

Postnatal depression: a study of the predictive effects of postnatal anxiety

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Abstract

Objectives: The aim of this study was to evaluate the predictive effects of anxiety, experienced on the third day after delivery, on postnatal depression, evaluated around the sixth week postpartum.

Method: The subjects were 291 postpartum mothers who responded to a certain number of inclusion criteria. The EPDS (Edinburgh Postnatal Depression Scale) and the STAI (State-Trait Anxiety Inventory) were used to evaluate the anxious and depressive symptomatology on the third day postpartum and around the sixth week postpartum. The mothers who obtained scores indicating a probable risk of postnatal depression also completed the Beck Depression Inventory.

Results: We observed that 31% of the mothers showed postpartum blues symptomatology on the third day postpartum. Around the sixth week postpartum 13% of the mothers showed postnatal depression. The results suggest that the level of trait anxiety ($\beta = 0.39$; $t = 3.64$ $p < 0.05$) and more particularly the intensity of the postpartum blues symptomatology ($\beta = 0.50$; $t = 6.88$ $p < 0.001$) can predict the risk of postpartum depression. Furthermore, 17.9% of the mothers with postnatal depression around the sixth week postpartum were not detected by the EPDS on the third day after delivery. However, all these mothers were detected by the State-Trait anxiety inventory.

Conclusion: A high level of anxiety during the first few days after delivery may contribute to the mothers' risk of developing postnatal depression. The early detection of high anxiety levels may enable the early screening of mothers at risk of developing postnatal depression.

Key words: Postnatal depression; Postnatal anxiety; Predictive effects; Screening.

Background

The postpartum period is a high-risk period for the occurrence of anxious and depressive episodes. Indeed, during the first few days after delivery, mothers can present postpartum blues symptomatology: fatigue, anxiety, disordered sleeping

and a changing mood.¹ This state generally lasts only for a short time period although it affects between 20% and 80% of mothers. Authors, such as Lane et al,² have noticed a high frequency of mothers experiencing postpartum depression following an intense postpartum blues episode. Accordingly, more than 20% of mothers having experienced an intense episode of postpartum blues demonstrate postnatal depression during the first nine weeks after giving birth. Postpartum depression is characterised by a changing mood (mood swings), anxiety, irritability, depression, panic and obsessional phenomena.³ Postpartum depression occurs in approximately 10%-20% mothers,^{4,5} the exact prevalence depending on the criteria used for detection. According to Warner et al,⁶ the first symptoms usually appear between the fourth and sixth week postpartum. However, postpartum depression can start from the moment of birth, or may result from depression evolving continuously since pregnancy. The relationship between the intensity of the depressive component of early postnatal blues and the risk of postpartum depression has been shown.²

Two studies have evaluated the relationship between depressive symptomatology and anxious symptomatology. Stuart et al⁷ studied the link between anxiety and postnatal depression. In their study, the EPDS, the Beck Anxiety Inventory, the Beck Depression Inventory and the Trait anxiety were completed by 107 mothers. The results indicated the prevalence of anxiety and depression co-morbid symptoms for 8.7% of mothers at the 14th week postpartum and for 16.8% of mothers at the 30th week postpartum. The incidence of anxiety during this time period was 10.3% and the incidence of depression was 7.4%, indicating the high prevalence of both postpartum anxiety and postpartum depression during the postpartum period. The EPDS had high correlations with anxiety scales ($r = 0.73$ at 14 weeks, $r = 0.82$ at 30 weeks). These results suggested that the EPDS was an instrument that measured not only postnatal depression but anxiety as well.

A study by Brouwers et al⁸ examined the anxious and depressive dimensions of the EPDS and in particular the validity of the anxiety symptomatology subscale of the EPDS. The EPDS, the SCL-90-R and the Trait Anxiety Inventory were completed by 197 mothers. The results confirmed the existence of an anxiety symptomatology subscale and a depressive symptomatology subscale within the EPDS. The Edinburgh Postnatal Depression Scale⁹ – in its 10 items version – is an excellent screening tool for postnatal depression which measures not only the postnatal depression symptomatology but the anxious symptomatology as well.⁸ Studies that evaluate the anxious symptomatology during the

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early postpartum period and its evolution are lacking. The question of whether or not anxiety may induce the favourable conditions for the occurrence of postnatal depression remains unanswered.¹⁰

Therefore, in this study, we examine the relationship between anxiety during the early postpartum period and the risk of postnatal depression. We report a study of the relationship between the anxious and depressive symptomatology in the early postpartum up to six weeks postpartum. We advance the hypothesis that significant anxious symptomatology in the early postpartum period contributes to the risk of developing postnatal depression.

Method

Participants

This study was carried out in an obstetric clinic in the south-west of France, during the period November 2000 to March 2001. A total of 301 mothers were evaluated, firstly, on the third day after delivery (Period 1) and secondly, around the sixth week postpartum (Period 2). Mothers with a previous history of psychological problems or current treatment for psychological problems were excluded from the study, as well as mothers with babies suffering from a neonatal pathology, born before 32 weeks of pregnancy, with malformations and/or weighing less than 2.5kg. These variables could influence the intensity of the mothers' mood. Eight mothers did not fulfil the inclusion criteria, and around the sixth week postpartum, two mothers failed to respond to the questionnaire. Therefore, 291 mothers were maintained in the study.

The 291 mothers had a mean age of 29.7 years (SD = 4.53); 59.8% gave birth to their first child, 31.2% to their second child, 13.1% to their third and 4.1% to their fourth child or more. Of the mothers, 81.78% were employed and 18.2% were unemployed. All the mothers lived with the father of the baby. A total of 89.6% of the mothers experienced a natural childbirth and 10.3% a caesarean section.

Instruments

The postpartum blues symptomatology as well as the intensity of the state anxiety and the frequency of the trait anxiety were measured on the third day after delivery (Period 1). A second evaluation of the anxious and depressive symptomatology took place around the sixth week postpartum (Period 2).

The French version of the EPDS¹¹ was used to measure the mother's mood on the third day after delivery and around the sixth week postpartum. It is a specific scale which enables the early screening of postnatal depression. The French version was validated by Guedeney et al.¹² The scale is composed of 10 questions which explore the mothers mood, her anxiety level, the sentiment of guilt, the sentiment of lacking ability, sleep problems and the desire to end ones own life. Two items explore the anxiety level. Hannah et al¹ showed a highly significant positive correlation between EPDS scores at five days and six weeks postpartum. A threshold of nine was selected in this study to improve the chances of identifying women at risk.^{2,13} A cut-off score 12/13 has been identified by Cox et al⁹ in order to screen for a major postpartum depressive episode. In our study, the EPDS scale presents a high internal consistency on the third day after

Table 1: Questionnaire scores at third day and six weeks postpartum

	Third day postpartum		Six weeks postpartum		t	p <
	Mean	SD	Mean	SD		
EPDS	6.29	4.71	4.62	6.90	4.71	0.001
State Anxiety Inventory	30.92	11.06	28.62	14.52	3.14	0.001
Trait Anxiety Inventory	35.88	8.95	31.77	14.49	6.09	0.001
Beck Depression Inventory			14.94	3.75		

delivery (alpha de Cronbach = 0.80) and around the sixth week after delivery (alpha de Cronbach = 0.85).

The intensity and the frequency of anxiety were measured with the State-Trait Anxiety Inventory (STAI) designed by Spielberger et al.¹⁴ This scale is one of the most used self-response scales. The originality of the inventory resides in its capacity to quantify independently the state anxiety and the trait anxiety. The inventory is composed of two separate parts each containing 20 propositions. Each item can be given a score from one to four, according to the state anxiety intensity and the trait anxiety frequency. The scores can therefore vary between 20 and 80. In this study the state anxiety inventory presents high internal consistency (alpha de Cronbach = 0.95) as well as the trait anxiety inventory (alpha de Cronbach = 0.91).

The abbreviated version of the Beck Depression Inventory (BDI), designed by Beck et al,¹⁵ which measures the intensity of depression was also used on the mothers who had an EPDS score ≥ 12 around the sixth week postpartum (Period 2). Each item is composed of four statements which correspond to four different levels of intensity. A score of four is considered to indicate mild depression, a score of 16 or higher is considered to indicate severe depression. This inventory was used at Period 2 as it is often used to measure maternal depression.^{4,13}

The questionnaire presents good internal consistency (alpha de Cronbach = 0.87). The items of this scale take into account only the intensity of the depressive symptomatology, there are no items exploring anxiety symptoms and intensity.

Data analyses

The statistical analyses were carried out using the STATISTICA 5.0. Descriptive analyses were undergone in order to obtain the general information concerning the population. The influence of the intensity of postpartum blues symptomatology, the state and trait anxiety during early postpartum was examined by multiple regression analyses.

Sensitivity (ie. the proportion of depressed women correctly identified), specificity (ie. the proportion of non-depressed women correctly identified) and the positive predictive values (ie. the proportion of women above the threshold who are depressed) were calculated for the different thresholds on the third day after delivery with the State-Trait Anxiety Inventory.

Results

EPDS scores

The different questionnaires were completed by 291 mothers. The mean scores on the different scales are presented in Table 1. We observed that 31% of the mothers showed postpartum blues symptomatology (EPDS score ≥ 9) at Period 1 (mean = 12.01, SD = 2.92). These mothers had a mean score on the State Anxiety Inventory of 39.13 (SD = 13.45) and on the Trait Anxiety Inventory a mean score of 40.69 (SD = 8.45). At Period 2, 13% of the mothers had scores which indicated postnatal depression symptomatology (EPDS score ≥ 12 at Period 2; mean = 15.32, SD = 3.53). These mothers had a mean score on the State Anxiety Inventory of 33.38 (SD = 11.24) and on the Trait Anxiety Inventory a mean score of 36.83 (SD = 9.95). These same mothers fulfilled the criteria of major depression on the BDI scale (mean = 18.5 ; SD = 3.53).

Sensitivity (SE), specificity (SP) and positive predictive value (PPV) of the Trait Anxiety Inventory

We kept the cut-off score of 35 on the trait anxiety inventory as the threshold being predictive of a risk of postpartum depression (see Table 2). For this value, the sensitivity (SE) and the specificity (SP) values are 0.66 and 0.68, respectively, and the positive predictive value (PPV) is 0.31 for an EPDS score ≥ 12 . We obtain a sensitivity (SE) value of 0.93 and a specificity (SP) value of 0.41 and a positive predictive value (PPV) of 0.42 for a BDI score ≥ 16 (see Table 3) which indicates a major postnatal depression. The cut off score of 35 enables the screening of the mothers who presented an intense postpartum blues episode (see Table 4) . For this value, the sensitivity (SE) and the specificity (SP) values are 0.79 and 0.50, respectively, and the positive predictive value (PPV) of 0.41 for an EPDS score ≥ 9 .

Sensitivity (SE), specificity (SP) and positive predictive value(PPV) of the State Anxiety Inventory

On the third day postpartum (Period 1), we kept the cut-off of 25 on the State Anxiety Inventory as the threshold being predictive of a risk of postpartum depression (see Table 5) . For this value, the sensitivity (SE) and the specificity (SP) values are 0.84 and 0.41, respectively, and the positive predictive value (PPV) is 0.18 for an EPDS score ≥ 12 ; we obtained a sensitivity (SE) value of 0.81 and a specificity (SP) value of 0.31 and a positive predictive value (PPV) of 0.40 for a B.D.I score ≥ 16 , which indicates a major postnatal depression (see Table 6) . We also kept the cut-off score of 25 on the State Anxiety Inventory for the screening of intense postpartum blues symptomatology. For this value, the sensitivity (SE) and the specificity (SP) values are 0.88 and 0.49, respectively, and the positive predictive value (PPV) of 0.43 for an EPDS score ≥ 9 (see Table 7).

Prediction of six weeks EPDS scores with EPDS and STAI scores in the early postpartum

The principal predictor of postnatal depression, for which the model accounted for 64.8% ($F_{3,288} = 40.030$; $p < 0.001$) of the variance of postnatal depression, was the EPDS scores ($\beta = 0.50$; $t = 6.88$; $p < 0.001$). Concerning the predictive effects of anxiety, we observed that the results

Table 2: Range of the Trait Anxiety Inventory thresholds on the third day postpartum – postnatal depression

Range of the Trait Anxiety Inventory thresholds on the third day postpartum and the corresponding values of sensitivity, specificity and positive predictive value for postnatal depression (for an EPDS cut-off ≥ 12)

Trait Anxiety cut-off	SE	SP	PPV
34	0.89	0.45	0.20
35	0.66	0.68	0.31
36	0.53	0.63	0.24
37	0.53	0.72	0.29
38	0.41	0.82	0.29

Table 3: Range of the Trait Anxiety Inventory thresholds on the third day postpartum – major depression

Range of the Trait Anxiety Inventory thresholds on the third day postpartum and the corresponding values of sensitivity, specificity and positive predictive value for major depression (for a BDI cut-off ≥ 16)

Trait Anxiety cut-off	SE	SP	PPV
34	1	0	0.47
35	0.93	0.14	0.42
36	0.81	0.13	0.40
37	0.81	0.13	0.40
38	0.62	0.22	0.37

Table 4: Range of the Trait Anxiety Inventory thresholds on the third day postpartum – postpartum blues

Range of the Trait Anxiety Inventory thresholds on the third day postpartum and the corresponding values of sensitivity, specificity and positive predictive value for postpartum blues symptomatology (for an EPDS cut-off ≥ 9)

Trait Anxiety cut-off	SE	SP	PPV
34	0.79	0.50	0.41
35	0.77	0.55	0.43
36	0.70	0.60	0.43

of the forward multiple regressions at each step show that the intensity of the trait anxiety ($\beta = 0.39$; $t = 3.64$; $p < 0.05$) and, although more moderately, the intensity of the state anxiety ($\beta = 0.13$; $t = 2.01$; $p < 0.05$) are predictive of postnatal depression symptomatology.

STAI prediction of postnatal depression on mothers not detected by the Period 1 EPDS scores

Of the 39 mothers with an EPDS score ≥ 12 around the sixth week postpartum, 17.9% were not detected by the EPDS on the third day after delivery but were detected by the Trait Anxiety Inventory (score ≥ 35). In the same way, 12.8%

Table 5: Range of the State Anxiety Inventory thresholds on the third day postpartum – postnatal depression

Range of the State Anxiety Inventory thresholds on the third day postpartum and the corresponding values of sensitivity, specificity and positive predictive value for postnatal depression (for an EPDS cut-off 12)

State Anxiety cut-off	SE	SP	PPV
24	0.87	0.35	0.17
25	0.84	0.41	0.18
26	0.79	0.45	0.18
30	0.53	0.59	0.17

Table 6: Range of the State Anxiety Inventory thresholds on the third day postpartum – major depression

Range of the State Anxiety Inventory thresholds on the third day postpartum and the corresponding values of sensitivity, specificity and positive predictive value for major depression (for a BDI cut-off 16)

State Anxiety cut-off	SE	SP	PPV
24	0.50	0.09	0.39
25	0.81	0.13	0.40
26	0.75	0.18	0.40
30	0.50	0.40	0.47

Table 7: Range of the State Anxiety Inventory thresholds on the third day postpartum – postpartum blues

Range of the State Anxiety Inventory thresholds on the 3 day postpartum and the corresponding values of sensitivity, specificity and positive predictive value for postpartum blues symptomatology (for an EPDS cut-off 9)

State Anxiety cut-off	SE	SP	PPV
24	0.88	0.41	0.39
25	0.88	0.49	0.43
26	0.80	0.52	0.43

of the mothers were not detected by the EPDS but were detected by the State Anxiety Inventory (score 25).

Discussion

In this study, 31% of the mothers had scores which indicated postpartum blues symptomatology (for an EPDS score 9) at Period 1. Around the sixth week postpartum, we observed that 13% of mothers were affected by postnatal depression (for an EPDS score 12, and 16 on the BDI). These results are similar to those presented in the literature.^{4,13,16}

We should add however that the generalisation of the results of this study is limited as we have controlled a certain number of variables which could influence the intensity of the depression and anxiety. However the descriptive results of

this population are similar to those seen in other studies.^{7,8}

This study demonstrates that the intensity of anxiety in the first few days after delivery may contribute to the risk of developing postnatal depression. The results of the forward multiple regression analyses at each step indicate these effects. The cut-off scores of 25 on the State Anxiety Inventory and of 35 on the Trait Anxiety Inventory show good sensitivity, specificity and a good positive predictive value for the early screening of anxiety after delivery. These results permit us to suggest that health professionals should be attentive of anxiety in the early days following delivery. It is important to insist on the fact that in this study some of the mothers were not detected for postnatal depression by the EPDS while they were at the clinic although they presented high levels of anxiety which evolved into postnatal depression around the sixth week postpartum.

The results indicate the importance of evaluating anxiety in the first few days following delivery. Furthermore, studies have shown that during the last trimester of pregnancy one third of women show depressive symptoms.^{17,18}

In conclusion, we can say that the intensity of anxiety is a risk factor that can perturb maternal development. The use of the EPDS and the STAI allows for an early screening of the risk of postnatal depression which is essential considering the consequences that postnatal depression can have on the development of the infant, on the quality of the relationship within the couple and on other social relationships.

Anxiety levels of mothers at risk for postnatal depression should be evaluated by the health professionals in obstetric clinics.

Declaration of interest: None

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