Original Article

Stress Level and Stressors in Women with Threatened Preterm Labor

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Abstract

Background: Threatened preterm labor is a common pregnancy problem. It is important to know the stress levels and stressors of women hospitalized due to the threat of preterm birth in order to protect the health of the mother and fetus.

Objectives: To compare the association between gestational weeks and stressors in hospitalized women with threatened preterm labor.

Methods: We implemented a cross-sectional descriptive study to examine the association between maternal stress level, stressors, and pregnancy weeks in threatened preterm labor. Information was collected from 125 participants who were diagnosed with threatened preterm labor in two research hospitals and included in the final analysis. Multinominal logistic regression model was used to estimate the adjusted odds ratio (OR) and 95% confidence interval (95% CI) controlling for stressors.

Results: In total, 72.8% of 125 women in this study evaluated stress level as ≥6 out of 10. According to multinomial logistic regression test results, the most important stressors according to gestational weeks in threatened preterm labor; fear of labor, stress score in the last month, diagnosis of threatened preterm labor, fear of losing her baby, familial conflict, being separeted from the child in the home and inability to provide care, problems in previous pregnancies, bed rest, and being primigravida.

Conclusion: Maternal stressors are associated with gestational week in threatened preterm labor. The findings will provide preliminary information to healthcare professionals in the evaluation of stress and stressors during the treatment process of women in threatened preterm labor.

Keywords: Threatened preterm labor, stress, stressors, Multinomial Logistic Regression, gestational week.

Introduction

Preterm labor, regardless of region or development level, is an important global health problem that needs to be addressed to reduce neonatal and child mortality and achieve Sustainable Development Goals. Globally, the preterm labor rate is estimated to be 9.8% in 2000 and 10.6% in 2014 (Chawanpaiboon et al., 2014). The rate is 12% in Turkey (World Health Organization, 2012). Threatened preterm labor (TPL) is defined as a condition in which cervical dilation and effacement due to regular uterine contractions may result in preterm labor before the 37th gestational week (American College of Obstetricians and Gynaecologists, 2016). The most common causes of TPL are chronic conditions, such as multiple pregnancies, infections, diabetes, and high blood pressure, as well as genetic factors and stress (World Health Organization, 2014). TPL may develop as a result of stress, as well as the stress related to TPL (García-Blanco et al., 2016; Lilliecreutz et al., 2016).

Women diagnosed with TPL are usually hospitalized and treated (Sosa et al., 2015). It is stated that pregnant women may experience TPL if they experience stress and that they experience stress when hospitalized due to a diagnosis of TPL, as well (Lilliecreutz et al., 2016). Acute stressors such as TPL are reported to decrease the level of maternal immunity, to cause increased maternal and fetal cortisol levels, and to possibly

contribute to an increased risk of TPL with the placental corticotropin-releasing hormone production (García-Blanco et al., 2016; Ruiz et al., 2016).

Various studies have investigated the association between stress and TPL. In these studies, the prevalence of stress in women with pregnancy has been found at different levels. Woods et al. (2010) evaluated 1.522 women with pregnancy using the Prenatal Psychosocial Profile stress scale. In their study, 6% of the women with pregnancy reported high stress, 78% reported low/ medium stress, and 16% reported no stress at all. In their study aiming to reduce the stress of women with pregnancy who were hospitalized due to TPL, Jallo et al. (2017) determined the stress level of 86% of 22 women as ≥ 4 (moderate stress) with the Visual Analog Stress Scale (VASS). Tanpradit et al. (2020) assessed 200 women with pregnancy with the Thai Perceived Stress Scale-10. The authors classified the scores as 0-13, low stress; 14-26, moderate stress; and 27-40, high stress. In the study, 83 of 100 women who had preterm labor exhibited moderate stress, while 65 of 100 women who had term labor were found to have low levels of stress.

In women experiencing high stress during pregnancy, TPL and TPL-associated shortened gestation length increase the risk as much as 25-60% more compared to women with low stress levels (Khashan et al., 2014; Tanpradit & Kaewkiattikun, 2020). Stressors associated with TPL in women with pregnancy include family problems, stressful life events, loss of a relative (Zhang et al., 2012), low socioeconomic status (Kim et al., 2018), urgent hospitalization due to risk in pregnancy (Rodrigues et al., 2016), work-related problems (shift work, long hours standing up, lifting heavy loads) (Stylianou-Riga et al., 2018, and the status of perceived stress (Vijayaselvi et al., 2015). Also, TPL is one of the most repeated and consistent findings in maternal stress studies (García-Blanco et al., 2016; Ruiz et al., 2016; Tanpradit & Kaewkiattikun, 2020). Accordingly, we planned to carry out a cross-sectional descriptive study to compare the association between gestational weeks and stressors in hospitalized women with TPL.

Materials and Methods

Study design and population: The study was conducted with a total of 125 pregnant women as a cross-sectional descriptive study at two research hospitals. The hospitals where the research was conducted were tertiary healthcare providers that followed-up and treated risky pregnancies such as TPL. We conducted this study to compare the association between gestational weeks and stressors in hospitalized women with TPL. The study population consisted of all pregnant women who were admitted to the clinics with a diagnosis of TPL between January 1, 2017 and October 31, 2017. The sample of the study consisted of 125 pregnant women at risk who were diagnosed with TPL, hospitalized for at least 24 hours, aged 18 or over, conversant in Turkish, and agreed to participate in the study. Women with psychiatric disorders were not included in the sample. Ethical approval was obtained from the Ethical Committee of Clinical Research of a University (no: 2017/01-28). The women were well counseled on the purpose of the study and they all gave consent. Those who withheld consent were excluded from the study. At the beginning of the study, a power analysis was conducted using the G-Power (3.0.1) data analysis software package. Perceived stress scores from the study of Khorsandi et al. (2016) were taken as a basis to determine the adequate sample size. We used the Student's T-test and accepted the effect size as .70, and Type I and II error levels as .05 and .20 (based on 80% power), respectively, and calculated the required sample size as 102 individuals.

Data collection and definition of variables: The study data were collected through face-to-face interviews, each of which lasted about 15-20 minutes. Data about the descriptive characteristics of the women with pregnancy were collected with a structured questionnaire. This questionnaire consists of a total of 14 items about socio-demographic and obstetric characteristics, such as age, education status, and gestational age. Data about stress and stressors were collected using a "Stressors Questionnaire", which was developed by the researchers according to the literature (Levison et al., 2014; American College of Obstetricians and Gynaecologists, 2019; The National Institute for Health and Care Excellence, 2019). The stressors questionnaire was submitted to the opinions of ten experts. Based on expert opinions and the stress level of ≥ 4 specified in Jallo et al. (2017), the stress levels were classified as low stress (≤ 5) and high stress (≥ 6). The Stressor Questionnaire consists of three sections and 22 items, nine of which are about general life, two of which are about pregnancy, and eleven of which are about the hospital environment. Information about stress levels was based on the question "Do you feel stressed at present?", and

information about stressors was based on the questions "Do you have stress due to bed rest?" and "Are you stressed about your baby's health?" Then, the women with pregnancy were asked to rate each question with a score between 0 and 10.

Variables: *Dependent variable – (gestational age as source)*

The dependent variable was classified into three categories. Category: To determine the stress level and stressors in women according to gestational weeks, dependent variable categories were classified according to the TPL weeks specified by the World Health Organization. Description: 1) Extremely preterm (EP) (less than 28 weeks), 2) Very preterm (VP) (28 to 32 weeks), and 3) Moderate to late preterm (MLP) (32 to 37 weeks) (World Health Organization, 2018).

Independent variables as predictors

Independent variables as predictors of the source of information about stress levels and stressors were based on the Stressors Questionnaire. Independent variables related to stress levels and stressors indicated by women with TPL are given in Table 1 and 2. The stress levels related to the variables used in the analysis were defined as low stress: 0 (Stress level ≤ 5) and high stress: 1 (Stress level ≥ 6).

Data Analysis: Data were analyzed using SPSS 20.0 for Windows software package, and two-tailed p <.05 was considered statistically significant. In the evaluation of the data, the Kolmogorov-Smirnov test was used for checking the conformity of the continuous variables to the normal distribution. For the descriptive characteristics of the women with pregnancy, numbers, percentiles, and chi-square values were used. Independent Samples T-test was used to evaluate the normal distribution of stressor variables. The Multinominal Logistic Regression model used in this study estimated the effect of women's stress levels on the possibility of choosing some type of stressor sources for TPL in terms of the gestational week.

Results

During the study, 142 women with TPL were screened for participation. Of these, 17 declined to participate. The women did not differ in any of the descriptive characteristics. Descriptive characteristics are presented in Table 1 (p >.05). Regarding the comparison of stressor variables according to women's stress levels, variables, such as family conflict (including the women and husband's families), diagnosis of TPL, fear of losing her baby, problems in previous pregnancies, fear of labor, being separated from the child at home and inability to provide care, bed rest, gestational age, number of pregnancies, and stress score in the last one month were statistically significant (p<.05) (Table 2).The Multinominal Logistic Regression analysis in Table 3 shows the change of stressor variables according to gestational weeks in women with high stress levels and gestational age ranging from EP to VP compared to women with low stress levels and MLP gestational age.

Table 1. Descriptive characteristics of the pregnant women according to their stress scores (n: 125)

Characteristics	Stress Level ≤ 5 (low stress)		Stress Level ≥ 6 (high stress)			
	n	**%**	**n**	**%**		
	34	27.2	91	72.8	**x²***	**P Value**
Age						
18-25	16	40.0	23	27.1		
26-35	15	37.5	41	48.2	2.17	.332
>=36	9	22.5	21	24.7		
Income status						
Low	8	20.0	22	25.9	.52	.467
Balanced	32	80.0	63	74.1		
Education status						
High school or lower	23	67.6	59	64.8	1.14	.563

College	11	32.4	32	35.2		
Working status						
Working	4	10.0	16	18.8	1.69	.194
Not working	36	90.0	69	81.2		
Family type						
Core	30	75.0	65	76.5	1.60	.856
Large	10	25.0	20	23.5		

*Fisher's Exact Test

Table 2. Distribution of stressors of pregnant women

Variables	Stress Level ≤ 5 x̄±SD	Stress Level ≥ 6 x̄±SD	Total x̄±SD	t*	P Value
General Stressors in the Last Month					
Familial conflict (her and her husband's family)	1.85±2.38	9.09±1.31	7.52±4.19	2.064	**.026**
Problems in the relationship with the spouse	3.62±3.95	5.93±4.13	5.34± 4.17	-.761	.448
Child care	2.64±3.69	4.12±4.20	3.76±3.90	-1.931	.056
Working status	5.25±4.70	6.31±5.67	3.51±3.45	-941	.349
Economic inability	1.91±.40	1.80±.60	2.87±2.81	-1.153	.251
Stressors Related to Pregnancy					
Diagnosis of TPL	4.79±3.62	9.09±1.31	7.83±2.09	3.121	**.002**
Fear of losing her baby	3.32±3.50	8.41±2.60	7.05±3.12	2.875	**.005**
Problems in previous pregnancies	2.73±3.18	7.23±3.70	6.02±4.52	2.086	**.039**
Unplanned current pregnancy	2.47±2.59	3.75±4.08	3.31±4.24	-1.926	.056
Stressors Related to the TPL Process					
Fear of labor	3.32±3.53	8.54±2.44	7.13±1.36	3.041	**.004**
Being separated from the child in the home and inability to provide care	2.14±2.65	4.97±4.29	4.25±3.80	2.023	**.041**
Bed rest	2.11±2.29	4.78±4.37	3.57±2.47	2.081	**.036**
Medication	2.17±2.52	4.65±4.60	3.54±3.59	-946	.346
Insomnia	2.00±3.13	3.12±3.99	2.96±3.54	-1.149	.254
Inability to eat hospital food	2.64±3.99	2.16±3.38	2.36±2.31	-.331	.741
Crowded room	1.73±.72	1.80±1.68	1.86±2.96	-1.006	.317
Attitude of health professionals	1.63±.70	1.49±.84	1.17±2.57	.635	.527
Pregnancy of week					
Extremely preterm (n: 37) (less than 28 weeks)	2.00±2.39	9.90±1.23	7.72±3.30	15.525	**.000**
Very preterm (n: 39) (28 to 32 weeks)	1.58±2.31	8.95±1.50	7.17±3.71	9.722	**.000**
Moderate to late preterm (n: 49) (32 to 37 weeks)	1.00±2.23	8.68±1.32	6.26±3.49	13.057	**.000**

Pregnancy number

Primipara	2.00±2.48	9.12±1.29	7.18±3.61	2.055	**.048**
Multipara	1.77±2.22	7.08±1.35	5.98±3.65	1.937	**.035**

Stress score in the last one month

Stress level ≤ 5	2.04±2.25	4.37±3.89	3.61±3.95	1.873	**.049**
Stress level ≥ 6	3.02±3.37	7.06±3.75	5.93±4.13	3.231	**.001**

*Independent Samples T-Test

Table 3. Results of the Multinomial Logistic Regression in the Final Model Showing Significant Effects in the Stressors of Women with TPL

	Stressors	Coefficient (β)	Standard Error	Wald	df	P Value	Odds Ratio ($e^{β}$)
Extremely preterm (less than 28 weeks)	Intercept	4.354	1.737	13.165	1	.000	
	Fear of labor	1.626	.675	5.576	1	.016	5.062
	Stress score in the last one month	1.316	.571	4.837	1	.030	4.120
	Diagnosis of TPL	1.499	.623	5.052	1	.025	4.145
	Fear of losing her baby	1.162	.450	4.263	1	.028	3.783
	Familial conflict (her and her husband's family)	1.375	.654	4.614	1	.036	3.354
	Being separated from the child in the home and inability to provide care	.852	.440	3.833	1	.047	2.377
	Problems in previous pregnancies	.236	.126	3.920	1	.048	.774
	Bed rest	.748	.346	4.662	1	.031	.453
	Primigravida	1.218	.314	10.237	1	.001	.361
Very preterm (28 to 32 weeks)	Intercept	3.487	1.456	9.733	1	.003	
	Familial conflict (her and her husband's family)	1.274	.525	6.352	1	.012	3.674
	Stress score in the last one month	1.362	.654	4.265	1	.035	3.383
	Fear of losing her baby	1.117	.348	10.312	1	.001	3.034
	Fear of labor	1.046	.390	7.498	1	.007	2.826
	Diagnosis of TPL	.858	.415	4.380	1	.039	2.360
	Being separated from the child in the home and inability to provide care	.279	.130	5.251	1	.025	1.209
	Bed rest	1.038	.485	4.574	1	.032	.454

*Reference category: Moderate to late preterm (32 to 37 weeks), ******Final model included only significant variables at .05 level
*** Model chi-square = 83.817; p<.0001, –2 log likelihood = -1309.779, Pseudo R2 (Nagelkerke) = .120.

Discussion

This study examined the association between gestational weeks and stressors in hospitalized women with TPL. 72.8% of 125 women evaluated their stress levels as ≥6 out of 10. Previous studies have shown that there is a relationship between TPL and stress (García-Blanco et al., 2016; Ruiz et al., 2016; Tanpradit & Kaewkiattikun, 2020), and that stress shortens the length of gestation (Ruiz et al., 2016; Tanpradit & Kaewkiattikun, 2020).

In the present study, compared to women in MLP weeks, the fear of labor was five times higher in those in EP weeks (95% CI, 1.59-9.83), while it was found three times higher in those in VP weeks (95% CI, .79-10.91). TPL may increase the likelihood of an unplanned cesarean section or vaginal delivery with intervention, and this has also been determined as a source of stress in women with pregnancy (Elvander, Cnattingius, & Kjerulff, 2013). According to Misund et al. (2014), sudden onset of birth causes loss of control in women. The duration of hospital stay and the uncertainty about the time when the birth will take place causes stress in women with TPL (Jallo et al., 2017), and they may experience stress due to the possibility of cesarean delivery and birth pain (Talley, 2013). At the same time, urgent hospitalization of women due to risk in pregnancy such as TPL is defined as a frightening condition for fetus health (Rodrigues et al., 2016). The term 'risk' for pregnant women is a label that increases stress alone (Simmons & Goldberg, 2011). Women experience anxiety and fear about the health of the fetus and losing the fetus in the presence of risk in pregnancy (Oliveira & Mandu, 2015). In this study, compared to the women in MLP weeks, the fear of losing the baby was about four times higher in women in EP weeks (95% CI, 1.32–6.75), while it was found three times higher in those who were in VP weeks (95% CI, 1.44–3.07). On the other hand, the continuation of pregnancy and the uncertainty of the delivery process is also a stressor (Janighorban et al., 2018). For these reasons, the causes of stress may increase during the TPL period.

In this study, compared the women in MLP weeks, the stress score in the last one month was about four times higher in those in EP weeks (95% CI, 1.48–3.28), while it was found three times higher in those in VP weeks (95% CI, 1.08-5.06). Zhu et al. (2010) examined 1800 women who gave birth after the 32nd week of pregnancy in terms of prenatal severe life events according to trimesters. They found that prenatal severe life events were 2.4 times more in women in the first trimester (95% CI, 1.13–5.09) and 3 times more in women in the second trimester (95% CI, 1.26 - 6.47) compared to women in the third trimester. According to the results of the study, prenatal severe life events were likely to play an important role in increasing the risk of TPL, especially in the first trimester. Other studies have shown that severe life events, which cause stress during pregnancy, increase the probability of TPL 2.8 to 5.54 times (Zhang et al., 2012; Meghea et al., 2014).

In this study, compared to MLP weeks, the stress score in women with a diagnosis of TPL was about four times higher in those in EP weeks (95% CI, 1.59-12.81), while it was determined to be about two times higher in those in VP weeks (95% CI, .89-4.82). The mortality risk in premature babies is stated to be higher than that of term babies (Howson et al., 2013). Therefore, TPL can be said to increase the stress levels of women as a stressor (Oliveira & Mandu, 2015) and to be perceived as a frightening phenomenon in terms of fetus health (Rodrigues et al., 2016). Preterm birth and the stress related to fetal health due to preterm birth are traumatic for women (Trumello et al., 2018). In the present study, the level of stress associated with a diagnosis of TPL was evaluated as lower in women in MLP weeks than those in EP and VP weeks. This may be due to some interventions such as steroids, depending on the fetal viability week (≥ 24 weeks), because the chance of the fetus to live increases as the gestational age increases (American College of Obstetricians and Gynaecologists, 2017). In this study, compared to the MLP and VP groups, the stress levels were .3 times higher in primigravida women in the EP group (95% CI, .49-1.88), and .7 times higher in women having problems in their previous pregnancies (95% CI, .30-2.60). Sawyer et al. (2013) stated that women with TPL wanted information from healthcare personnel about symptoms of TPL, the process of labor, and what would happen when the baby was born. Therefore, things may be perceived as more stressful due to lack of experience and knowledge in primigravida women. However, the development of complications in previous pregnancies and births is a stressor that affects women's subsequent pregnancies (Tosson, Elsayed Atwa, & Mahmoud, 2019).

The TPL has a social cost because it may sometimes result in months-long stressful hospital stays (Jallo et al., 2017) and it may also lead to the sudden loss of the premature newborn (World Health Organization, 2012). Women's experience of stress during pregnancy causes TPL by increasing the level of maternal cortisol (García-Blanco et al., 2016; Ruiz et al., 2016). Compared to MLP weeks, another stressor in this study was family conflict, which was three times higher in EP weeks (95% CI, .59-11.82) and about four times higher in VP weeks (95% CI, .79-10.91). Family conflicts can cause TPL (Zhang et al., 2012). Sobhani et al. (2018) found that 45.5% of 402 women with pregnancy experienced domestic emotional violence. In addition to such situations that create domestic stress during pregnancy, TPL-related stressors can also negatively affect women's family relationships (Korja, Latva, & Lehtonen, 2012). Following the TPL, postpartum anxiety and depression increases in women (Shaw et al., 2013). Therefore, family conflicts in the TPL process can increase the stress levels of women and cause TPL in the early weeks of pregnancy.

Hospitalization and therefore separation of women from their family due to TPL treatment is a big hospital stressor (Pohlmann et al., 2016; Janighorban et al., 2018). In this study, compared to MLP weeks, the stress score due to separation from the baby at home and inability to provide care was about two times higher in women in EP weeks (95% CI, 1.30-1.17) and one time higher in women in VP weeks (95% CI, .15-0.12). Hospitalization is a big change in a woman's life, and it becomes a stressor due to separation from home and family, inability to take care of the child at home, transferring responsibilities at home to the spouse, loss of control, fatigue, and worries about the health of the fetus and hers (Janighorban et al., 2018). For these reasons, women experience a wide range of emotions, from boredom to anger, sadness to hope, as the length of the hospital stay increases (Rubarth et al., 2012; Pohlmann et al., 2016). Compared to MLP weeks in the present study, this stressor may have been found higher in VP and EP weeks.

During the hospital stay, some physical and psychological health problems, such as decreased muscular dysfunction, weight loss, bone loss, thrombosis, fatigue (Janighorban et al., 2018), stress, fear, and anxiety (Oliveira & Mandu, 2015; Rodrigues et al., 2016) develop in women. In this study, the stress score in the bed rest was .4 times higher in EP weeks (95% CI, .41-.62) and .4 times higher in VP weeks (95% CI, .41-.51). For women who are hospitalized, discomfort, incompatible roommates, sleeping in a foreign bed, waiting for test results, and the length of hospital stay are stressors associated with the hospital environment (Pohlmann et al., 2016). Also, electronic fetal heart rate monitoring, medication applications, and restriction of activity cause deterioration in sleep patterns (Gallo & Lee, 2008). Disruption of sleep pattern is a risk factor for TPL (Hung, Ko, & Chen, 2014) and it is stated that the risk of TPL increases in women who sleep less than six hours a day (Kajeepeta et al., 2014; Qiu et al., 2015). For this reason, the length of hospital stay can turn into a continuing stressor due to long hospital stays during shorter gestational weeks.

Conclusion: Stress is a consistent and recurrent risk factor in many studies related to TPL. However, it has not been included in routine evaluations. Therefore, we examined the stressors of women according to their gestational weeks in TPL. In conclusion, the findings of our study suggest that there is a need for determining stress and stressors in addition to treatment in women hospitalized due to TPL.

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