School	49.42	16.98	5.105	0.164
High School	44.76	14.08		
University/ Postgraduate	44.35	16.80		
Income Status (n: 276)				
Income less than Expenses	48.08	17.08		
Income Equal to Expenses	46.79	16.63	0.428	0.807
Income more than Expenses	44.69	15.79		
			U	p
Employment Status (n:276)				
Employed	44.31	16.94	6657.000	0.111
Not employed	47.85	16.43		
Family Type (n:276)				
Nuclear Family	47.33	16.67	3629.500	0.122
Extended Family	43.83	16.14		
Did you get married to your husband of your own free will?				
Yes	46.94	16.64	185.000	0.429
No	37.50	12.02		
Does anybody help you do household chores such as cleaning, shopping etc.?				
Yes	48.76	16.11	7872.500	0.025*
No	45.44	16.91		
Is your pregnancy an intended one?				
Yes	46.66	16.73	2889.500	0.352
No	48.88	15.66		
What is your baby's sex?				
Girl	47.51	15.74	8520.000	0.170
Boy	46.35	17.33		
			χ^2	p
What would you like the sex of your baby to be?				
Girl	44.29	14.07		
Boy	50.71	21.15	1.243	0.537
It does not matter	47.48	16.94		

* $p<0.05$

DISCUSSION

The present study was carried out to determine the effect of stress levels of pregnant women on their prenatal attachment and the factors affecting prenatal attachment. The results of the present study demonstrated that pregnancy stress affected prenatal attachment negatively, and that the level of prenatal attachment decreased as the stress level increased.

Consistent with our result, in other studies conducted with pregnant women, a negative relationship was found between the level of stress perceived during pregnancy and maternal-fetal attachment (Srivastava and Bhatnagar 2019, Mazzeschi et al. 2015). Similarly, it was determined that anxiety (Abasi et al. 2012) and distress (Coşkun, Okçu & Arslan 2019) experienced during pregnancy affected prenatal attachment negatively. In their study, Lefkovic et al. (2014) analyzed the results of 35 studies, and they found that the diagnosis and treatment of depressive symptoms in the antenatal period was important because it ensures prenatal mother-infant attachment. The stress experienced during pregnancy is eustress (positive stress) resulting from the changing role of the woman as a mother and her concerns about the health of the baby. This stress does not prevent the expectant mother from bonding with her unborn child, on the contrary, it facilitates her bonding. If stress turns into distress (negative stress), it becomes a barrier to maternal-fetal attachment (Karakoça & Ozkanb 2017, Srivastava & Bhatnagar 2019). As long as the psychological health is good during pregnancy, the level of prenatal attachment may increase (Karakoça & Ozkanb 2017). There is enough evidence that even a mild stress or anxiety experienced during pregnancy affects the fetus and has long-term consequences in prenatal attachment, then in mother-infant attachment, and finally in the development of the infant and child (Lindgren 2001, Van den Bergh et al. 2017, Lin et al. 2017). In one study, the pregnancy stress suffered by the woman was stated to be significantly associated with cortisol reactivity in the infant in the postpartum period (Zietlow et al. 2019). In another study, the mother's sex posture to emotional stress before birth was stated to have a negative effect on the cognitive development of the child after birth (Lin et al. 2017). In their study, Riedstra and Aubuchon-Endsley (2019) revealed a statistically and clinically significant relationship between the prenatal stress and anxiety levels of women and the reduced breastfeeding duration after delivery, and they stressed that, given this result, in clinical settings, even low prenatal stress and anxiety levels should not be ignored. It is thought that it is extremely important to diagnose and treat the stress in the early period because it can cause serious problems for the mother and baby during and after pregnancy.

In the present study, the level of stress suffered by the participating pregnant women was below the moderate level. In studies conducted to determine stress,

anxiety and depression in pregnant women, the stress levels of pregnant women were determined to be below the moderate level (Chen 2015, Zhang et al. 2019). Unlike our study findings, in Hou et al.'s study (2018), most of the pregnant women had a moderate level of stress, and in Tsai et al.'s study (2018), the participants' stress level was above the moderate level. This might be due to the fact that in the aforementioned studies, the participants were in the second trimester. The level of stress experienced pregnant women may be different due to the characteristics of the trimesters they are in (Tunçel & Süt 2019). That the pregnant women participating in our study had low stress levels was interpreted as a positive finding.

Another remarkable result is that the participants' stress level decreased as their age increased. Different from our study results, in their study conducted with a sample of 914 pregnant women, Çapık, Apay & Sakar (2015) determined that the participants' distress level increased as their mean age decreased. In their study conducted with healthy nulliparous patients, Garcia-Blanco et al. (2017) determined that prenatal depressive symptoms increased as the age increased. That the level of stress increases as the gestational age increases can be explained by the pregnant women's belief that they may have negative physiological and psychological experiences in the process. The belief that the risks will increase with age may have caused an increase in the stress level of the pregnant women.

In our study, contrary to the results of other studies (Demirbaş & Kadioğlu 2014, Dağlar & Nur 2014, Betts et al. 2015, Kaya et al. 2020), the participants' pregnancy stress levels increased as their education level and income status increased. Education and income status are important factors that determine a woman's social position and they also affect her adaptation to the motherhood role during and after pregnancy (Demirbaş & Kadioğlu 2014). The rate of receiving prenatal care is high in pregnant women with higher education and income status. Women who receive proper and adequate prenatal care accept pregnancy in a shorter time and can adapt to pregnancy and the motherhood role more easily (Katz 2010). On the other hand, women with high education and income levels may experience stress due to the change in their body image resulting from weight gain in the last trimester, which may cause them to perceive their bodies as unattractive (Kumcağız 2012, Smith et al. 2008). In our study, the fact that the majority of the participants were in the third trimester may have led to this result.

While prenatal attachment scores in pregnancy in Kartal & Karaman's (2018) 59.90 ± 12.40 , Dağlar & Nur's (2018) 57.1 ± 11.5 , Tuncel & Süt's (2019) 60.1 ± 12.6 , Coşkun, Okcu & Arslan's (2019) 62.35 ± 11.28 , Badem & Zeyneloğlu's (2021) 59.31 ± 11.06 , and Karakoca & Ozkanb's (2017) 56.97 ± 11.58 studies were higher than were those in our study, those in Özkan, Küçükkeleşpe & Özkan's (2020) 43.84 ± 9.71 study were similar to our study results (46.87 ± 16.62). Prenatal attachment is

an important factor contributing to postnatal attachment (Dağlar & Nur 2018). Pregnant women with a good prenatal attachment level also experience less negativity in mother-baby attachment in the postpartum period (Dubber et al. 2015). It is recommended that pregnant women with low prenatal attachment level should be identified during antenatal visits and that they should be offered interventions to improve attachment.

Our study results demonstrated that the prenatal attachment levels of the participants who received social support and those who were helped with household chores were higher than were those of the participants who did not receive support or help. The pregnant woman's receiving social support increases the level of bond between her and baby both during pregnancy and after birth, and accordingly empowers her to cope with stress (Lamarca et al. 2013, Kartal & Karaman 2018, Kaya et al, 2020). If a pregnant woman's prenatal attachment and ability to cope with pregnancy stress are to be improved, her receiving social support is of great importance (Tunçel & Süt 2019). In a study, it was observed that when a woman received a good level of social support during pregnancy, the negative effect of stress on prenatal attachment decreased (Hopkins et al. 2018). In their study Özcan et al. (2018) found that the presence of social support increased prenatal attachment and reduced the stress level in pregnant women. It is thought that receiving a social support by pregnant women achieving multiple roles (such as household chores, shopping, childcare etc.) will encourage them to focus on their babies, which will decrease their stress level and increase their attachment level. Contrary to many studies (Lindgren 2001, Tunçel & Süt 2019, Coşkun et al. 2019, Napoli et al. 2020, Karabulutlu et al. 2020, Badem & Zeyneloğlu 2021), in our study, no significant relationship was found between prenatal attachment and such variables as age, education, income level, gestational age, having a planned pregnancy.

CONCLUSION

In conclusion, it was determined that the participants' prenatal attachment levels decreased as their stress levels increased, that their stress levels decreased as their age increased, that their pregnancy stress levels increased as their education and income levels increased, and that prenatal attachment levels of the participants who received social support for doing household chores were higher. It was also determined that the participating women's pregnancy stress levels were below moderate and that their prenatal attachment level was moderate.

Given the fact that pregnancy stress negatively affects prenatal attachment, it is recommended that screenings not only for the psychosocial but also physical health of pregnant women should be performed. The results of the screenings suggest that health professionals

should plan practices to prevent pregnancy stress to improve the well-being of the mother and baby during pregnancy and to take measures to strengthen social support systems, and that they should also conduct qualitative studies in order to determine sources of stress in pregnant women and situations that may adversely affect prenatal attachment.

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Contribution of individual authors:

Yasemin Şanlı: design of the study, literature searches and analyses, application of research, interpretation of data, first draft and revising it critically for important intellectual content; approval of the final version.

Nuran Nur Aypar Akbağ: design of the study, statistical analyses, interpretation of data, first draft and revising it critically for important intellectual content; approval of the final version.

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