Prevalence and risk factors associated with postpartum depression during the covid-19 pandemic: a cross-sectional study

ABSTRACT

Aims: To identify the prevalence and risk factors associated with postpartum depression (PPD) during the covid-19 pandemic, in the city of Teófilo Otoni, MG.
Methodology: This is a cross-sectional study that included 183 puerperal women aged between 18 and 42 years, who were attended at the city's public maternity hospital, between the months of February and August 2021. The cut-off point used was ≥ 11 on the Edinburgh Postpartum Depression Scale (EPDS). The Microsoft Excel program was used to tabulate the data; subsequently, they were transported to the Jamovi program, version 1.6.23.0. Descriptive statistical analysis used measures of central tendency, dispersion and Pearson's chi-square test. The reliability analysis of the EPDS was performed with Cronbach's alpha (α).
Results: The prevalence of PPD was 35.5%. Only schooling was the sociodemographic factor that obtained a significant association with PPD ($\chi 2$ (2) = 8.72, p = 0.013). Anxiety about giving birth during the pandemic; fear of the child having covid-19; fear of being infected in the hospital and desire not to be pregnant for fear of acquiring covid-19 were risk factors associated with PPD. The number of women who reported having anxiety about childbirth during the pandemic had a 2.46 times higher prevalence ratio of PPD.
Conclusion: The high prevalence of PPD found reinforces its role as a public health problem and highlights the need for careful monitoring of mothers. The significant association of DPP with a higher level of anxiety about giving birth during the pandemic, with anxiety, with low education, reveals negative impacts on maternal and child well-being.

Keywords: Depression; Postpartum; covid-19 pandemic; Postpartum Period; Unified Health System; Women's Health.

1. INTRODUCTION

The puerperium or postpartum period encompasses the eight weeks following the birth of a neonate. This is a time during which women undergo significant changes in their routines and physiology, particularly in their hormonal profiles. These changes are often accompanied by a relative physical and emotional vulnerability. As a result, postpartum women require care and attention that take their unique circumstances into account, considering the multiple dimensions of the sociocultural environment surrounding them [1-3].

Although pregnancy, childbirth, and the postpartum period are socially perceived as times of emotional well-being brought about by the arrival of a baby, various emotional disorders can affect women during these phases. From an epidemiological perspective, the postpartum period is when women are most susceptible to psychiatric disorders, with postpartum depression (PPD) being one of the most prevalent conditions, affecting 10% to 15% of postpartum women. Notably, PPD is underdiagnosed worldwide, with 50% to 90% of cases going unrecognized and untreated [4-8].

It is evident that PPD is a significant public health issue, impacting not only postpartum women but also the general care provided to newborns. In most cases, symptoms appear within a month after delivery, intensifying until reaching their peak around six months postpartum. Common symptoms include irritability, frequent crying, feelings of helplessness and hopelessness, lack of energy and motivation, loss of sexual interest, changes in appetite and sleep patterns, feelings of inadequacy, and psychosomatic complaints such as headaches, back pain, vaginal irritation, and abdominal pain without identifiable organic causes [6, 9].

This situation may be further aggravated, both individually and collectively, by non-biological factors, such as political, economic, social, and cultural issues. Indeed, such a scenario emerged in 2020 and especially in 2021, the second year of the COVID-19 pandemic, during which this research was conducted. COVID-19, a highly impactful infectious disease caused by the SARS-CoV-2 virus [10], imposed profound changes on populations worldwide, including business and factory closures, restrictions on mobility, social distancing measures, mandatory mask use, overexposure to tragic news, and the daily experience of people falling ill, being hospitalized, or dying.

Some maternity wards, as a preventive measure, opted to isolate women giving birth before, during, and after delivery. Such measures, among many others, illustrate how the pandemic disrupted the routines of women in maternity wards, contributing to feelings of insecurity, loneliness, anxiety, and, consequently, postpartum stress [2, 10-11].

Moreover, the type of information obtained about COVID-19 and the daily exposure to pandemic-related news generated concerns about childbirth. This was particularly true for news related to death tolls, the shortage of hospital beds, and the political handling of the health crisis [12].

In light of the above, this study aims to identify the prevalence of PPD and the factors associated with it during the COVID-19 pandemic

2. MATERIAL AND METHODS

2.1 Procedures

This was a cross-sectional study conducted at a public maternity hospital in the city of Teófilo Otoni, Minas Gerais, Brazil. The municipality is located in the northeastern region of the state, in the Mucuri River Valley mesoregion. It is a medium-sized city with a population of approximately 134,745 inhabitants and a Municipal Human Development Index (MHDI) of 0.701 [13]. Teófilo Otoni serves as the headquarters of the Northeast Macroregion Health Network of Minas Gerais, comprising 57 municipalities and approximately 1 million inhabitants. Due to its strategic location, the city centralizes high-complexity health services, including those related to pregnancy and childbirth. Its maternity hospital provides emergency obstetric care and high-complexity services through both the Unified Health System (SUS) and private healthcare providers [14].

Questionnaires were administered between February and August 2021, during the COVID-19 pandemic. Postpartum women were approached at bedside in the joint accommodation rooms of the aforementioned maternity hospital. Data collection was limited to patients admitted to the public sector. Inclusion criteria were being 18 years or older, voluntary agreement to participate in the study, and signing the Informed Consent Form (ICF). Women whose newborns had congenital malformations or had died were excluded from the study. Additionally, 13 participants who did not complete the Edinburgh Postnatal Depression Scale (EPDS) and one participant who did not provide her age were excluded [15].

2.2 Instruments

A sociodemographic questionnaire, developed based on a literature review specifically for this study, was used to collect sociodemographic data. The questionnaire included questions about age, education level, occupation, marital status, family income, and stress perception due to affected family income during the pandemic. It also addressed aspects related to pregnancy and childbirth during the pandemic, such as whether the pregnancy was desired and planned, levels of anxiety about giving birth during the pandemic, emotional support received during delivery, length of postpartum hospital stay, type of breastfeeding practiced, fear of contracting COVID-19 during pregnancy, fear of infection for both the mother and the newborn, preference for delivering in a hospital that did not treat COVID-19 patients, and the desire not to be pregnant during the pandemic.

The Edinburgh Postnatal Depression Scale (EPDS) was used to assess the prevalence of postpartum depression (PPD). The EPDS is a self-administered scale consisting of 10 items rated on a four-point Likert scale (0–3), assessing the presence and intensity of depressive symptoms over the past seven days. The EPDS was validated and adapted for use in Brazil by Santos et al. (1999) [16]. The total score ranges from 0 to 30. In this study, postpartum women with scores ≥ 11 were classified as having PPD, in accordance with the optimal cut-off point suggested by the validation study authors.

2.3 Data analysis

This Statistical analysis included measures of central tendency (mean) and dispersion (standard deviation) for continuous variables, as well as absolute and relative frequency distributions for categorical variables. Missing data were noted but excluded from statistical analysis.

The reliability of the EPDS was assessed using Cronbach's alpha (α), with values ranging from 0.70 to 0.95 considered indicative of good internal consistency [17].

For bivariate analysis, Pearson’s chi-square test or Fisher’s exact test was used to evaluate associations between PPD and sociodemographic variables, as well as pregnancy- and childbirth-related factors.

Prevalence ratios (PR) and their 95% confidence intervals (CI 95%) were estimated using Poisson regression with robust variance, an appropriate method for cross-sectional studies [18].

A multivariate model was subsequently constructed using Poisson regression with robust variance, following a hierarchical entry method. Sociodemographic and pregnancy- and childbirth-related variables with a significance level of $p \leq 0.05$ in the bivariate analysis were retained in the final model.

For all tests, a statistical significance level of $p \leq 0.05$ was adopted. Statistical analyses were performed using Jamovi software, version 1.6.23.0 [19].

2.4 Ethical Considerations

The study was approved by the Research Ethics Committee (CEP) of the Federal University of Jequitinhonha and Mucuri Valleys (UFVJM) under protocol number 4.514.565. Postpartum women gave their consent to participate in the study by signing the Informed Consent Form.

3. RESULTS

3.1 Sociodemographic Characteristics

The study included 183 postpartum women aged 18 to 42 years (M = 26.5; SD = 6.21). Regarding sociodemographic data, the majority were aged 18–25 years (46.4%), self-identified as mixed-race (75.4%), had completed high school (38%), were primarily homemakers (51.5%), were in a consensual union (74.1%), reported a family income of ≤1 minimum wage (53.5%), and indicated that their family income was negatively affected by the COVID-19 pandemic (62.6%). Among those whose income was affected, 52.3% reported experiencing stress.

Regarding pregnancy, most participants stated that it was desired (84.9%), though unplanned (56%). Concerning delivery, 53.3% reported anxiety due to giving birth during the pandemic. Emotional support during delivery was reported by 71.3% of participants. A significant proportion of the postpartum women (81.5%) were hospitalized for 48 hours or less. Exclusive breastfeeding was practiced by 78.1% of respondents.

There was notable concern about COVID-19, with 73.5% fearing contracting the disease during pregnancy, 75.3% fearing the newborn contracting the disease, and 59.4% fearing hospital-based infection. Perhaps due to these concerns, 71.9% expressed a preference for giving birth in a hospital without COVID-19 patient wards. Notably, 72.1% of postpartum women did not express a desire to avoid pregnancy during the pandemic.

3.2 Sociodemographic Characteristics

Reliability analysis demonstrated good overall internal consistency for the EPDS ($\alpha = 0.86$). The prevalence of postpartum depression (PPD) was 35.5% (CI 95% : 28.9–42.7).

Regarding the association between sociodemographic variables and PPD (Table 1), only education level showed a significant association with PPD (χ^2 (2) = 8.72, p = 0.013), with the highest prevalence observed among women with elementary education (48.6%).

Table 1. Association between sociodemographic variables and postpartum depression in women, Teófilo Otoni, Brazil, 2022 (N=183)

Variable	N (%)	Prevalence n (%)	Crude PR (CI 95%) [a]	p[b]
Age range				
18-25	85 (46.4)	33 (38.8)	1	

26-30	43 (23.5)	16 (37.2)	0.95 (0.58-1.53)	0.484
31-42	55 (30.1)	16 (29.1)	0.74 (0.45-1.20)	
Race				
Brown	135 (73.8)	51 (37.8)	1	
Black	20 (10.9)	9 (45)	1.19 (0.64-2.04)	
White	17 (9.3)	3 (17.6)	0,46 (0.15-1.07)	0.206
Otherc	7 (3.8)	1 (14.3)	0.37 (0.04-1.36)	
Missing	4 (2.2)			
Education				
Elementary	35 (19.1)	17 (48.6)	4.04 (1.64-12.57)	
High School	119 (65)	44 (37)	3.08 (1.33-9.25)	0,013
Higher Education	25 (13.7)	3 (12)	1	
Missing	4 (2.2)			
Occupation				
Housewife	86 (47)	32 (37.2)	1	
Urban Worker	49 (26.8)	14 (28.6)	0.76 (0,45-1,26)	
Rural Worker	21 (11.5)	9 (42.9)	1.15 (0.60-204)	0.651
Otherd	11 (6)	4 (36.4)	0.97 (0.37-2.10)	
Missing	16 (8.7)			
Consensual Union				
Yes	117 (63.9)	36 (30.8)	1	
No	41 (22.4)	18 (43.9)	1.42 (0.88-2.24)	0.127
Missing	25 (13.7)			
Household Income				
≤ 1 SMe	84 (45.9)	30 (35.7)	1	
> 1 SM	54 (29.5)	16 (29.6)	0.83 (0.49-1.34)	0.574
Otherf	19 (10.4)	8 (42.1)	1.17 (0.59-2.15)	
Missing	26 (14.2)			

Income Affected				
Yes	109 (59.6)	39 (35.8)	1	
No	65 (35.5)	20 (30.8)	0.86 (0.54-1.32)	0.499
Missing	9 (4.9)			
Estresse em ter a renda afetada				
Yes	57 (52.3)	15 (26.3)	0.31 (0.20-0.44)	
No	19 (17.4)	7 (36.8)	1	0.381
Missing	33 (30.3)			

a: RP: Prevalence Ratio. CI 95%: 95% Confidence Interval.
b: p-value from Pearson's chi-square test or Fisher's exact test, as appropriate.
c: Indigenous and yellow (Asian).
d: None, student, or unemployed.
e: MW: Minimum Wage (R$1,100.00 during the study period).
f: Did not declare income.

Regarding the association between variables related to pregnancy, childbirth, and postpartum depression (PPD) (Table 2), significant associations were found between PPD and anxiety about giving birth during the pandemic ($\chi2$ (1) = 15.6, p = <0.001); fear of the child contracting COVID-19 ($\chi2$ (1) = 5.70, p = 0.017); concern about contracting COVID-19 in the hospital environment ($\chi2$ (1) = 4.87, p = 0.027); and the desire not to be pregnant out of fear of contracting the virus ($\chi2$ (1) = 9.39; p = 0.013). Among these variables, the highest prevalence of PPD was observed in postpartum women affected by anxiety during childbirth in the pandemic (50%); those who expressed fear of the newborn contracting COVID-19 (40.3%); those who reported concern about contracting COVID-19 in the hospital (42.1%); and women who wished they were not pregnant due to fear of contracting the virus (54%).

Table 2. Association between pregnancy- and childbirth-related variables and postpartum depression in women, Teófilo Otoni, Brazil, 2022 (N=183)

Variable	N (%)	Prevalencen (%)	Crude PR[a] (CI 95%)	p[b]
Desired Pregnancy				
Yes	152 (83.1)	52 (34.2)	0.77 (0.47-1.31)	
No	27 (14.8)	12 (44.4)	1	0.307
Missing	4 (2.2)			
Planned Pregnancy				
Yes	80 (43.7)	24 (30)	0.76 (0.50-1.14)	
No	102 (55.7)	40 (39.2)	1	0.196

Missing	1 (0.5)			
Anxiety about giving birth during the pandemic				
Yes	84 (45.9)	42 (50)	2.28 (1.50-3.53)	
No	96 (52.5)	21 (21.9)	1	<0.001
Missing	3 (1.6)			
Emotional Support				
Yes	127 (69.4)	44 (34.6)	0.98 (0.63-1.55)	
No	51 (27.9)	18 (35.3)	1	0.935
Missing	5 (2.7)			
Time After Delivery				
≤ 48h	137 (74.9)	44 (32.1)	1	
>48h	31 (16.9)	14 (42.2)	1.40 (0.84-2.25)	0.168
Missing	15 (8.2)			
Type of Breastfeeding				
Exclusive	100 (54.6)	36 (36)	1	
Predominant	17 (9.3)	4 (23.5)	0.65 (0.25-1.39)	0.257
Artificial	11 (6)	6 (54.5)	1.51 (0.70-2.90)	
Missing	55 (30.1)			
Fear of contracting COVID-19 during pregnancy				
Yes	133 (72.7)	46 (34.6)	0.92 (0.60-1.45)	
No	48 (26.2)	18 (37.5)	1	0.717
Missing	2 (1.1)			
Fear of the child contracting COVID-19				
Yes	134 (73.2)	54 (40.3)	1.97 (1.15-3.64)	
No	44 (24)	9 (20.5)	1	0.017
Missing	5 (2.7)			

Fear of contracting COVID-19 in the hospital				
Yes	107 (58.5)	45 (42.1)	1.61 (1.06-2.52)	
No	73 (39.9)	19 (26)	1	0.027
Missing	3 (1.6)			
Preferred the hospital not to admit COVID-19 patients				
Yes	128 (69.9)	47 (36.7)	1.02 (0.66-1.60)	
No	50 (27.3)	18 (36)	1	0.929
Missing	5 (2.7)			
Wished not to be pregnant due to fear of contracting the vírus				
Yes	50 (27.3)	27 (54)	1.83 (1.22-2.71)	
No	129 (70.5)	38 (29.5)	1	0.002
Missing	4 (2.2)			

a: CI 95%: 95% Confidence Interval; PR: Prevalence Ratio.
b: p-value from Pearson's chi-square test or Fisher's exact test, as appropriate.

The multivariate Poisson regression analysis (Table 3) showed significance only for the variable "anxiety about giving birth during the pandemic." Postpartum women who experienced anxiety during the pandemic had a 2.46 times higher prevalence ratio for PPD (Adj. PR = 2.46; CI 95%: 1.11–5.71, p = 0.032) compared to those who did not experience this condition.

Table 3. Final hierarchical model of factors associated with Postpartum Depression in women, Teófilo Otoni, Brazil, 2022 (N=183)

Variable	Prevalence n (%)	Adjusted PR (CI 95%)	p[b]
Education			
Elementary	17 (48.6)	1.27 (0.32-6.16)	0.307
High School	44 (37)	1.86 (0.66-7.74)	0.740
Higher Education	3 (12)	1	
Stress from having income affected			
Yes	25 (41.7)	2.04 (0.95-4.97)	0.088

No	5 (17.9)	1	
Anxiety about giving birth during the pandemic			
Yes	42 (50)	2.46 (1.11-5.71)	0.032
No	21 (21.9)	1	
Fear of the child contracting COVID-19			
Yes	54 (40.3)	1.37 (0.55-3.65)	0.510
No	9 (20.5)	1	
Fear of contracting COVID-19 in the hospital			
Yes	45 (42.1)	0.63 (0.28-1.47)	0.278
No	19 (26)	1	
Wished not to be pregnant during the pandemic			
Yes	27 (54)	1.53 (0.76-2.98)	0.220
No	38 (29.5)	1	

a: CI 95%: 95% Confidence Interval; PR: Prevalence Ratio.
b: p-value from Poisson regression with robust variance.

4. DISCUSSION

The data from this study reveal a significant prevalence of postpartum depression (PPD) among postpartum women, particularly associated with low educational attainment and anxiety related to the COVID-19 pandemic.

The prevalence of PPD found in our study was lower than the 38.8% reported by Galletta et al. (2022) [12] in a study with 184 participants conducted during the same pandemic period at the Clinics Hospital and University Hospital of the University of São Paulo (USP). In contrast, Ostacoli et al. (2020) [20] reported an even higher prevalence of 44.2% in a sample of 163 women at the Obstetrics and Gynecology Unit of Sant'Anna Hospital in Turin, Italy. Comparing our results to pre-pandemic studies, the prevalence of PPD in our research exceeded the 20% reported by Lobato et al. (2011) [21] and the 19.8% reported by Araújo et al. (2019) [22] in Salvador, Bahia.

This study identified a relationship between low educational attainment and a higher prevalence of PPD, findings consistent with those of Hartmann, Mendonza-Sassi, and Cesar (2017) [23] and Silva et al. (2017) [24]. As suggested by Morais et al. (2015) [25], low educational attainment is linked to poor living conditions and social inequality, which limit access to social and formative structures that could provide psychological protection. Lower levels of education restrict access to jobs, income, schools, universities, hospitals, clinics, psychological services, and family planning—resources that could form a protective network against PPD if postpartum women had higher educational levels.

The association found in this study between PPD and anxiety about giving birth during the COVID-19 pandemic was significantly higher than that reported by Nomura et al. (2021) [26]. Their study conducted a secondary analysis of a multicenter cross-sectional study in 10 Brazilian cities in 2020 and identified a 27.6% prevalence of moderate or severe anxiety among healthy pregnant women at the end of pregnancy. The connection between fear, stress, and anxiety and a higher prevalence of PPD was also observed by Lebel (2012) [27].

According to Preis et al. (2020) [28], the pandemic introduced additional challenges to psychological well-being. Fear of contracting COVID-19 and transmitting it to the fetus, disruptions to routine prenatal consultations, and restrictions on the presence of companions in maternity wards are factors that may contribute to increased psychological distress in pregnant women.

5. STRENGTHS OF THE STUDY

Several strengths of this study should be noted. First, its originality, as no prior research in the available literature has attempted to assess the prevalence of postpartum depression (PPD) among postpartum women in Teófilo Otoni, the headquarters of the Northeast Macroregion Health Network of Minas Gerais. Second, its pioneering nature as a research field, as it opens a new thematic area for future efforts to further investigate this previously neglected phenomenon. Third, it represents an important epidemiological survey that can serve as a foundation for the development of public policies aimed at improving the well-being of postpartum women affected by PPD.

6. LIMITATIONS OF THE STUDY

Several limitations of this study should be considered. First, as a cross-sectional study, it does not allow for the establishment of causality. Data were collected through a bedside questionnaire, which may have influenced participants' responses due to the fatigue experienced after childbirth.

Additionally, previous research indicates that the onset of PPD typically occurs after the first four weeks postpartum, with peak intensity within the first six months postpartum [6, 9]. Consequently, some participants in this study may have exhibited symptoms after data collection was completed.

7. CONCLUSION

The prevalence of postpartum depression (PPD) observed in this study underscores its role as a public health issue and highlights the need for careful monitoring of postpartum women. The significant association of PPD with higher levels of anxiety about giving birth during the pandemic and with low educational attainment reveals factors linked to negative impacts on maternal well-being.

Further research is necessary to understand the medium- and long-term consequences of the COVID-19 pandemic. Such studies can assist in planning preventive and therapeutic measures by healthcare professionals and policymakers during public health crises.

CONSENT

All authors declare that written informed consent was obtained from the patient for publication of this study. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki

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