An investigation of the prevalence of depression and related factors in pregnant women living in the province of Erzurum

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ABSTRACT

Objectives: Pregnancy is a time of numerous biological and psychosocial changes in women. The purpose of this study was to reveal the risk of depression, an important psychological problem, in pregnant women, and its association with sociodemographic characteristics.

Methods: This descriptive, cross-sectional study was performed between March 1 and May 31, 2015, with pregnant women registered at family health centers in the central districts of Aziziye, Palandöken and Yakutiye in the province of Erzurum. A sociodemographic and obstetric data form and the Beck Depression Inventory (BDI) were used for analysis.

Results: Subjects' mean age was 27.54 ± 6.2 years. Their mean BDI score was 16.09 ± 3.7. The mean BDI score of pregnant women in the first trimester was 16.3 ± 3.7, the mean score of those in the second trimester was 15.8 ± 4.2, and the mean score of those in the third trimester was 16.1 ± 2.5. There was a significant difference between trimesters in terms of risk of depression ($p = 0.006$). Significant associations were determined between the risk of depression and education level, number of pregnancies, and number of living children ($p < 0.05$). The logistic regression analysis results show that a pregnant woman's level of education, length of marriage, number of pregnancies and previous mental state are significant in terms of antenatal depression ($p < 0.05$).

Conclusions: There was a significant risk of depression according to the BDI in women in the first and third trimesters, and this was associated with several sociodemographic variables. This reveals the need for pregnant women to also be evaluated using a holistic approach involving mental state as well as sociodemographic and obstetric characteristics when undergoing medical evaluation.

Keywords: Depression, pregnancy, Beck Depression Inventory

Depression, a major mental health problem worldwide, lowers quality of life and leads to productivity losses by impacting on functioning, creativity, happiness and satisfaction. Studies have revealed an increased risk of depression with fertility processes in women aged 18-44. Pregnancy is particularly important since this is a time of intense biological and psychosocial changes. While some women are able to adapt easily to changes associated with pregnancy and birth, mild, moderate or severe psychological diseases may occur in others [1, 2]. The prevalence of depressive symptoms in pregnancy has

been reported to vary depending on trimester, most commonly increasing in the first and third trimesters [3].

Failure to diagnose depression in pregnancy can give rise to very severe obstetric and neonatal outcomes in both mother and fetus as norepinephrine and cortisol elevation associated with changes in the neuroendocrine system during pregnancy reduce blood flow to the uterus [4]. Associated complications such as hypertensive disease such as pre-eclampsia/eclampsia, spontaneous abortion, antenatal bleeding, intensive care requirements, developmental retardation, prematurity, fetal death and low birth weight babies may occur. Antepartum depression is also a risk factor for postpartum depression [5-7]. The American College of Obstetricians and Gynecologists emphasizes the need for women in the perinatal period to be screened for depression at least once [8].

Although there have been several studies of depression in the postpartum period, far fewer have investigated depression during pregnancy. The prevalence of antepartum depression in overseas studies ranges between 17.9% and 30.0% [9-11]. According to studies from Turkey based on various different scales, the prevalence of antepartum depression varies between 14.0% and 36.0% [12-14]. Health workers have important responsibilities in terms of the identification, prevention and treatment of antepartum depression, with its severe consequences. The purpose of our study was therefore to determine the prevalence of depression among pregnant women in the province of Erzurum, the risk factors involved and preventive measures that might be adopted.

METHODS

This descriptive, cross-sectional study was performed with pregnant women registered at family health centers in the Erzurum districts of Aziziye, Palandöken and Yakutiye in March 1-May 31, 2015. According to data from the Provincial Public Health Directorate, the number of pregnant women in the city center when the study began in March 2015 was 3897. Sample calculation was performed using OpenEpi version 8 software. A sample of 569 women was determined at a 99% confidence interval and a 5%

margin of error. The research was performed with pregnant women presenting to family health centers during the study period, without high-risk pregnancies and capable of establishing communication. Fifty-seven women refused to take part for various reasons. The final participation rate was 89.0%.

A questionnaire consisting of 55 questions was used as a data collection tool. The first part of the questionnaire contained 34 questions inquiring into sociodemographic and obstetric information. The Beck Depression Inventory (BDI) consisting of 21 questions was used in the second part. Questionnaires were applied by the authors at face-to-face interviews and with verbal consent being obtained from participants. Approval for the research was granted by the Atatürk University Medical Faculty Non-Interventional Research Ethical Committee (No. B.30.2.ATA.0.01.00/53 dated 20.02.2015).

The BDI developed by Beck *et al.* [15] in 1961 is a four-point Likert-type self-report scale consisting of 21 items. The purpose of the inventory is to measure emotional, cognitive and motivational symptoms observed in depression. A depression-related behavioral characteristic is determined in each item. Items are scored from 0 to 3 on a four-point Likert-type scale depending on the severity of depression. Scores of 0-9 indicate no depressive symptom, 10-16 mild, 17-24 moderate and 25 and above severe depressive symptoms. The highest possible score is 63. The aim of the scale is the objective quantification of degree of symptoms, rather than being diagnostic of depression [15]. The inventory was adapted in Turkish in 1989 by Hisli *et al.* [16], and a cut-off point of 19 was determined. Scores of 17 or above indicate depressive symptoms sufficiently severe to require treatment [16].

Statistical Analysis

Data were analyzed on SPSS (Statistical Package for the Social Sciences) 20.0 software. Descriptive statistics were expressed and number and percentage distributions and mean ± standard deviation. Normal distribution of data was assessed using the Kolmogorov-Smirnov test, and data were determined not to comply with normal distribution. Analyses were performed using the chi-square test, the chi-square trend test, the Kruskal-Wallis test, the Mann Whitney U test and logistic regression analysis. Significance

was set at $p < 0.05$. Logistic regression analysis was applied to reveal the effect of independent variables on depressive state. During binominal logistic regression analysis, a dichotomous variable, 'present' or 'absent,' was established on the basis of the depressive state cut-off point. The common features of the variables included in the model are that these are factors affecting or capable of affecting depression according to the previous literature. The Kruskal-Wallis test was used to analyze women's mean depression scores by trimesters, and the Mann-Whitney U test with Bonferroni correction was applied in order to identify the group constituting the source of variation. A p level < 0.016 was regarded as significant.

RESULTS

The mean age of the 512 pregnant women was 27.5 ± 6.2 years. In terms of education, 14.3% of women and 30.5% of spouses were high school or university graduates. Information concerning the sociodemographic characteristics of the pregnant women in the study is shown in Table 1. Housewives constituted 79.7% of the women in this study, and 26.6% of subjects described their monthly income as good while 6.1% described it as poor. Finally, 85.9% of women had social security, and 14.8% lived in families of six members or more.

Of the pregnant women in the study, 31.1% were in the first year of marriage, and 34.2% reported that

Table 1. Risks for depression according to various sociodemographic characteristics of the pregnantwomen in the study

| | Depression Status According to the Beck Depression Inventory | | | | | | x^2, p |
| | BDI < 17 | | BDI ≥ 17 | | Total | | |
	No.	%	No.	%	No.	%	
Woman's level of education							
Literate/Primary school	108	29.0	56	40.0	164	32.0	$x^2 = 9.484$
Middle/High school	216	58.1	60	42.9	276	53.9	$p = 0.009$
College/University	48	12.9	24	17.1	72	14.1	
Spouse's level of education							
Literate/Primary school	52	14.0	40	28.6	92	18.0	$x^2 = 20.747$
Middle/High school	212	57.0	52	37.1	264	51.5	$p < 0.001$
College/University	108	29.0	48	34.3	156	30.5	
Occupation							
Housewife	292	78.5	116	82.9	408	79.7	$x^2 = 1.362$
White collar worker	44	11.8	12	8.6	56	10.9	$p = 0.506$
Other	36	9.7	12	8.6	48	9.4	
Monthly income							
Good	105	28.2	31	22.1	136	26.6	$x^2 = 2.628$
Average	243	65.3	102	72.9	345	67.3	$p = 0.269$
Poor	24	6.5	7	5.0	31	6.1	
Social security							
Yes	320	86.0	120	85.7	440	85.9	$x^2 = 0.008$
No	52	14.0	20	14.3	72	14.1	$p = 0.929$
Duration of marriage							
0-1 years	120	32.3	40	28.6	160	31.3	$x^2 = 1.244$
2-5 years	80	21.5	36	25.7	116	22.7	$p = 0.537$
6 or more	172	46.2	64	45.7	236	46.0	
Total	372	72.7	140	27.3	512	100.0	

BDI = Beck Depression Inventory

Table 2. Risk of depression according to various obstetric characteristics

	BDI < 17		BDI ≥ 17		Total		x^2, p
	No.	%	No.	%	No.	%	
Number of pregnancies							
1	115	30.9	60	42.9	175	34.2	**x^2=6.759**
2	122	32.8	35	25.0	157	30.6	**p = 0.034**
3 or more	135	36.3	45	32.1	180	35.2	
Trimester*							
1st trimester	119	32.0	62	44.3	181	35.4	**x^2=10.114**
2nd trimester	163	43.8	43	30.7	206	40.2	**p = 0.006**
3rd trimester	90	24.2	35	25.0	125	24.4	
Type of delivery in previous pregnancy							
Normal birth	178	69.3	48	60.0	226	67.1	**x^2=6.422**
Cesarean	44	17.1	24	30.0	68	20.2	**p = 0.040**
Miscarriage /still birth /abortion	35	13.6	8	10.0	43	12.7	
Number of living children							
None	126	33.9	64	45.7	190	37.1	**x^2=7.087**
1	130	34.9	35	25.0	165	32.2	**p = 0.029**
2 or more	116	31.2	41	29.3	157	30.7	
Was current pregnancy wanted?							
Yes	315	84.7	120	85.7	435	85.0	x^2=0.086
No	57	15.3	20	14.3	77	15.0	p = 0.770
Receipt of medical assistance for pregnancy							
None	352	94.6	128	91.4	480	93.8	x^2=5.008
Implantation	16	4.3	12	8.6	28	5.4	p = 0.082
IVF	4	1.1	0	0	4	0.8	
Possession of knowledge concerning delivery							
Yes	225	60.5	60	42.9	285	55.7	**x^2 = 12.806**
No	147	39.5	80	57.1	227	44.3	**p < 0.001**
Total	372	72.7	140	27.3	512	100.0	

*Kruskal-Wallis Test

this was their first marriage. Deliveries among those women with previous histories of pregnancy were by the normal vaginal route in 67.1% and cesarean in 20.2%.

In terms of trimesters, 35.4% of women were in the first trimester, 40.2% in the second and 24.4% in the third. Of the pregnant women in the study, 32.1% already had one child, and 30.7% had two or more. Current pregnancies were wanted in 85.0% of cases. We observed that 6.2% of women had sought medical assistance for their current pregnancies, and that 5.4% had become pregnant via implantation and 0.8% by in vitro fertilization. In addition, 87.5% of pregnant women were under observation by a physician, with 41.3% being monitored by the same physician throughout pregnancy. Finally, 44.3% of women reported possessing no information about types of delivery.

Chronic disease was present in 18.0% of the pregnant women in this study, and 68.0% reported using medications in association with their pregnancies. A further 11.7% reported smoking during pregnancy and 3.1% reported consuming alcohol. Of the women in this study, 76.6% reported being happy with their current pregnancies. In addition, 93.8% reported receiving support from their spouses during pregnancy and 90.6% reported receiving support from first-degree relatives, while 3.7% stated that their current pregnancy had an adverse impact on their marriages. In terms of gender, 21.1% of the women in this study reported that they wished the baby born from their current pregnancies to be a boy, while 23.5% preferred a girl. While 30.9% of the women had experienced anxiety and unease during their current

Table 3. Logistic regression analysıs results of factors affecting risks of depression in pregnant women according to the Beck Depression Inventory

Category	OR	(95% CI)	*p* value
Woman's education level			
Literate/primary school	2.7	1.0-6.8	**0.031**
Middle school/High school	1.2	0.5-2.5	0.615
College/University	1.00 (ref)		
Spouse's education level			
Literate/Primary school	1.5	0.7-3.2	0.276
Middle school/High school	0.4	0.2-0.7	**0.007**
College/University	1.00 (ref)		
Duration of marriage			
0-1 years	1.00 (ref)		
2-5 years	4.0	1.8-8.7	**< 0.001**
6 years or more	2.6	1.2-5.7	**0.011**
Trimester			
1st trimester	1.00 (ref)		
2nd trimester	0.4	0.2-0.6	**0.001**
3rd trimester	0.8	0.5-1.5	0.622
Number of pregnancies			
1	6.7	2.8-15.5	**< 0.001**
2	0.8	0.4-1.6	0.624
3 or more	1.00 (ref)		
Was current pregnancy wanted?			
Yes	1.00 (ref)		
No	1.4	0.7-2.7	0.284
Possession of knowledge concerning delivery			
Yes	1.00 (ref)		
No	1.5	0.9-2.5	0.076
Under monitoring by a physician			
Yes	1.00 (ref)		
No	2.3	1.1-4.9	**0.026**
Mental illness			
Yes	3.8	1.4-10.0	**0.006**
No	1.00 (ref)		

pregnancies, 4.7% reported having a diagnosed psychiatric disease themselves, and 3.9% in their families.

The mean BDI score of the women in the study was 16.0 ± 3.7, with 27.3% of women scoring 17, the cut-off points for the inventory, or higher. The mean age of the women with a BDI score of 17 or above was 26.4 ± 4.8. No significant relation was observed between mean ages and exhibition of depressive symptoms (p = 0.112). Mean BDI scores were 16.3 ± 3.7 among women in the first trimester, 15.8 ± 4.2 among women in the second and 16.1 ± 2.5 among women in the third. Significant variation was observed between trimesters in terms of risk of depression, these differences occurring between the first and second trimesters ($p = 0.005$) and the second and third trimesters ($p = 0.012$) (Table 2).

A significant relation was determined in terms of risk of depression in current pregnancies and type of delivery in previous pregnancies. A higher prevalence of depression was determined in women who had previously experienced normal deliveries ($p = 0.04$) (Table 2). Risk of depression was significantly related to number of pregnancies and number of living children ($p = 0.034$ and $p = 0.029$, respectively), deriving from women in their first pregnancies and with no living children (Table 2). A significant difference was observed in terms of risk of depression between women with knowledge of types of delivery and those without. The risk of depression was higher in pregnant women possessing information about the birth process ($p < 0.001$) (Table 2).

The level of women reporting being monitored by the same physician during their current pregnancies was 51.4%, and there was a significant difference in terms of mean depression scores between women being regularly monitored by the same physician and those not ($p = 0.001$). We also determined a significant association between smoking during pregnancy and the risk of depression ($p < 0.001$). No significant correlation was determined between the risk of depression and support from spouses or relatives among the pregnant women in this study ($p = 0.052$ and $p = 0.081$, respectively).

The logistic regression analysis results are shown in Table 3. The risk of depression according to the BDI was 2.7 times higher in literate/primary school graduate mothers than in high school/university graduates. The risk of depression was 4.0 times higher among women married for 2-5 years compared to those married for 0-1 years, and 2.6 times higher among women married for 6 years or more. The risk of depression was 6.7 times higher in women with no previous pregnancies compared to those with three or more previous pregnancies, and 2.3 times higher in women not being monitored by a physician compared to those receiving monitoring. Finally, the risk of depression was 3.8 times higher among women with no mental illness before pregnancy compared to those with a previous mental illness.

DISCUSSION

The mean age of the 512 pregnant women in this study of the prevalence of depression and related factors among subjects living in the province of Erzurum was 27.5 years. In agreement with our study, the 25-29 age group has the fastest age-specific fertility rate in Turkey [17]. Of the pregnant women in this study, 34.2% had no previous history of pregnancy, while 37.2% of women giving birth in Turkey in 2016 were having their first children. Our study finding is compatible with previous studies [17]. The rate of pregnant women at risk of depression with a BDI score of 17 or more was 27.3%. In other studies from Turkey, Yılmaz et al. [18] reported a figure of 25.1%, Yanıkkerem et al. [19] a figure of 30.0%, and Erbil et al. [20] a figure of 30.9%, all in agreement with our own finding. According to studies from other

countries and cultures, prevalences of antepartum depression have been reported of 15.5% in Malta [21], 30.0% in Finland [11], and 19.6% in Brazil [22]. According to a comparative study involving Nicaragua and the Netherlands [23], the prevalence of depression during pregnancy is 54.0% in Nicaragua and 6.0% in the Netherlands. The difference between the two countries may be attributed to levels of development, and may also reflect the importance that they attach to psychosocial services.

In terms of occupation, 79.7% of the expectant mothers in this study were housewives, and no significant variation in risk of depression was determined among the occupational groups. In a study from Manisa in Turkey, Yanıkkerem et al. [19] reported significantly higher depression scores among housewives compared to working pregnant women, while in their study from Ankara, Ocaktan et al. [24] reported lower mean depression scores among housewives compared to working women. This difference may be attributed to the probability of the study groups having different socioeconomic, sociocultural, educational, spousal and familial characteristics.

Depressive symptoms in our study were higher among pregnant women with no living children, and no significant association was determined with familial support. We observed that 11.7% of women smoked during pregnancy, while Turkish Statistical Institution data for 2016 indicate that 13.3% of women smoked during pregnancy [25]. Risk factors for antepartum depression in other studies include a higher number of living children, lack of familial or social support, smoking, alcohol use, medication use and a history of mental illness [26-28]. The fact that these levels are very close to one another shows that smokers continue to smoke during pregnancy. Smedberg et al. [29] reported depression in one in three pregnant women who smoked before pregnancy and who continued to smoke during it.

A history of previous mental illness was reported by 4.7% of all the pregnant women in this study. Depressive symptoms in subjects with mental illness were significantly higher than in those with no such disease, the risk being 3.8-fold greater. In their study from Brazil, Castro e Couto et al. [30] identified a history of major depression as the most important risk factor for depression during pregnancy. In our study,

the risk of depression differed significantly among women in the first (44.3%) and third (25.0%) trimesters compared to the second. Erbil *et al.*'s [20] study supports our own findings. The first trimester of pregnancy is a time an intense adaptation process to hormonal changes, and therefore one of great importance.

In terms of type of delivery, 20.2% of the women reported having undergone previous cesarean deliveries in our study. According to data from the 2016 Statistical Yearbook, the incidence of cesarean deliveries in Turkey is 53.1%, considerably higher than that in our study [31]. On the basis of our study findings, greater symptoms of depression were observed among pregnant women with normal deliveries in previous pregnancies. This may be attributed to fear of episiotomy and pain. Concerns over the baby's health during birth may also be a source of stress in expectant mothers. Normal delivery is a process in which expectant mothers play an active role, and uncertainty over when this will take place may also lead to anxiety. The fact that cesarean deliveries are under the control of health personnel may produce a feeling of confidence in the expectant mother. These factors may all explain the high level of cesarean deliveries in Turkey. These points must all be considered in Health Ministry programs intended to encourage natural birth.

According to the Prenatal Care Management Guideline published by the Turkish Ministry of Health, all women must receive at least four sessions of prenatal care from family physicians and family healthy personnel during pregnancy. The guideline states that the first check must take place within the first 14 weeks of pregnancy, the second between weeks 18 and 24, the third between weeks 28 and 32 and the fourth between weeks 36 and 38 [32]. The rate of pregnant women reporting receiving adequate monitoring by a physician was 87.5%. In addition, the risk of depression among women thinking they did not receive sufficient monitoring was twice as high as that in women who thought that they were adequately monitored. Additionally, 51.4% of women reported receiving check-ups from the same physician. Mean BDI scores were significantly lower among women monitored by the same physician than those not seen by the same physician. Being monitored by the same physician can increase communication between the

expectant mother and medical staff and can bestow a sense of security on her.

In our study, 44.3% of women reported possessing no knowledge of different types of delivery, the frequency of depression in that group being 57.1%. In agreement with our study, Akbaş *et al.* [33] reported greater symptoms of depression among subjects not receiving information about types of delivery. In support of our findings, Kartal *et al.* [34] reported that possession of information concerning giving birth and the provision of preparatory instruction reduced the risk of depression. The nature of the birth process at the end of pregnancy and potential complications are the principal uncertainties facing expectant mothers. A total of 44.3% of expectant mothers in our study possessed no information about types of delivery. Women frequently only decide in the final weeks of pregnancy on the type of delivery to be performed, and this may not be even be settled until the time of birth. The fact that almost half of expectant mothers possessed no information about types of deliveries is not, therefore, an unexpected finding. The incidence of depression among the group with no information concerning delivery was 57.1%. A higher incidence of depressive symptoms among women in this group was also reported by Akbaş *et al.* [33], in agreement with the present study. In support of our findings, Kartal *et al.* [34] also reported that possession of information concerning delivery and the provision of preparatory training reduce the risk of prenatal depression. The type of delivery and potential complications they may experience represents the principal uncertainty facing pregnant women.

Depressive symptoms were greater among women experiencing their first pregnancy in this study. Logistic regression analysis revealed that the risk of depression was 6.71-fold higher among women in their first pregnancies compared to those with three pregnancies or more. While some previous studies have reported that previous experience of pregnancy represents a risk for depression [33, 35], other have shown a risk in women in their first pregnancies [28, [34]. In the light of these data, it may be concluded that the mental health of women with no previous experience of pregnancy may be adversely affected by physiological and hormonal changes occurring in the body since they are experiencing these for the first time.

The Limitations of the Study

Only the BDI was used to identify depressive states among the expectant mothers in our study, and clinical evaluation diagnostic tools for psychiatric disorders were not employed. This represents the main limitation of our study, but this will be considered in further studies that we plan on this subject.

CONCLUSION

The education levels of the pregnant woman and her spouse, number of pregnancies, week of pregnancy, outcomes of previous pregnancies, number of living children and possession of information about the birth process were identified as factors affecting antenatal depression in this study. As in all periods of people's lives, greater importance must be attached during pregnancy to health, defined as a state of physiological, social and psychological well-being. Early recognition and treatment of depressive disorders, currently standing in eighthplace on the Disability Adjuster Life Year (DALY) in Turkey, are important since these can lead to more serious problems during pregnancy. The requisite importance must therefore be attached to these, starting with studies concerning the preservation of women's health,to psychosocial services during pregnancy monitoring. Early diagnosis and treatment must be provided for gravidas at risk of depression through careful screening of risk factors for mental illness and combining this with education and counseling services.

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