



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Short communication

Is there a higher prevalence of mood and anxiety disorders among pregnant women during the COVID-19 pandemic? A comparative study

Faruk Uguz^{a,*}, Aysegul Kirkas^a, Tugba Yalvac^a, Kubra Memnune Gundogan^b, Kazim Gezginc^b

^a Department of Psychiatry, University of Necmettin Erbakan, Meram Faculty of Medicine, Konya, Turkey

^b Department of Obstetrics and Gynecology, University of Necmettin Erbakan, Meram Faculty of Medicine, Konya, Turkey

ARTICLE INFO

Keywords:
 COVID-19 pandemic
 Pregnancy
 Depression
 Anxiety

ABSTRACT

Objective: This study aimed to compare data on mood and anxiety disorders of pregnant women before and during the COVID-19 pandemic.

Methods: The study sample included 253 women evaluated on their first postpartum day during the COVID-19 pandemic. Mood and anxiety disorders were determined by the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders, *Fourth Edition* (DSM-IV). Data from sample was compared with data from previous study that was completed and published prior to the COVID-19 pandemic.

Results: The prevalence rate of mood and anxiety disorders during the COVID-19 pandemic was 7.1% and 13.0%, respectively. The most common specific disorder was generalized anxiety disorder (7.1%). Compared to period before the COVID-19 pandemic, the prevalence of mood and anxiety disorders in the current sample was not significantly different.

Conclusion: Results of this study suggest that pregnant women may have not be under higher risk for mood and anxiety disorders during the COVID-19 pandemic compared to before the pandemic.

1. Introduction

It is well known that pregnancy is the most important reproductive life events in women. The presence of a new baby also makes pregnancy highly valuable. Several studies have shown that, mental health problems such as depression and anxiety in the mother can affect not only herself, but also her baby in the short or long term [1–3]. On the other hand, pregnancy does not seem to protect women from psychiatric disorders. Studies have suggested that about 20% of pregnant women experience mood or anxiety disorder; this prevalence rate is similar to the non-pregnant female population [4–7]. Therefore, individual or social stresses may make pregnant as well as non-pregnant women susceptible to mental health issues.

Coronavirus disease 2019 (COVID-19) has become a major public health concern worldwide, especially after its declaration as a pandemic by The World Health Organization. It is expected that global stress due to COVID-19 pandemic can affect mental health of pregnant women. A recent meta-analysis [8] suggested that psychological stress was observed in 70% of pregnant women. There is an important question as to whether the COVID-19 pandemic-related stress could lead to a higher

prevalence of depression and anxiety disorders during pregnancy in the literature. If so, infants who born after the COVID outbreak may more negatively affected from detrimental effects of depression or anxiety disorder compared to before the outbreak. Additionally, these results affect healthy programs of governments, because pregnant women should be supported more psychologically by the professionals during the outbreak. Therefore, investigating mental status in pregnant women after the outbreak is very important. In the past year, many authors have examined this relevance. Lebel et al. [9] reported elevated anxiety and depression symptoms in pregnant women during the COVID-19 pandemic compared to similar pre-pandemic pregnancy cohorts. In a prospective study of 63 pregnant women, Ayaz et al. [10] found that depressive and anxiety symptom levels were significantly increased after the pandemic compared to before. However, the available studies conducted on this topic were based on symptom rating scales rather than a structured clinical interview. Moreover, to date, there is not any published study comparatively examining prevalence of mood and anxiety disorders by means of the same method in pregnant women before and after COVID-19 pandemic in the literature. The current study aims to investigate whether COVID-19 pandemic negatively affected the

* Corresponding author at: Necmettin Erbakan Üniversitesi Meram Tıp Fakültesi, Psikiyatri Anabilim Dalı Akyokuş, 42080 Konya, Turkey.
 E-mail address: farukuguz@gmail.com (F. Uguz).

<https://doi.org/10.1016/j.jpsychores.2022.110725>

Received 2 July 2021; Received in revised form 15 January 2022; Accepted 15 January 2022

Available online 20 January 2022

0022-3999/© 2022 Elsevier Inc. All rights reserved.

prevalence of specific mood or anxiety disorders during pregnancy by comparing data obtained before pandemic.

2. Methods

The current study was carried out at the same hospital, using the same methodology as a study published prior to the COVID-19 pandemic [4], which the current data was compared. In other words, participants in both studies were recruited from the same hospital. Data of both studies were collected in the first 24 h postpartum and with the same diagnostic instruments. The participants in two studies were different. Previous study ($n = 1154$) was carried out between January 2017 and March 2018 years. The current sample included a total of 336 consecutive women who delivered their babies from January 15th - May 15th 2021 at the Obstetrics and Gynecology Inpatient Clinic of Necmettin Erbakan University, Meram Faculty of Medicine. At the time of this study, the second wave of COVID-19 outbreak was being experienced in Turkey. The inclusion criteria for the study were age of >18 years at the assessment and voluntary to participation. From this sample, 83 women were excluded from the study as they met the following exclusion criteria: a history of schizophrenia or related psychotic disorder, mental retardation, alcohol or substance use, multiple pregnancy, congenital anomalies, pregnancy-related complications such as preeclampsia, gestational diabetes mellitus and early membrane rupture. The exclusion criteria also included uncontrolled medical diseases including endocrine abnormalities and metabolic disturbances as well as cardiovascular, pulmonary, central or peripheral nervous system diseases. As result, the final study sample consisted of 253 women.

The ethics committee of Meram Faculty of Medicine, Necmettin Erbakan University approved the study procedure. Initially, the participants were informed about the objectives and procedures of the study and a written informed consent was obtained from them. First, data on sociodemographic characteristics and the results of obstetrics evaluation were recorded at the obstetric inpatient clinic. Next, the participants were evaluated by psychiatrists. Psychiatric interviews with participants were conducted within 24 h after birth while the patient is in the hospital. To diagnose mood and anxiety disorder, the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders, *Fourth Edition* (DSM-IV) (SCID-I) [11] was administered to the participants. For comparison, we used dataset of study previously published (reference study) to determine whether the prevalence of mood anxiety disorders during pregnancy before and during the COVID-19 pandemic is different.

The Statistical Package for Social Sciences (SPSS), version 16.0, for Windows (SPSS Inc., Chicago, IL) was used to analyze the study data. Categorical data on current and comparative samples were analyzed by using the chi-square (χ^2) test and Fisher's exact-test, where necessary. Continuous variables were evaluated with t-test. All levels of significance were 2-tailed and set at the level of $P < 0.05$.

3. Results

The mean age and the number of children in current sample ($n = 253$) was 28.9 ± 5.8 years and 1.45 ± 1.12 , respectively. Almost all of the participants ($n = 252$, 99.6%) were married and most ($n = 224$, 88.5%) were unemployed. While 161 (63.6%) of the participants were primary school graduates, 34 (13.4%) were a university graduates. The proportion of primigravidae and history of abortion was 22.9% ($n = 58$) and 27.3% ($n = 69$), respectively.

The prevalence of current mood and anxiety disorder in the study sample and comparisons with the reference study are presented in Table 1. Of the 253 women included in the study, 42 (16.6%) had at least one mood or anxiety disorder, 18 (7.1%) had any mood disorder and 33 (13.0%) had any anxiety disorder during their pregnancy irrespective of comorbid conditions. Comorbid diagnoses were established in 12 (4.7%) women and were observed most frequently among anxiety disorders.

Table 1

Sociodemographic characteristics and prevalence of mood and anxiety disorders in samples of comparative study and current study.

	Current sample, n = 253	Comparative sample, n = 1154*	P value
Age, mean \pm SD, years	28.9 \pm 5.8	28.2 \pm 5.7	0.14
Number of children, mean \pm SD	1.45 \pm 1.12	1.48 \pm 1.21	0.58
Education, n (%)			0.75
Primary school	161 (63.6)	732 (65.4%)	
Secondary school	68 (22.9)	240 (20.8)	
University	34 (13.4)	156 (13.5)	
Marital status			0.48
Married	252 (99.6)	1152 (99.8)	
Employment status, n (%)			0.82
Unemployed	224 (88.5)	1028 (89.1)	
History of abortion, n (%)	58 (22.9)	313 (27.1)	>0.99
Primiparity, n (%)	69 (27.3)	327 (28.3)	0.09
Diagnoses, n(%)			
Any mood or anxiety disorder	42 (16.6)	210 (18.2)	0.59
Comorbid diagnosis	12 (4.7)	78 (6.8)	0.26
Any mood disorder	18 (7.1)	83 (7.2)	>0.99
Major depression	14 (5.5)	67 (5.8)	>0.99
Dysthymic disorder	4 (1.6)	14 (1.2)	0.55
Bipolar disorder	0 (0)	2 (0.2)	-
Any anxiety disorder	33 (13.0)	184 (15.9)	0.29
Panic disorder	9 (3.6)	51 (4.4)	0.61
Obsessive-compulsive disorder	13 (5.1)	57 (4.9)	0.87
Social phobia	6 (2.4)	30 (2.6)	>0.99
Specific phobia	7 (2.8)	47 (4.1)	0.47
Posttraumatic stress disorder	3 (1.2)	8 (0.7)	0.43
Generalized anxiety disorder	18 (7.1)	91 (7.9)	0.79

* Ref. 4 study.

The most commonly diagnosed specific disorder was generalized anxiety disorder ($n = 18$, 7.1%) followed by major depression ($n = 14$, 5.5%), obsessive-compulsive disorder ($n = 13$, 5.1%) and panic disorder ($n = 9$, 3.6%).

There was no significant difference between the current study and reference study with regards to age ($t = -1.48$, $P = 0.14$), number of children ($t = 0.551$, $P = 0.58$), marital status (Fisher's exact test, $P = 0.48$), educational level (Fisher's exact test, $P = 0.75$), employment status (Fisher's exact test, $P = 0.82$), history of abortion (Fisher's exact test, $P > 0.99$) and proportion of primigravidae (Fisher's exact test, $P = 0.09$) (Table 1). Statistical analyses indicated that prevalence of any mood or anxiety disorder, any mood disorder, any anxiety disorder, comorbidity between mood and anxiety disorders and specific diagnoses were statistically similar between current sample and the sample in the reference study.

4. Discussion

To the best our knowledge, this is the first structured psychiatric interview-based comparative study carried out on women who delivered their babies at the same hospital before and during COVID-19 pandemic. Recently, two meta-analyses [8,12] have suggested that the prevalence rate of depression and anxiety during the COVID-19 pandemic was 30–31% and 34–37%, respectively, although some authors have reported lower these rates (5.3% and 6.8% for depression and anxiety, respectively) [13]. Therefore, the prevalence rate of 7.1% for depression and 13.0% for anxiety disorders found in the current study are markedly lower than the rates that were reported in most of the previous studies. The most important cause for this discrepancy may be differences in the diagnostic instruments used such as structured clinical interview versus symptom rating scales. A lower prevalence rate can be expected in

interview based studies because symptoms determined by rating scales do not show psychiatric diagnoses. In a meta-analysis by Yan et al. [8], anxiety symptoms were observed in 37% of pregnant women; however, the prevalence rate of mild and severe anxiety were 24% and 7%, respectively. On the other hand, the time period when the assessment carried out and specific characteristics of study populations may also affect the results. In the current study, the participants were assessed within 24 h following birth; other studies have mostly screened the women during their pregnancy. A previous study on depression in a sample of Turkish women that was conducted within 48 h after birth reported that 14.7% of the participants had a score of 12 or higher with the Edinburgh Postpartum Depression Scale [14].

Wu et al. [15] reported that the prevalence of depression increased from 26% to 29.6% after the declaration of the COVID-19 epidemic. According to a meta-analysis [12], the prevalence of depression was 1.95 fold higher while that of anxiety was 2.15-fold higher in pregnant women compared to the controls during the pregnancy. In contrast, Zhou et al. [13] reported that pregnancy was associated with a reduced risk of depressive or anxiety symptoms during the COVID-19 epidemic. The results of the current study suggest that the diagnosis of mood and anxiety disorders during pregnancy was not significantly affected during the COVID-19 pandemic. One explanation could be that elevated distress and symptoms of depression or anxiety among pregnant women during the COVID pandemic may not have reached a level of clinical significance that required a diagnosis. Additionally, current evidence suggest that overall, COVID-19 infection in pregnant women was not associated with a worse course of the disease or neonatal outcomes compared to the general population, although the risk of preterm birth was higher in COVID-19 infected pregnant women compared to uninfected pregnant women [12,16,17,18]. Moreover, vertical transmission of infection is very rarely observed [16]. Awareness of these factors from the internet or social media may have reduced the fetus-focused stress among pregnant women, which may be another explanation. Finally, many previous studies were conducted in 2020 when earlier months of the pandemic, whereas the current study was carried out during 2021, one year after the COVID-19 was declared a pandemic. Although there are societal restrictions and high daily confirmed case numbers (about 30,000/d) during the time period during which these data were collected in Turkey, in time, pregnant women may have developed relatively tolerance to anxiety and stress secondary to the pandemic as a result of social confrontation and increase in scientific knowledge.

Use of a structured clinical interview and comparison with data collected prior to the COVID-19 pandemic are the main strengths of the current study. On the other hand, the assessment of participants within 24 h following birth may have negatively affected the results due to recall bias and the intense emotions related to the early postpartum period. This may be considered to be a restrictive factor in generalization of the study results to all pregnant women. A cross sectional design and relatively small sample size are other limitations. In cross-sectional design, due to the separate samples, individual variability is not taken into account. Ideally, to evaluate of the same participants before and after COVID outbreak may ensure more robust data. However, the same hospital and methodology may minimize limitation resulted from evaluation times and samples. Despite these limitations, the current study suggests that pregnant women may have similar prevalence rates of mood and anxiety disorders prior to and during the COVID-19 pandemic. Further multicenter and large-scale studies may provide more robust data on this subject.

Author statement

The authors have approved the final version of article. Each author

declare her or his individual contribution to the article.

Declaration of competing interest

The authors declare no actual or potential conflict of interest whether financial, personal or otherwise related to this manuscript.

Acknowledgments

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.

References

- [1] S. Grigoriadis, E.H. VonderPorten, L. Mamisashvili, G. Tomlinson, C.L. Dennis, G. Koren, et al., The impact of maternal depression during pregnancy on perinatal outcomes: a systematic review and meta-analysis, *J Clin Psych.* 74 (2013) e321–e341.
- [2] X.X. Ding, Y.L. Wu, S.J. Xu, R.P. Zhu, X.M. Jia, S.F. Zhang, et al., Maternal anxiety during pregnancy and adverse birth outcomes: a systematic review and meta-analysis of prospective cohort studies, *J. Affect. Disord.* 159 (2014 Apr) 103–110.
- [3] S. Gentile, Untreated depression during pregnancy: short- and long-term effects in offspring. A systematic review, *Neuroscience* 342 (2017) 154–166.
- [4] F. Uguz, E. Yakut, S. Aydogan, M.G. Bayman, K. Gezinc, Prevalence of mood and anxiety disorders during pregnancy: a case-control study with a large sample size, *Psychiatry Res.* 272 (2019) 316–318.
- [5] C.L. Dennis, K. Falah-Hasani, R. Shiri, Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis, *Br. J. Psychiatry* 210 (2017) 315–323.
- [6] C. Borri, M. Mauri, A. Oppo, S. Banti, C. Rambelli, D. Ramacciotti, et al., Axis I psychopathology and functional impairment at the third month of pregnancy: results from the Perinatal Depression-Research and Screening Unit (PND-ReScU) Study, *J Clin Psych.* 69 (2008) 1617–1624.
- [7] F. Uguz, K. Gezinc, F. Kayhan, S. Sari, D. Buyukoz, Is pregnancy associated with mood and anxiety disorders? A cross-sectional study, *Gen. Hosp. Psychiatry* 32 (2010) 213–215.
- [8] H. Yan, Y. Ding, W. Guo, Mental health of pregnant and postpartum women during the coronavirus disease 2019 pandemic: a systematic review and meta-analysis, *Front. Psychol.* 11 (2020), 617001.
- [9] C. Lebel, A. MacKinnon, M. Bagshawe, L. Tomfohr-Madsen, G. Giesbrecht, Elevated depression and anxiety symptoms among pregnant individuals during the COVID-19 pandemic, *J. Affect. Disord.* 277 (2020) 5–13.
- [10] R. Ayaz, M. Hocaoglu, T. Gunay, O.D. Yardimci, A. Turgut, A. Karateke, Anxiety and depression symptoms in the same pregnant women before and during the COVID-19 pandemic, *J. Perinat. Med.* 48 (2020) 965–970.
- [11] M.B. First, R.L. Spitzer, M. Gibbon, J.B.W. Williams, Structured Clinical Interview for DSM-IV Clinical Version (SCID-I/CV), American Psychiatric Press, Washington D.C., 1997.
- [12] F. Sun, J. Zhu, H. Tao, Y. Ma, W. Jin, A systematic review involving 11,187 participants evaluating the impact of COVID-19 on anxiety and depression in pregnant women, *J. Psychosom. Obstet. Gynecol.* 42 (2021) 91–99.
- [13] Y. Zhou, H. Shi, S. Peng, R. Wang, L. Qi, Z. Li, et al., The prevalence of psychiatric symptoms of pregnant and non-pregnant women during the COVID-19 epidemic, *Transl. Psychiatry* 10 (2020) 319.
- [14] Z.A. Oskovi-Kaplan, G.N. Buyuk, A.S. Ozgu-Erdinc, H.L. Keskin, A. Ozbas, O. Tekin, The effect of COVID-19 pandemic and social restrictions on depression rates and maternal attachment in immediate postpartum women: a preliminary study, *Psychiatr Q* (2021) 675–682.
- [15] Y. Wu, C. Zhang, H. Liu, C. Duan, C. Li, J. Fan, et al., Perinatal depressive and anxiety symptoms of pregnant women during the coronavirus disease 2019 outbreak in China, *Am. J. Obstet. Gynecol.* 223 (240) (2020) e1–e9.
- [16] E.A. Figueiro-Filho, M. Yudin, D. Farine, COVID-19 during pregnancy: an overview of maternal characteristics, clinical symptoms, maternal and neonatal outcomes of 10,996 cases described in 15 countries, *J. Perinat. Med.* 48 (2020) 900–911.
- [17] S.Q. Wei, M. Bilodeau-Bertrand, S. Liu, N. Auger, The impact of COVID-19 on pregnancy outcomes: a systematic review and meta-analysis, *CMAJ* 193 (2021). E540–548.
- [18] B.J.F. Huntley, I.A. Mulder, D. Di Mascio, W.S. Vintzileos, A.M. Vintzileos, V. Berghella, S.P. Chauhan, Adverse pregnancy outcomes among individuals with and without severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): a systematic review and meta-analysis, *Obstet. Gynecol.* 137 (2021) 585–596.