

## **Effects of the COVID-19 Pandemic on Postpartum Depression: A Retrospective Case-Control Study on A Significant Sample of Mothers in Northern Italy**

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**Abstract:** The present study compared a group of women who gave birth during the COVID-19 pandemic with a group of women who gave birth in the antecedent period, using the Edinburgh Postnatal Depression Scale (EDPS) questionnaire. The results show a significant increase in the risk of developing postpartum depression and an increase in the use of epidurals in women who have given birth during the pandemic period. These findings are indicative of the impact the pandemic has also had on the childbirth experience.

**Keywords:** COVID-19 pandemic, anhedonia, anxiety, depression, Edinburgh Postnatal Depression Scale (EDPS), postpartum depression

The periods of gestation and postpartum represent a delicate phase in the life of women, who are also more vulnerable from a psychic point of view. Contingent upon the presence of objective events (such as obstetric or fetal complications) and/or subjective experiences (fear, pain, lack of support), women can experience childbirth in a traumatic way (Chiorino et al., 2020). In the postpartum period, about 85% of women manifest forms of malaise or mood alterations mainly characterized by mild, transient symptoms and with spontaneous remission. However, 12%—20% of mothers experience more severe forms of postpartum depression (Heron et al., 2004; Henderson & Redshaw, 2013; Leigh & Milgrom, 2008; O'Hara

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& Swain, 1996), a disorder with a multi-faceted etiology, which includes multiple biological (Skalkidou et al., 2012), psychological (Jeong et al., 2013), socio-demographic, and obstetric-gynecological factors (Biaggi et al., 2016).

On March 11, 2020, the declaration of COVID-19's global pandemic status by the World Health Organization triggered numerous consequences on the health, political-economic, and social levels, and had equally critical psychological and emotional repercussions. As some researchers have already highlighted (Chen et al., 2020; Ozamiz-Etxebarria et al., 2020), forms of psychological distress associated with anxiety, depression, and psycho-physical stress increased considerably in parallel with the progress of the state of health emergency.

Within this general framework, pregnant women appeared to be one of the most vulnerable groups in several respects. First, pregnancy involves physiological alterations of the immune system that challenge pregnant women to have greater difficulty fighting off viruses and respiratory infections (Ellington et al., 2020). Second, scientific evidence has already shown that catastrophic events (earthquakes, terrorist attacks, etc.) are important predictors for the development of postpartum depression (Maunder et al., 2003). In addition, the constant increase of infections, the infodemic (the current overabundance of mis- and disinformation), and the tightening of social distancing and isolation policies contributed to the spread of a sense of uncertainty and loneliness in women.

The present research represents a retrospective case-control study that aims to identify which psychological effects derived from the COVID-19 pandemic and, in particular, the risk of developing postpartum depression. The data collection, carried out at a hospital in Northern Italy, aims to highlight potential alarms that may be relevant for health workers in gynecology and obstetrics wards.

## **Methods**

This research was conducted at the Complex Operating Unit of Obstetrics and Gynecology at the "Fracastoro" Hospital of ULSS-9 Scaligera in San Bonifacio (Verona, Italy). Between January, 2018, and October, 2020, the Departmental Simple Operational Unit of Clinical Hospital Psychology—the unit which organizes and coordinates the clinical psychology resources and activities at the hospital—carried out daily screenings for postpartum depression in the maternity ward. This is a retrospective case-control study, in which a group of women who gave birth during the COVID-19 pandemic was compared to a group of women who gave birth before the global pandemic was declared.

Every day, the research team administered an introductory interview, a verbal form including the socio-demographic information of the participants (age, nationality, marital status, education, occupation), and the Edinburgh Postnatal Depression Scale questionnaire (EPDS; Benvenuti et al., 1999; Cox et al., 1987; Carpiniello et al., 1997), to women who agreed to take part in the self-report screening. Women had to meet certain inclusion criteria: having given birth between the 37<sup>th</sup> and 42<sup>nd</sup> gestational week, not having been subjected to general anesthesia, and not being under psychological treatment at the time of admission.

The EDPS is a ten-item, self-report tool with a four-point Likert scale (0–3) for a total of 30 points maximum. This is the gold standard for postpartum depression screening. The present study used a cut-off equal to 12 (or higher) to identify the risk of developing depressive symptoms. The tool in question has three subscales (Tuohy & McVey, 2008): the anhedonia subscale (items 1 and 2), the anxiety subscale (items 3, 4, 5, 6), and the depression subscale (items 7, 8, 9, 10). The original version demonstrated 86% sensitivity and 78% specificity for a cut-off of 12/13, with a standardized alpha coefficient of 0.87 (Cox et al., 1987).

### Statistical Analysis

Statistical analyses were performed with SPSS software. The first part of the results will focus on the personal and obstetric-gynecological characteristics of the participants, in order to analyze the reliability of the sample. Descriptive statistics and students' *t*-scores for independent samples were carried out, with a significance criterion set at  $p = 0.05$ .

Subsequently, the total scores related to the EPDS (and its subscales) will be taken into consideration. Also in this case, descriptive analysis and students' *t*-scores for independent samples were conducted to verify any significant differences between the two groups (COVID-period group and control group).

### Results

The purpose of this study was to evaluate how much the COVID-19 pandemic affected the risk of developing postpartum depression, comparing women who gave birth in the period prior to the pandemic (January, 2018—January, 2020) with women who gave birth during the COVID-19 pandemic (May, 2020—October, 2020).

#### Characteristics of the Sample

The overall sample was made up of 900 participants. The COVID-period group was made up of 295 women; the control group (pre-COVID)

was made up of 605 women. **Table 1** shows the obstetric-gynecological variables of the sample taken into consideration.

#### CHARACTERISTICS RELATING LABOR AND DELIVERY

	Control group	Covid period group	
<b>Labor</b>			
Spontaneous	328 (54.2%)	159 (53.9%)	
Induced	195 (32.2%)	95 (32.2%)	
Non-cesarean labor	82 (13.6%)	41 (13.9%)	
<b>Delivery</b>			
Natural	441 (72.9%)	215 (72.9%)	
Operative	33 (5.5%)	15 (5.1%)	
Planned cesarean	64 (10.6%)	36 (12.2%)	
Emergency cesarean	67 (11.1%)	29 (9.8%)	
<b>Pain management</b>			
Epidural	<b>121 (20%)</b>	<b>88 (29.8%)</b>	<b>**</b>
Non-pharmacological	70 (11.6%)	13 (4.4%)	
None Stated	321 (53.1%)	130 (44.1%)	

**Table 1** – Obstetric-gynecological features. The values are assigned according to the following criterion: N (%); \* $p < 0.01$ , \*\* $p < 0.001$

Students' *t*-scores analysis did not find significant differences between the two groups with respect to age ( $p = 0.86$ ) and marital status ( $p = 0.45$ ). Respectively, the mean age of the control group was 32.39 ( $\pm 4.95$ ) years, whereas that of the COVID period was 32.33 ( $\pm 4.96$ ) years. With regards to marital status, 63.3% of the control group was married, 35.5% cohabiting, and 0.7% single, while 60.7% of the COVID-period group was married, 38.6 % cohabiting, and 0.7% single. In relation to nationality (79.7% vs 90.5%;  $p = 0.001$ ), education (1.5% vs 0% have a primary school certificate, 12.4% vs 10.5% have a middle school certificate, 54.2% vs 49.5% have a high school certificate, 31.9 % vs 40% have a degree;  $p = 0.01$ ) and employment (71.2% vs 81%;  $p = 0.01$ ), some significant differences were found.

The groups were also compared on the basis of characteristics relating to labor and delivery, aspects on which no significant differences were found ( $p = 0.94$ ;  $p = 0.91$ ). 54.2% vs 53.9% had spontaneous labor, 32.2% vs 32.2% were induced, and 13.6% vs 13.9% had no cesarean labor. Compared to childbirth, 72.9% vs 72.9% had a natural birth, 5.5% vs 5.1%

operative birth, 10.6% vs 12.2% planned cesarean, and 11.1% vs 9.8% emergency cesarean.

The only feature in which the two groups differed was pain management during birth. In the COVID-period group, 29.8% ( $p < 0.001$ ) of women underwent an epidural, 11.6% resorted to non-pharmacological pain management methods (baths, movement, breathing, etc.) and the remaining 53.1% did not use any stated way to deal with the pain. In the control group, the percentages observed are respectively 20% for epidural, 4.4% for non-pharmacological modalities, and 44.1% did not use any stated way to manage pain. It should be noted that women who underwent caesarean section surgery were excluded from these percentages.

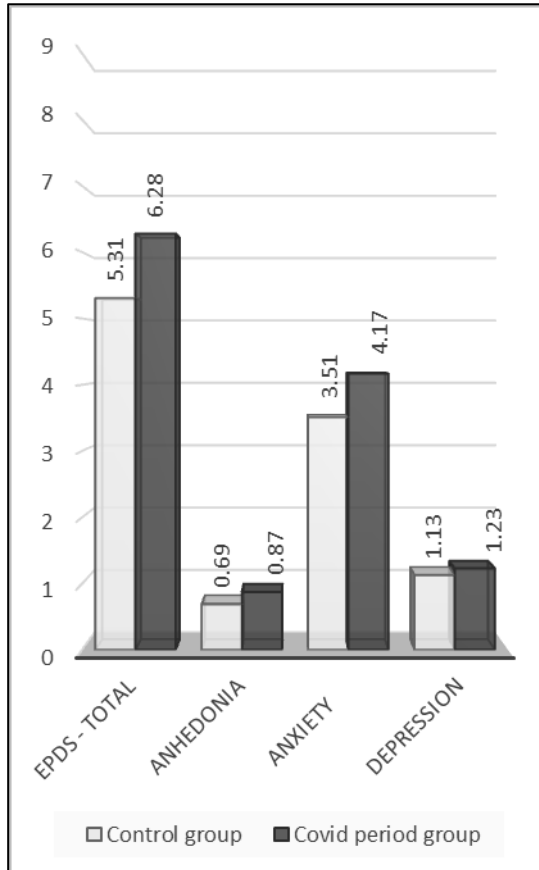
### Symptoms of Anxiety and Depression (EDPS)

The analysis of the students'  $t$ -scores showed that women from the COVID period reported an average score on the EPDS significantly higher than the control group ( $6.28 \pm 4.02$  vs  $5.31 \pm 3.88$ ;  $p < 0.001$ ). As for the subscales, the COVID-period group statistically reported significantly higher scores with respect to anhedonia ( $0.87 \pm 1.07$  vs  $0.69 \pm 0.95$ ;  $p = 0.01$ ) and anxiety ( $4.71 \pm 2.46$  vs  $3.51 \pm 2.44$ ;  $p < 0.001$ ). No noteworthy differences emerged as regards the depression subscale ( $1.23 \pm 1.49$  vs  $1.13 \pm 1.42$ ;  $p = 0.30$ ). See Table 2 and Graph 1.

#### EPDS scores

	Control group	Covid period group	
EPDS total	5.31 (3.88)	6.28 (4.02)	**
EPDS - anhedonia	0.69 (0.95)	0.87 (1.07)	*
EPDS - anxiety	3.51 (2.44)	4.17 (2.46)	**
EPDS - depression	1.13 (1.42)	1.23 (1.49)	
Risk level			
Low risk	286 (47.3%)	112 (38%)	
Medium risk	276 (45.6%)	148 (50%)	
High risk	43 (7.1%)	35 (11.9%)	

**Table 2** – Edinburgh Postnatal Depression Scale (EPDS) scores. The values are assigned according to the following criterion: M (DS) e N (%); \* $p < 0.01$ , \*\* $p < 0.001$



**Graphic 1** – Edinburgh Postnatal Depression Scale (EPDS) and subscales medium scores.

Overall, therefore, the percentage of women who showed a high risk in the EPDS questionnaire (data derived from exceeding the cut-off of 12) is 11.9% in the COVID-period group, compared to 7.1% in the control group, 45.6% versus 50% had a medium risk (score 5-11) and 47.3% versus 38% had a low risk (score 0-4).

### Discussion and Conclusions

The present study assessed how much the COVID-19 pandemic affected the mental well-being of new mothers, in relation to the risk of developing postpartum depression—a dimension that was assessed using the EPDS questionnaire. From the comparison between the two studied

groups, it was found that the group of women who gave birth during the pandemic period reported significantly higher scores on the EPDS than the control group, thus highlighting an increased risk for postpartum depression contingent on this pandemic period.

In particular, mothers who gave birth in the COVID-19 period reported an overall score above the cut-off of 12. 11.9% of women in the COVID period falls into a high-risk range, while 38.8% falls into a low-risk range. In contrast, only 7.1% of the control group reported a high risk and 47.3% a low risk. Hence, a majority of the women who gave birth during the pandemic period fell back into a medium-high risk range. These data highlight the vulnerability and susceptibility of women who have given birth—and who will give birth—during the pandemic, for whom assistance sensitive to the peculiarity of the current circumstances would be appropriate in order to prevent the onset of postpartum depression (Maunder et al., 2003).

During COVID-19, anxieties, worries, and fears about one's own health and that of one's child may have been exacerbated, further burdening pregnancy and childbirth, experiences that in themselves can be experienced in a stressful way (Chiorino et al., 2020). The literature has already highlighted how the presence of stressors during pregnancy is associated with an increased risk of developing anxiety-depression symptoms in new mothers (Leigh & Milgrom, 2008; O'Hara & Swain, 1996). In fact, the group from the COVID period reported a significant increase in scores in the anhedonia and anxiety subscales of the EPDS, a fact plausibly attributable to COVID-19 and its resulting consequences.

Furthermore, it is interesting to note, with the same number of labors and births occurring in the same way, the women of the COVID period resorted more frequently to pharmacological pain management. 29.8% of the women belonging to the COVID-period group resorted to epidural use for pain management compared to 20% reported in the control group—scores that were statistically significant.

It is conceivable that these data are attributable to the health regulations for the prevention and containment of the spread of infections. Women in the COVID period could not benefit from the presence of their partners during the active phase of labor (of a more or less extended duration) and this could have impacted their experience of pain tolerance. It is evident how the presence of the partner can be an important resource in pain management and, in general, during the experience of childbirth (Bohren et al., 2019; Hui et al., 2020). The pandemic has also seriously shaken expectations surrounding the time of birth.

This data represents relevant information for health workers in the Obstetrics and Gynecology UOCs, as it underlines the need to review the care policies aimed at compensating for the relational isolation due to the pandemic. In light of current knowledge, this is the first study involving

such a large sample in Italy. Among the strengths of this study are the characteristics related to childbirth, which are among the main factors affecting the total score of the EPDS (Goker et al., 2012; Koo et al., 2003), and that the two groups are absolutely comparable (see Table 1). Future studies could be carried out in a multi-center perspective in order to obtain an even more representative sample and therefore more generalizable results.

### Conflict of Interest and Funding

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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