



## Short communication

## Prevalence of mood and anxiety disorders during pregnancy: A case-control study with a large sample size

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## A B S T R A C T

This study aimed to compare pregnant and non-pregnant women in terms of the current prevalence of mood and anxiety. The study sample included 1154 women evaluated on the first day postpartum and 328 control subjects. Mood and anxiety disorders were determined by structured psychiatric interview. The prevalence rate of any mood or anxiety disorder was 18.2% during pregnancy. Generalized anxiety disorder, obsessive-compulsive disorder, panic disorder and comorbidity among anxiety disorders were more prevalent during pregnancy compared to the control subjects. The present results suggest that pregnant women may be at increased risk of depression and anxiety disorders.

## 1. Introduction

It is known that psychiatric disorders can affect 20–40% of the general population; these disorders are among the important social and biological issues for public health (Bijl et al., 1998; De Girolamo et al., 2006; Vicente et al., 2006; Baumeister and Härter, 2007). Epidemiological studies have suggested that psychiatric disorders are more prevalent in females compared to males; however, its cause is unclear. In the last decades, many studies have examined the relationship between reproductive events (e.g., menarche, pregnancy, parturition and menopause) and psychiatric diagnoses in women. Among the reproductive periods, studies have mostly focused on the periods of pregnancy and puerperium. Compared to pregnancy, the mental status of women in the postnatal period has been more frequently investigated. On the other hand, 20–30% of pregnant women present with at least one psychiatric disorder (Felice et al., 2007; Borri et al., 2008; Andersson et al., 2006; Uguz et al., 2010).

The strength of association of pregnancy with psychiatric disorders is currently unclear. Epidemiological studies conducted in some countries imply that pregnant women have a higher prevalence rate of mood and anxiety disorders than that estimated for the general population (Adewuya et al., 2006; De Girolamo et al., 2006; Gureje et al., 2006; Borri et al., 2008). In addition, a meta-analysis has suggested that the rate of depression during the second and third trimesters was higher than observed rate of in the general female population (Bennett et al., 2004). However, these suggestions have not been supported by the findings of other studies (Halbreich, 2004; Vesga-López et al., 2008). Recently, Goodman et al. (2014) in a systematic review have reported

that although the prevalence rate of anxiety disorders was high among pregnant women, the evidence on whether the prevalence of anxiety disorders among pregnant women differed from that in the non-pregnant female populations was inconclusive. The limited number of available studies utilizing control groups to compare the prevalence of psychiatric morbidity in pregnant versus non-pregnant women seems to be an important reason for this dichotomy. In the present study, we aimed to compare the current prevalence of mood and anxiety disorders in a large sample of pregnant and non-pregnant women.

## 2. Methods

The study sample included 1409 consecutive women who were admitted to the Obstetric Inpatient Clinic of a University hospital, because they were in labour. Voluntariness to participate in the work and maternal age of  $\geq 18$  were inclusion criteria for the study. One hundred and sixty-four women refused to participate in the study. Ninety-one of the remaining women were excluded from the study due to the following exclusion criteria: (1) Fetal malformation, (2) Multiple pregnancy, (3) Severe pregnancy-related complications such as pre-eclampsia, gestational diabetes mellitus, early membrane rupture, and placental abnormalities affecting fetal growth), (4) Severe medical problems such as uncontrolled endocrine abnormalities, cardiovascular and pulmonary system diseases, neurological disease, and metabolic diseases, (5) Schizophrenia and related psychotic disorders, (6) Reported alcohol or substance consumption, (7) Maternal age of  $< 18$  years. The final pregnancy group was comprised of 1154 women. Additionally, a total of 328 control non-pregnant premenopausal

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women with sociodemographic features similar to the pregnant women were included in the study. The control group of non-pregnant women aged 18 and over was gathered from hospital personnel and their relatives. The control women do not have any gynecological or other medical diseases, schizophrenia and related psychotic disorders and the usage of alcohol or substance.

The study was approved by the ethics committee of Meram Faculty of Medicine of Necmettin Erbakan University. In addition, the objectives and procedures of the study were explained to all participants and written informed consent forms were obtained. After the socio-demographic characteristics and results of obstetrical evaluation were recorded in the obstetric inpatient clinic, the participants were evaluated by researcher psychiatrists with at least 4 years of experience in psychiatric disorders and diagnostic instruments. Psychiatric interviews were conducted within 24 h following the delivery. Mood and anxiety disorders in the participants were diagnosed by means of the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders, *Fourth Edition* (DSM-IV) (SCID-I) (First et al., 1997).

The data were analyzed using the Statistical Package for Social Sciences (SPSS), version 16.0, for Windows (SPSS Inc, Chicago, IL). Categorical variables in the study groups were compared using the chi-square ( $\chi^2$ ) test and Fisher's exact test. For comparisons of continuous variables, *t*-test was used. All significant levels were 2-tailed and set at the level of 0.05.

### 3. Results

The mean age of the participants ( $n = 1482$ ) was  $28.25 \pm 5.66$  years; the mean number of children was  $1.48 \pm 1.21$ . Most of the participants were married (99.7%) and primary school (66.4%) graduates. The difference between pregnant women and the controls in terms of age ( $28.31 \pm 5.76$  vs  $28.05 \pm 5.32$  years,  $t = 0.775$ ;  $P = 0.439$ ), marital status (Fisher's exact test,  $P = 0.214$ ), educational level ( $\chi^2 = 1.186$ ;  $P = 0.311$ ), employment status (Fisher's exact test,  $P = 0.238$ ), history of abortion (Fisher's exact test,  $P = 0.135$ ), and number of children ( $Z = -0.942$ ,  $P = 0.346$ ) was statistically non-significant.

Table 1 shows current prevalence of mood and anxiety disorders in the study groups. Of the 1154 women evaluated on the first day postpartum, 210 (18.2%) had at least one mood or anxiety disorder and 78 (6.8%) had at least 2 diagnoses during their pregnancy. The most common diagnoses in this group of women were generalized anxiety disorder ( $n = 91$ , 7.9%), major depression ( $n = 67$ , 5.8%), obsessive-compulsive disorder ( $n = 57$ , 4.9%) and panic disorder ( $n = 51$ , 4.4%). The proportion of women with mood disorder plus anxiety disorder during pregnancy was 4.6% ( $n = 53$ ). Similarly, 52 (4.5%) women

showed comorbidity between anxiety disorders. Statistical analyses indicated that there was no significant difference between the study groups with regard to the prevalence of any diagnosis, any mood disorder, any anxiety disorder, bipolar disorder, dysthymic disorder, major depression, phobic disorders, posttraumatic stress disorder, any comorbid diagnosis and comorbidity between mood and anxiety disorders. Generalized anxiety disorder, obsessive-compulsive disorder, panic disorder and comorbidity among anxiety disorders were more prevalent during pregnancy compared to the control subjects.

### 4. Discussion

To our knowledge, this comparative study has the largest sample size among studies conducted in a clinical setting. In the present study, 18.2% of pregnant women had at least one mood or anxiety disorder during psychiatric interview; however, this prevalence rate was statistically similar to non-pregnant controls (16.5%). This finding is consistent with studies published in the literature (Uguz et al., 2010). Previous clinical studies have suggested that current prevalence rates of mood and anxiety disorders ranged between 8.8% - 13.4% and 4.4% - 39.0%, respectively (Felice et al., 2007; Borri et al., 2008; Andersson et al., 2003; Adewuya et al., 2006; van Heyningen et al., 2017; Fairbrother et al., 2016). Similarly, the prevalence rates of mood and anxiety disorders in our sample were 7.2% and 15.9% respectively. Adewuya et al. (2006) reported that anxiety disorders were more frequently observed during pregnancy (39.0% vs 16.3%) in pregnant women compared to non-pregnant women. Another cross-sectional study confirmed this finding (Uguz et al., 2010). In our sample, however, prevalence rate of any anxiety disorder was not statistically different between the pregnant women and the controls. This discrepancy could be due to high prevalence rate of any anxiety disorder in pregnant women as reported by Adewuya et al. (2006). A recent meta-analysis (Dennis et al., 2017) has indicated that the overall prevalence of clinically diagnosed of anxiety disorder during pregnancy was 15.2%. In the current study, similar to any anxiety disorder, the difference in prevalence of any mood disorder in pregnant and non-pregnant women was not statistically significant. These results imply that pregnancy is associated with increased risk of overall prevalence of mood and/or anxiety disorders.

Generalized anxiety disorder was the most prevalent diagnosis during pregnancy with a prevalence rate of 7.9% in the current study. Its prevalence has been reported to be 0.3–10.5% in previous studies (Andersson et al., 2003; Adewuya et al., 2006; Felice et al., 2007; Borri et al., 2008; Uguz et al., 2010; Farias et al., 2013; van Heyningen et al., 2017; Fairbrother et al., 2016) and 4.1% in a meta-analysis (Dennis et al., 2017). Generalized anxiety disorder was reported to be

**Table 1**  
Mood and anxiety disorders in the study groups.

	Pregnancy $n = 1154$	Control group $n = 328$	Odds Ratio (95%CI)	P value*
Axis I diagnoses				
Major depression	67(5.8)	18(5.5)	1.06 (0.64–1.75)	0.894
Dysthymic disorder	14(1.2)	4(1.2)	0.99 (0.33–3.00)	1.000
Bipolar disorder	2(0.2)	-(-)	-(-)	1.000
Panic disorder	51(4.4)	5(1.5)	2.90 (1.17–7.20)	0.013
Obsessive-compulsive disorder	57(4.9)	7(2.1)	2.31 (1.07–5.02)	0.030
Social phobia	30(2.6)	9(2.7)	0.94 (0.45–1.97)	0.846
Spesific phobia	47(4.1)	17(5.2)	0.79 (0.46–1.35)	0.360
Posttraumatic stress disorder	8(0.7)	2(0.6)	1.14 (0.24–5.32)	1.000
Generalized anxiety disorder	91(7.9)	10(3.0)	2.59 (1.36–4.91)	0.002
Any mood disorder	83(7.2)	25(7.6)	0.44 (0.61–1.45)	0.810
Any anxiety disorder	184(15.9)	47(14.3)	1.11(0.83–1.50)	0.546
Any mood or anxiety disorder	210(18.2)	54(16.5)	1.10 (0.84–1.46)	0.513
At least two diagnoses	78(6.8)	21(6.4)	1.06(0.66–1.68)	0.901
Mood disorder + anxiety disorder	53(4.6)	18(5.5)	0.84(0.50–1.41)	0.557
At least two anxiety disorders	52(4.5)	6(1.8)	2.46(1.07–5.68)	0.024

\* Fisher Exact Test

the most commonly established in only one study by Adewuye et al. (2006). Moreover, the prevalence rate in our sample was slightly higher than that of most studies. This may have resulted from inherent differences between the samples. Similar to generalized anxiety disorder, the prevalence rate of other specific diagnoses in our sample was within the range reported in the literature (Andersson et al., 2003; Bennett et al., 2004; Adewuya et al., 2006; Felice et al., 2007; Guler et al., 2008; Borri et al., 2008; Uguz et al., 2010; Farias et al., 2013; Goodman et al., 2014).

Studies examining whether specific psychiatric disorders are more frequently observed during pregnancy compared to the controls are limited. In a meta-analysis by Russel et al. (2013), it was demonstrated that pregnant women had an increased risk of obsessive-compulsive disorder compared to non-pregnant women. Contrary to previous comparative clinical studies with very much smaller sample size (Adewuya et al., 2006; Uguz et al., 2010), in the current study, obsessive-compulsive disorder, panic disorder and generalized anxiety disorder were more prevalent during pregnancy compared to the controls. However, these results should be confirmed by further clinical studies.

A meta-analysis reported that the prevalence rate of clinically diagnosed of depression plus any anxiety disorder in pregnant women was 9.2% (Falah-Hassani et al., 2017). This rate was reported to be 3.0% and 4.4% in two other studies that were not included in this meta-analysis (Borri et al., 2008; Fairbrother et al., 2016). Borri et al. (2008) also reported the existence of at least two anxiety disorders in 2.2% of pregnant women. These prevalence rates appear to be relatively consistent with those of the current study. To our knowledge, no data on whether comorbidities between mood disorders and anxiety disorders during pregnancy differed from non-pregnant women has been reported. Our results showed that comorbidity between anxiety disorders but not mood and anxiety disorders was more frequently observed during pregnancy compared to non-pregnant women.

A relatively large sample-size, a structured clinical interview and the existence of a control group are main strengths of this study. However, the cross-sectional design and sample derived from single medical center do not allow for generalization of the results of the study. Moreover, due to various exclusions, the findings to high-functioning women experiencing a medically uncomplicated pregnancy do not reflect the prevalence of depressive and anxiety disorders among pregnant women in general. Study findings can only be generalized to low risk pregnant women who are not suffering from a serious mental health condition. Psychiatric interviews were conducted within 24 hours following the delivery. This factor may negatively affect the results due to recall bias and the intense emotions associated with the early neonatal period. In addition, we did not evaluate family history of psychiatric disorders. Finally, although there is no statistically significant difference between the control group and the study group for number of children, the control sample does not represent all women who do not have children. Despite these limitations, our results suggest that pregnancy may be associated with anxiety disorders, particularly generalized anxiety disorder, panic disorder and obsessive-compulsive disorder but not mood disorders. Multicenter and prospective controlled studies may present more robust data on this topic.

#### Conflicts of interest and source of funding

This research has not been supported by any commercial or non-commercial organization. In addition, the authors have no conflict of interest with any commercial or other associations in connection with

submitted paper. The authors have no financial funding source supporting the article

#### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2018.12.129.

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