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# Predictors of postpartum depression: Prospective study of 264 women followed during pregnancy and postpartum



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## ABSTRACT

The prevalence of postpartum depression is approximately 13%. Postpartum depression is associated with a higher maternal morbidity and mortality, and also with pervasive effects on the emotional, cognitive and behavioral development of the child. The aim of our study was to identify socio-demographic, psychosocial and obstetrical risk factors of postpartum depression in a middle class community sample, using a prospective design. We enrolled consecutively 312 pregnant outpatients in a single maternity unit. The first assessment was conducted between 32 and 41 weeks gestation, and a second time between 6 and 8 weeks after delivery. Depressive symptoms were measured using the French version of the Edinburgh Postnatal Depression Scale (EPDS). A cut-off score of 12/30 or above was considered as indicative of Major Depression. Of the initial sample of 312 women, 264 (84.6%) were followed-up between 6 and 8 weeks after delivery and considered for analysis. Depression during pregnancy, migrant status, and physical abuse by the partner were independently associated with postpartum depression when considered together, whereas physical complications were significantly associated with postpartum depression only when adjusting for antenatal depression. Depression during pregnancy, history of physical abuse, migrant status and postpartum physical complications are four major risk factors for postpartum depression.

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## 1. Introduction

Postpartum psychiatric disorders range from the mild and common postpartum “blues” to much rarer incidences of severe postpartum psychosis. The most commonly studied postpartum disorder is postpartum depression (PPD). Although the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM IV-TR) criteria for symptom onset of postpartum depression are limited to 4 weeks after childbirth (APA, 1994), many clinicians and researchers in the field consider symptoms within 12 months after delivery to be related to childbirth (Gaynes et al., 2005). PPD prevalence is considered as high, ranging between 5.5% and 33.1% depending on studies, cultures, samples,

instruments and statistical methods (Le Strat et al., 2011; O'Hara and Swain, 1996; Yonkers et al., 2004).

PPD has some specific outcomes. Although suicide attempt is less frequent in PPD than in non-postpartum Major Depressive Episode (Warner, 1996), PPD is associated with low quality of life and poor mental health in mothers. PPD also has pervasive effects on mother–infant bonding, and affects the emotional, cognitive and behavioral development of the child (Field, 2010). In long term studies, PPD is associated with an increased risk for psychiatric disorders in adolescence (Murray et al., 2011).

In addition to the classical symptomatology associated with a Major Depressive Episode, women with PPD often report having a lack of confidence in their abilities to take care for their child. Sleep disturbances and fatigue are common after childbirth and during the postpartum period, making it harder to diagnose PPD (Matthey and Ross-Hamid, 2011). Consequently, a large percentage – estimated up to 50% – of PPD remains undetected (Ramsay and Torbet, 1993).

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Some biological risk factors of PPD have been identified, including genetic (Mahon et al., 2009), epigenetic factors (Meltzer-Brody, 2011) and endocrine dysregulations (Yim et al., 2009). Many sociodemographic and psychosocial characteristics, as well as psychiatric disorders have been associated with PPD in the literature. Sociodemographic and psychosocial characteristics include low socio-economic status (e.g., low education level, poverty, low income, unemployment), lack of social support, lack of partner support, stressful life events, history of traumatic experiences, physical abuse by the partner (Beck, 1996; Robertson et al., 2004; Csator dai et al., 2007; Ludermir et al., 2010; Milgrom et al., 2008; Reck et al., 2008; Vesga-López et al., 2008). Psychological and psychiatric predictors include depression or anxiety during pregnancy, as well as severe postpartum blues (Heron et al., 2004; Leigh and Milgrom, 2008; Saisto et al., 2001). Although numerous studies have described these sociodemographic and psychosocial determinants, only a few studies investigated the role of complication during pregnancy or delivery in postpartum depression.

The consequences of obstetrical factors, such as mode of delivery, pain during delivery (Eisenach et al., 2008; Kumar, 1997), pregnancy or delivery complications, parity, unfavorable pregnancy case history, unwanted pregnancy (Boyce and Todd, 1992; Csator dai et al., 2007; Johnstone et al., 2001) have been described but remain uncertain. Some studies suggest that emergency cesarean section or assisted vaginal delivery are associated with a higher risk for PPD (Xie et al., 2011; Blom et al., 2010; Yang et al., 2011), some do not (Carter et al., 2006; Patel et al., 2005; Hannah et al., 2004). Pain intensity during delivery and absence of epidural anesthesia has been found to increase postpartum blues (Boudou et al., 2007; Hiltunen et al., 2004) but not PPD. For some, unplanned pregnancy is considered as a predictor of vulnerability to PPD (Csator dai et al., 2007; Eastwood et al., 2012; Ludermir et al., 2011), other studies report conflicting results (Blom et al., 2010). Discrepancies may be explained by methodological differences. As an example, some studies did not use a prospective design (e.g. Edwards et al., 1994; Culp and Osofsky, 1989) and did not evaluate mood during pregnancy (e.g. Xie et al., 2011; Yang et al., 2011; Blom et al., 2010). Some studies examining the impact of cesarean section did not differentiate emergency and elective cesarean section (Carter et al., 2006). Moreover, time assessment for PPD ranges from 2 weeks to 6 months after delivery.

Depression during pregnancy is a major predictor of PPD but few studies have examined separately antenatal depression continuing after childbirth (antenatal onset PPD) and postpartum onset PPD (Heron et al., 2004; Milgrom et al., 2008; Leigh and Milgrom, 2008).

The aim of our study is to estimate the role of sociodemographic, psychosocial characteristics and obstetrical risk factors on PPD, using a prospective, two-wave design in a middle class community sample and to test whether these factors are related to postpartum onset PPD controlling for the presence of antenatal depression.

## 2. Methods

### 2.1. Design

In this prospective study, data was collected on two occasions, namely between 32 and 41 weeks gestation (wave 1), and a second time between 6 and 8 weeks after delivery (wave 2).

### 2.2. Participants

Between November 2007 and November 2009, 312 pregnant outpatients were consecutively enrolled at a single public maternity unit (Louis Mourier Hospital, Colombes, France). Colombes is a 85,000 inhabitants city in the suburbs of Paris. Its population is mostly middle class community. Two thousand three hundred deliveries are performed annually in Louis Mourier Hospital. The mean age of women giving birth

in the recruited sample is 31 year old. 61% of them are in a relationship, 41% are primiparous, 81% give birth vaginally and 82% have epidural analgesia.

Women were recruited by nurses, midwives and obstetricians while standing in a waiting room. The exclusion criteria were patients with mental retardation ( $N=5$ ) or altered consciousness before screening ( $N=10$ ).

### 2.3. Procedure

During wave 1 and wave 2, patients were screened for depressive symptoms using the French version (Guedeny and Fermanian, 1998) of the Edinburgh Postnatal Depression Scale (EPDS). EPDS screens depressive symptoms specifically during postnatal period (Cox et al., 1996, 1987), and is also widely used during pregnancy (Adouard et al., 2005; Bunevicius et al., 2009). The French version of the EPDS shows fair to good psychometric properties (sensitivity: 0.91; specificity: 0.74) for the detection of major postpartum depression, and a good internal consistency (Cronbach's alpha > 0.80) (Teissedre and Chabrol, 2004). The cut-off score of 12 has been used for consistency with previous work on the French version of this scale (Teissedre and Chabrol, 2004). Therefore, a cut-off score of 12/30 was used to indicate a risk for major depression. A participant with an EPDS score of 12 or above at the first assessment was considered as being at risk for antenatal depression. A participant with an EPDS score of 12 or above at the second assessment was considered as being at risk for PPD, regardless of the score at the first assessment. To confirm the validity of the EPDS for the diagnosis of PPD, women with an EPDS score  $\geq 12$  were contacted by a senior psychiatrist (AG) who administered by telephone the Diagnostic Interview for Genetic Studies (DIGS) (Nurnberger et al., 1994), a semi-structured interview that assesses the DSM-IV diagnostic criteria for Major Depression and other psychiatric diseases. The senior psychiatrist was not blind to the EPDS score.

Data concerning socio-demographic background (age, education, employment, marital status, health insurance, migrant status), and current pregnancy history (parity, hospitalization during pregnancy) were routinely collected during pregnancy using a background questionnaire administered along with the EPDS. The accuracy of these data was then checked with medical records. In the background questionnaire, women were also asked whether they had ever experienced violence by their intimate partner before or during pregnancy and whether their current pregnancy was planned or not. Women without a partner were considered as not having experienced abuse. We used nationality as a proxy for migrant status. Participants with a foreign nationality were considered as having a migrant status.

Data from medical notes concerning type of delivery (spontaneous or assisted vaginal delivery, elective or emergent cesarean section), analgesia during delivery (epidural analgesia or not), and delivery duration were collected at birth. Pain felt before, during and after delivery was measured with an eleven point numerical rating pain score from 0 to 10. The maximum score at these three points was used. Newborn outcomes (newborn weight, gestational age, 5-min APGAR score, newborn hospitalization) were also collected from medical records. During the second postpartum month, women were asked whether they had undergone any objective postpartum physical complications since delivery. Postpartum physical complications were defined as any serious physical event occurring during the 2 months after delivery. All data source and timing of assessment are detailed in [Supplementary Table 1](#).

The outcome variable was the presence of PPD (defined by an EPDS score  $\geq 12$ ) during the second month after delivery.

The research protocol, including informed consent procedures, received full ethical review and approval from the Pitié-Salpêtrière ethic committee.

### 2.4. Statistical analysis

Odds Ratios (ORs) were derived from logistic regression analyses to examine the relationships between a given risk factor and the presence of PPD. When mentioned, results were adjusted for antenatal depression measured by the EPDS at wave 1. *T*-tests were used to compare continuous variables. Normally distributed outcome data were summarized as mean  $\pm$  S.D.

Multivariable logistic regressions were conducted with simultaneous entry of all sociodemographic variables significantly associated with PPD in the univariate analysis. Two multivariable regressions were run: one for sociodemographic and psychosocial characteristics, the other for obstetric risk factors. Differences were considered to be significant if  $p < 0.05$ . Statistical analyses were performed using the SPSS 17.0 (SPSS, Chicago) software.

## 3. Results

### 3.1. Sample characteristics

A total of 312 women were enrolled during pregnancy and 17 refused the protocol. Of those included, 264 (84.6%) were followed up through the second month postpartum.

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