

# Post-partum depressive symptomatology and its possible effect on mother-baby bond in Morocco

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## Abstract

The post-partum period represents a time of vulnerability to mood disorders, particularly post-partum depression (PPD). PPD can have serious repercussions not only for the mother, but also for the mother-child relationship and the subsequent development of the child. This study aimed to screen Moroccan mothers for early postpartum depressive symptomatology (PDS) in order to identify difficulties in establishing a better-quality mother-baby bond. A prospective study was conducted on 234 mother-newborn dyads (N = 234) at the SOUISSI Maternity Unit of the CHU IBN SINA RABAT using the Edinburgh Postnatal Depression Scale (EPDS) (Cox *et al.* 1987) to identify postpartum depressive symptomatology and the Mother-Infant Bonding test (MIB) (Taylor *et al.* 2005) to assess the quality of the mother-baby bond. The results of this study revealed a highly significant difference ( $t = 4.451$ ;  $p < 0.001$ ) in the mother-baby bonding disturbance (MIB) scores between the two periods studied, T1 (48h) and T2 (12 months postpartum), indicating a significant decrease in this disturbance after 12 months. In contrast, no significant difference was observed in the depressive symptomatology (EPDS) scores between the two periods T1 and T2 ( $p \geq 0.05$ ), indicating a persistence of this symptomatology during the baby's first year. Correlational analysis showed a significantly positive correlation between the mother's age and EPDS in T2 ( $r = 0.252$ ;  $p < 0.05$ ) and the baby's weight and EPDS in T2 ( $r = 0.786$ ;  $p < 0.001$ ). In addition, a significant and positive correlation was found between PDS (EPDS) scores and mother-child bond (MIB) disruption scores at T1 ( $r = 0.259$ ;  $p < 0.05$ ). Finally, a highly significant and positive correlation was obtained between the MIB score at T1 and the EPDS score at T2 ( $r = 0.533$ ;  $p < 0.001$ ). However, logistic regression revealed that early depression was the main predictor of disruption of the mother-baby bond at one year ( $p < 0.001$ ). This study highlights the importance for clinicians of detecting maternal depressive symptoms as early as the maternity hospital stay, in order to take early action through appropriate management to promote a better bond

between mother and baby.

## INTRODUCTION

Immediately after giving birth, most mothers feel a special attachment to their newborns and instinctively begin actions to care for them, such as breastfeeding and looking after their hygiene. This marks the start of an interactive process between mother and baby, fostered by physical contact (Bienfait *et al.* 2017). However, in some cases, the mother does not experience these feelings, or may even feel aversion towards her child (Tsuchida *et al.* 2019). As a result, she may find it difficult to bond with her child or provide adequate maternal care. Several authors have focused on the postpartum period, including (Brockington *et al.* 2006; Klier 2006; Moehler *et al.* 2006; Taylor *et al.* 2005; Tessier *et al.* 1998; Wittkowski *et al.* 2007). Most of them have concluded that motherhood and the postpartum period constitute a particularly vulnerable period, which can lead to decompensation and even the development of psychiatric disorders, particularly mood disorders. In this context, "post-partum blues" or third-day syndrome is a frequent phenomenon, affecting around 50-80% of women after childbirth (Hau & Levy 2003). It is characterized by frequent crying episodes with or without sadness, emotional instability and cognitive disorders (Beck 2001; O'Hara *et al.* 1990; Stewart *et al.* 2003). This mood disorder usually disappears within a few hours or days. It resolves spontaneously, often rapidly, thanks to the warm, maternal support of those around us. However, in around 10% of cases, it persists for more than a week, and can be the starting point for the development of post-partum depression (PPD) (Beck 2001; Buist *et al.* 2002; Hau & Levy 2003; O'Hara *et al.* 2000), characterized by a severe depressive state occurring between 4-6 weeks and a year after delivery. Clearly identified by (Pitt 1968), it is the most frequent mood disorder after childbirth. Its prevalence ranges from 10% to 20%, with an average prevalence of 13% (Gaynes *et al.* 2005; O'Hara & Swain 1996; Pearlstein *et al.* 2009; Stewart *et al.* 2003). However, the diagnosis of these post-partum depressions is difficult due to the variability of clinical symptoms, the frequency of somatization and the secretive nature of this disorder (O'Hara & Wisner 2014). Unfortunately, these depressive states often remain insufficiently prevented, diagnosed and treated (Miller 2002). Yet the occurrence of such depressions can have serious consequences not only for the mother, but also for the relationship between mother and baby, and thus for the child's subsequent psycho-affective development (Field 2010; Murray & Cooper 1997). It is widely recognized that children whose parents suffer from recurrent major depression have an increased risk of developing anxiety and depressive disorders in adolescence and adulthood

(Guedeney 1989; Weissman *et al.* 1997). However, the consequences of less severe depression in mothers on their children's development should not be overlooked. It seems that the period of maximum sensitivity for infants exposed to their mother's depressive affects is very early. Indeed, (Murray & Lopez 1997; Murray 1992) showed that infants in contact with a depressed mother between 2 and 4 months of age showed significantly poorer cognitive and affective development than those whose mothers became depressed later. What's more, according to Murray, these consequences were relatively independent of the subsequent course of maternal depression. This suggests that, in terms of public health, it is necessary to intervene rapidly after the onset of depression, from the child's first months of life. In Morocco, few studies are available, the most interesting of which (Agoub *et al.* 2005) indicates a high prevalence of postpartum depression among a sample of Moroccan mothers: 18.7% according to a structured diagnostic interview (M.I.N.I. (Mini International Neuropsychiatric Interview) and 20.1% according to the EPDS two weeks after childbirth. Our study is the first in Morocco to investigate maternal depressive symptoms from the time of maternity and their link to disruption of the mother-baby bond, in order to update the data in Morocco and encourage clinicians to interact as early as possible to improve the quality of the mother-child relationship and, consequently, the infant's healthy development.

## MATERIALS AND METHODS

### *Participants and study design*

**Participants:** A prospective study of mother-newborn dyads (N = 234) recruited in the maternity suites' unit of the Soussi Maternity Hospital of the IBN SINA University Hospital Center in RABAT between November 2018 and June 2019.

**Inclusion criteria:** Any woman who gave birth at the maternity unit and subsequently stayed in the post-natal ward with her healthy newborn was eligible for this study.

**Exclusion criteria:** However, mothers were excluded from this study if their baby was transferred to other departments for medical reasons, if they delivered a stillborn baby or lost their baby after birth, if they delivered premature babies or if they refused to take part in the study.

### *Context of the study*

Within 24 to 48 hours of delivery and with the mother's consent, the two screening tools, the Mother and Infant Bonding (MIB) and the Edinburgh Postnatal Depression Scale (EPDS), were given to her to complete within 15 to 30 minutes. If the mother was unable to do so, due to health problems or illiteracy, the information was recorded on the questionnaire by the interviewer. After

12 months, we carried out a telephone follow-up with the women to reassess these parameters.

**Ethics:** This work was approved by the scientific research department of the Ibn Sina University Hospital. All participants signed an informed consent form on enrolment, and were informed of the aim of the research, as well as being guaranteed anonymity.

#### Demographic and medical data

Each participant's socio-demographic data (age, level of education, marital status, residence, socio-economic status, etc.) and health-related information, in particular mode of delivery, medical, surgical and obstetrical history, were recorded on the day of the consultation.

#### Mother and Infant Bonding test (MIB)

The MIB is an 8-item, 4-Likert-type scale assessing a mother's feelings towards her baby (Taylor *et al.* 2005). The MIB was designed to screen for problems in maternal feelings towards the baby. It is a short, simple questionnaire. Scores range from 0 to 24. The questionnaire has been validated in French (Bienfait *et al.* 2017), and no threshold is defined in the Anglo-Saxon version of the MIB. However, (Bienfait *et al.* 2017) has established a threshold of 2 for the diagnosis of difficulty in the mother-child bond, with a sensitivity of 0.9 and a specificity of 0.8. This means that there is a 90% chance of a positive result when the person has difficulties, and an 80% chance of a negative result when there are no difficulties. In addition, it estimates that the risk of having difficulties is 40.9% when the test is positive (positive predictive value), i.e. when the score obtained is greater than 2. On the other hand, it estimates that the risk of being free of difficulties is 98.1% when the test is negative (score less than 2). However, given the very narrow distribution of scores (between 0 and 6, whereas possible scores range from 0 to 24), the authors of the English validation of the MIB (Taylor *et al.* 2005) suggest that the questionnaire is probably more effective at detecting the most "abnormal" responses than at assessing subtle variations from normal.

#### Edinburgh Postnatal Depression test (EPDS)

To screen for postpartum depression, we used the EPDS, a scale developed by (Cox *et al.* 1987). This scale has been translated into several languages and validated in diverse populations (Aydin *et al.* 2004; Shrestha *et al.* 2016). In Tunisia, it was translated into Arabic and validated by (Masmoudi *et al.* 2008). The EPDS is a 4-Likert scale comprising 10 items, scored from 0 to 3, in ascending order of severity. The total EPDS score thus ranges from 0 to 30. The choice of the threshold value to be considered varies from study to study. The optimal threshold score in terms of sensitivity and specificity ranges from 9.5 to 12.5, depending on the study. In our study, we chose a score  $\geq 12$  as the threshold score, in line with the international litera-

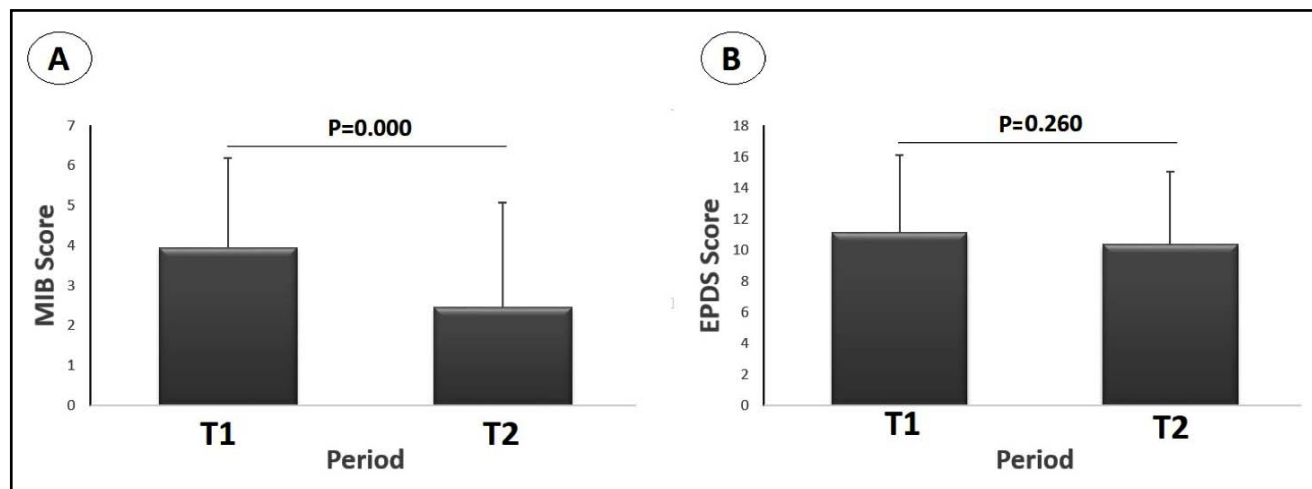
**Tab. 1.** Clinical characteristics of the sample

Gender (N ; %)	Femelle	56 ; 60.9%
	Male	36 ; 39.1%
Mode of delivery (N ; %)	Low route	55 ; 59.8%
	Caesarean	37 ; 40.2%
Age of mother (N=92)	Mean	28.66
	Standard deviation	6.106
GESTATION (N=92)	Mean	1.77
	Standard deviation	0.950
PARITY (N=92)	Mean	1.76
	Standard deviation	0.965
Weight (gramme) (N=92)	Mean	3438.37
	Standard deviation	473.661
Feeding/ H (N=92)	Mean	6.98
	Standard deviation	8.634
Apgar (N=92)	Mean	10/10
	Standard deviation	0.00
Etat_MIB_T1 (N ; %) (N=92)	Normal	15 ; 16.3%
	Trouble	77 ; 83.7%
Score_MIB_T1 (N=92)	Mean	3.95
	Standard deviation	2.245
Etat_EPDS_T1 (N ; %)	Normal	59 ; 64.1%
	high	33 ; 35.9%
Score_EPDS_T1 (N=92)	Mean	11.11
	Standard deviation	4.984
Etat_MIB_T2 (N ; %)	Normal	43 ; 46.7%
	Disturbed	49 ; 53.3%
Score_MIB_T2 (N=92)	Mean	2.46
	Standard deviation	2.620
Etat_EPDS_T2 (N ; %)	Normal	64 ; 69.6%
	high	28 ; 30.4%
Score_EPDS_T2 (N=92)	Mean	10.35
	Standard deviation	4.691

ture. We considered that a score greater than or equal to 12 in a parturient indicates the probable presence of a clinically significant depressive disorder, with good sensitivity (0.80) and specificity (0.92).

#### Data analysis

Qualitative variables were presented as percentages, while quantitative variables were reported as means  $\pm$  standard deviations (SD) in descriptive analyses. To identify correlations between variables, Pearson's correlation test was used. Next, predictors of the mother's feelings towards her baby were determined using a two-stage hierarchical regression analysis. Finally, to compare the means of the MIB and EPDS



**Fig. 1.** Analysis of the comparison of mean MIB (A) and EPDS (B) scores between T1 and T2. Results are presented as mean values ± standard deviation (SD).

scores between two periods (T1 and T2), the t-test was employed.

**RESULTS**

The study samples comprised 234 mothers aged 28.66±6.106 years, with extreme values ranging from 18 to 46 years. Of these, 49% were primiparous, with a high rate of vaginal delivery (59.8%), compared with 40.2% by caesarean section. The babies' birth weights ranged from 2500 g to 4800 g, with a mean of 3438.37±473.661 g. The Apgar score was 10/10 for all babies, but the average first feed was after 6 hours.

With regard to scores on the two EPDS scales measuring postpartum depression and problems in maternal feeling towards the baby in the sample, mean scores were (11.11±4.984 (T1); 10.35±4.691 (T2)) and (3.95±2.245 (T1); 2.46±2.620 (T2)) respectively (Table 1). As shown in the table, only 16.3% (T1) and 46.7% (T2) obtained normal scores for problems in maternal feelings towards the baby, while 64.1% (T1) and 69.6% (T2) obtained normal scores for postpartum depression over the two periods studied (Table 1).

**The evolution of maternal depressive symptoms and disruption of the mother-baby bond between birth and one year through a comparison of means:**

The results of the comparative analysis of mean MIB (disruption of the mother-baby bond) and EPDS (maternal depressive symptoms) scores between the two periods T1 and T2 are shown in Figure 1 (A, B). These results reveal a highly significant difference (t = 4.451; p < 0.001) in the MIB score between the two periods studied, T1 and T2, indicating a significant drop in maternal sentiment after 12 months (Figure 1A). In contrast, no significant difference was observed in EPDS scores between the two periods T1 and T2 (t = 1.133; p > 0.05) (Figure 1B).

**Correlation analysis between the disruption of mother-child bonding and maternal depressive symptomatology:**

The results obtained from the correlational analysis (Table 2) showed a significantly positive correlation between age of mother and depressive symptomatology (EPDS) score in T2 (r = 0.252; p < 0.05), meaning that as age increased, so did depressive symptoms after 12 months of childbirth. Similarly, a significantly positive correlation was also observed between baby weight and EPDS score at T2 (r = 0.786; p < 0.001).

**Tab. 2.** Pearson's correlations analysis between the disruption of mother-child bonding and maternal depressive symptomatology

	MIB Score (T1)	MIB Score (T2)	EPDS Score (T1)	EPDS Score (T2)
Age of mother	0.200	0.021	0.176	0.252*
GESTATION	0.159	-0.134	0.142	0.166
PARITY	0.100	-0.165	0.108	0.147
Weight (gram)	0.144	-0.016	0.078	0.786**
Feeding / H	0.094	-0.119	-0.087	0.202
EPDS Score T1	0.249*	-0.078	1	0.115
EPDS Score T2	0.533**	-0.043	0.115	1

\*p < 0.05, \*\*p < 0.001

**Tab. 3.** 2-stage hierarchical regression analyses of variables predicting mother-child bonding disruption

	B	SE	β	p	CT	B	SE	β	P	CT
	<b>MIB SCORE T1</b>					<b>MIB SCORE T2</b>				
	<b>Model 1</b>									
Age (mother)	0.066	0.040	0.179	0.107	0.877	0.066	0.040	0.179	0.107	0.877
Gestation	1.173	0.684	0.497	0.090	0.126	1.173	0.684	0.497	0.090	0.126
PARITY	-1.009	0.679	-0.434	0.141	0.124	-1.009	0.679	-0.434	0.141	0.124
Weight (baby)	0.000	0.001	0.083	0.435	0.937	0.000	0.001	0.083	0.435	0.937
1 <sup>ere</sup> feed (hours)	0.019	0.027	0.073	0.486	0.975	0.019	0.027	0.073	0.486	0.975
	$R^2 = 0.090 ; p = 0.143$					$R^2 = 0.095 ; p = 0.140$				
	<b>Model 2</b>									
Age (mother)	0.054	0.040	.0148	0.180	0.859	0.024	0.030	0.065	0.433	0.854
GESTATION	1.012	0.678	0.428	0.140	0.124	1.035	0.506	0.438	0.044	0.126
PARITY	-0.889	0.670	-0.382	0.188	0.123	-0.937	0.501	-0.403	0.065	0.124
Poids (baby)	0.000	0.000	0.073	0.485	0.934	-0.003	0.001	-0.724	0.000	.0381
1 <sup>st</sup> feed (hours)	0.024	0.027	0.094	0.364	0.965	-0.007	0.020	-0.027	0.730	0.953
EPDS SCORE T1	0.093	0.047	0.206	0.042	0.940	-----	-----	-----	-----	-----
EPDS SCORE T2	-----	-----	-----	-----	-----	0.516	0.061	1.078	0.000	0.361
	$\Delta R^2 = 0.040 ; R^2 = 0.130 ; p = 0.52$					$\Delta R^2 = 0.419 ; R^2 = 0.509 ; p = 0.000$				

Abbreviations: SE = standard error; B = unstandardized regression coefficients; β = standardized regression coefficients; R2 = total variance explained; ΔR2 = the change in variance explained per step; CT= Collinearity tolerance.

Furthermore, a significant and positive correlation was found between the EPDS scores at T1 ( $r = 0.249$ ;  $p = 0.017$ ) and the MIB score at T1 ( $r = 0.259$ ;  $p < 0.05$ ). Finally, a highly significant and positive correlation was obtained between the MIB score at T1 and the EPDS score at T2 ( $r = 0.533$ ;  $p < 0.001$ ), meaning that as depressive symptoms increased, maternal feelings decreased. On the other hand, no significant difference was detected between the different variables studied and the MIB and EPDS scores in the first T1 period.

Hierarchical regression analyses to study the impact of maternal depressive Symptomatology on the disruption of the mother-baby bond.

The results of the two-step hierarchical regression predicting the disruption of the mother-child relationship at both time points (T1 and T2) are presented in Table 3: the results of model 1 at time point 1 (T1), which examines the quality of the relationship between the mother-child bond and demographic variables, were not statistically significant ( $R^2 = 0.090$ ;  $F(5, 86) = 1.701$ ;  $p = 0.143$ ). This indicates that these variables (mother's age, number of pregnancies, number of parities, baby's weight and first feeding) account for only 9% of the variance that can predict the quality of the mother-child relationship. Similarly, the second model is also insignificant ( $\Delta R^2 = 0.040$ ;  $R^2 = 0.130$ ;  $F(6, 85) = 3.893$ ;  $p = 0.52$ ), meaning that adding the behavioral variable (EPDS T1) to the model has no effect on the variance explained in relationship quality beyond the variables in the first model.

However, the regression coefficient reveals that the T1 EPDS SCORE is statistically significant ( $\beta = 0.206$ ,  $p < 0.042$ ), confirming the correlation results observed in Table 2. With regard to T2, the results obtained show that model 1 is statistically insignificant ( $R^2 = 0.095$ ;  $F(5, 86) = 1.707$ ;  $p > 0.05$ ), which also reveals that variables such as mother's age, number of pregnancies, number of parities, baby's weight and first feeding only account for 9.5% of the variance in the mother-child bond. In contrast, the results of Model 2 at Time 2 are statistically significant ( $\Delta R^2 = 0.419$ ;  $R^2 = 0.509$ ;  $F(6, 85) = 72.666$ ;  $p < 0.001$ ), indicating that variables such as number of pregnancies, baby weight and, above all, score (EPDS T2) have an effect on the change in maternal feeling and, consequently, on the quality of the mother-child relationship, accounting for around 50.9% of the variance.

## DISCUSSION

In our overall sample ( $n=234$ ), we found a high prevalence of early depressive maternal symptomatology (EDMS) in the first week postpartum, at 35.9%. This rate is significantly higher than the rates reported in the literature, which generally vary between 13% and 30% in developed countries (O'Hara & Swain 1996). A literature review of 143 studies also showed that this prevalence can range from 0 to 60% (Halbreich & Karkun 2006). In the Arab world, a recent literature review of 25 studies in 22 Arab countries found a prevalence

of postpartum depression of between 15% and 25% (Ayoub *et al.* 2020).

The results of this study show a significantly higher prevalence than those reported in the literature, particularly when compared with the study by (Agoub *et al.* 2005) carried out in Morocco in 2005. This study reported a 20.1% prevalence of PPDs, assessed using the EPDS, 2 to 3 weeks after delivery. These results are in line with those of (Mchichi Alami *et al.* 2006) study, which reported that 21% of mothers had an EPDS score above 12 at the same time. This epidemiological discrepancy may be explained by the timing of the assessment and the score threshold used. In the present study, the EPDS was assessed in the first week postpartum, characterized by the onset of the "baby blues" (a common syndrome affecting around 80% of women), manifested by personal, family and environmental adjustments between day 3 and day 10 (Sutter-Dallay *et al.* 2008). In the study by (Masmoudi *et al.* 2008) in Tunisia, the prevalence of intense "baby blues" was 19.2% in the first week postpartum, using the EPDS with a score threshold of 10. These results suggest that the relatively high rate observed in the early postpartum period may be influenced by the "baby blues", a transient state dominated by anxious feelings (Matthey *et al.* 2003; Ross *et al.* 2003).

According to (Masmoudi *et al.* 2008), this state may persist in some cases and develop into post-partum depression. The severity of the "baby blues", measured by high EPDS scores, is a strong predictor of this development (Austin & Lumley 2003; Chabrol *et al.* 2007; Kumar *et al.* 1995; Lane *et al.* 1997; Teissedre & Chabrol 2004).

According to the results of this study, there was a slight decrease in the prevalence of PDS at T2 (12 months postpartum) compared with T1 (first week postpartum). This leads us to conclude that women with early depressive symptomatology, particularly those with intense "blues", maintained a depressive tendency at T2, indicating a persistence and evolution of PDS towards postpartum depression, as described by (Masmoudi *et al.* 2008). Previous studies have investigated the evolution of PDS at two points in time: between birth and even before delivery, and between 6 and 8 weeks postpartum, but very few have completed this assessment up to 12 months. In this context, a very recent meta-analysis by (Wang *et al.* 2021) aimed to map the global prevalence of depression in postpartum women. In this investigation, a total of 565 studies from 80 different countries or regions were included in the final analysis, where postpartum depression was found in 17.22% (95% CI 16.00-18.51) of the world population. In the Arab region, a review by (Ayoub *et al.* 2020) showed that the prevalence of PPD was generally high, but comparable to that observed in other low- and middle-income countries. Indeed, 12 studies reported PPD prevalences of between 15% and 25%, while the figures were less than 15% for 7 studies and more than

25% for 6 studies. Nevertheless, our T2 results remain high compared with the figures reported in the literature from developed countries. For example, a study conducted at the CHU de Caen in France by (Varin 2015) on a sample of 208 women revealed a prevalence of PPD of 25.5% (i.e. 25.5% of women delivered had scored above 9/30 on the EPDS). Another study conducted in the UK by the University of London reported a prevalence of around 14% of postpartum depression in the first year after delivery at primary care consultations (Maia *et al.* 2012). Similarly, studies in Europe have shown similar prevalences: Norway (10.1%), Portugal (3.9% to 17.6%), the Netherlands (8% to 10%), and Sweden (8% to 12.3%) (Andrews-Fike 1999; Howell *et al.* 2014; Sylvén *et al.* 2011).

However, the prevalence demonstrated in the present study remains similar to what has been reported in many Arab and developing countries, taking into account differences in methodology, assessment times and thresholds used to screen for postpartum depression. For example, a prevalence study of postpartum depression conducted in Bahrain by (Al Dallal & Grant 2012) on a sample of 237 women established a prevalence of 37.1%. In addition, a literature review on the prevalence of postpartum depression in African countries by Catherine (Atuhaire *et al.* 2020) showed a prevalence ranging from 9.2% in Sudan to 50.3% in South Africa, with one study in Egypt reaching as high as 70%, albeit with a small sample size. These results underline the fact that the EPDS is a screening tool, but cannot by itself establish or confirm a diagnosis. The main problem with screening instruments like the EPDS lies in the net dichotomy obtained by the score: an arbitrary cut-off value is used to maximize sensitivity and specificity. In screening, it is more important to reduce the score threshold so as not to miss affected patients, thus reducing false negatives, to the detriment of increasing false positives. Nevertheless, using an EPDS score threshold  $\geq 10$  results in higher sensitivity, with a slight decrease in specificity (Chaaya *et al.* 2002; Ghubash & Abou-Saleh 1997; Robertson *et al.* 2004) reported a sensitivity of 73% and a specificity of 90% using a score threshold of 12, and 91% and 84% with a score threshold of 10, thus improving sensitivity and detecting minor depressive states in the women of our population.

Our study revealed that 83.7% of dyads assessed during the first week postpartum were at risk of developing a mother-child bonding disorder (MIB $>$ 2). However, this rate dropped to 53.3% for the population reassessed at two separate assessments. This means that 83.7% of the dyads assessed at both evaluations were considered to be at risk of developing a mother-child bonding disorder (n=102) out of the entire population (out of 102 dyads assessed to be at risk of developing a pathological bond with their children in the first week postpartum, 77 dyads could be reassessed one year later, and around 53.3% still had this disorder after

12 months). Despite high prevalence rates compared with those reported in the literature, this disruption persists even after one year. The study by (Figueiredo *et al.* 2007), which assessed the quality of early mother-infant bonding in the first 24 hours after birth, found a strong bond in 66.6% of dyads, a moderate bond in 29.4% and no bonding in 4%. The study by (Reck *et al.* 2006) reported a poor bonding rate of 7.1% two weeks after birth, while the study by (Taylor *et al.* 2005) revealed a rate of 8.9% at 12 weeks. More recently, (Bienfait *et al.* 2017) found that after 48 hours from birth, 12.2% of women had a score above the high-risk threshold for poor bonding on the Mother-Infant Bonding Scale (MIBQ $\geq$ 2).

The results of the present study revealed a highly significant correlation between MIB scores at T1 and EPDS scores at T2, as well as a significant and positive correlation between MIB and EPDS scores at T1. These results confirm that the disruption of early mother-child interactions, and consequently the dyadic relationship, is affected by early maternal depressive symptoms, and this may persist throughout the first year. On the other hand, unlike the study by (Bienfait *et al.* 2017), which found no correlation between the scores studied in the same period. Moreover, the study by (Wittkowski *et al.* 2007) using the Post-Partum Bonding Questionnaire showed a weak correlation with maternal mood at a later stage than ours. In addition, the study by (O'Higgins *et al.* 2013) reported a significant association between EPDS scores at 4 weeks and MIB scores at 1, 4, 9, 16 weeks and 1 year postnatally. It also showed an association between MIB scores in the early weeks and all measurement points at 1, 4, 9, 16 weeks and 1 year.

However, logistic regression revealed that early depression was the main predictor of attachment at one year. This finding is in line with a Japanese study by (Nakano *et al.* 2019), which confirms the association between postpartum depression and impaired maternal bonding. This study also highlights the fact that negative feelings expressed in early pregnancy are a risk factor for this alteration in bonding. To explain this very high proportion of mothers reporting clinically significant depressive symptoms and an altered mother-child bond likely to harm the emotional, behavioural and cognitive development of the young child, several hypotheses can be put forward. According to several studies reviewed by (Soufiani *et al.* 2023.), certain elements characteristic of postnatal depression may contribute to this situation. Firstly, depressed mothers often feel physically incapable of meeting their child's needs. They question their mothering skills and often blame themselves falsely when things don't go according to plan with their child. They are often torn between the joy of motherhood and the feeling of not being able to fully enjoy their child's presence. What's more, they experience a lack of pleasure when caring for their infant. These different characteristics under-

line the significant impact that postnatal depression can have on the mother-child bond.

It is also possible that social desirability influenced some of the mothers' responses. Given that all the scales used were self-reported measures, completed only by the mothers, it is possible that the mothers unconsciously overestimated or exaggerated their condition, which could partly explain the high scores observed.

## CONCLUSION

One of the advantages of early detection of depressive symptoms using the EPDS is to identify women at high psychological risk. Our study highlighted the persistence of these symptoms, even after 12 months, with scores exceeding the global threshold. This underlines the importance of paying greater attention to women's psychological state, by putting in place more appropriate treatment. These interventions could be extended nationwide, helping to create an environment more conducive to the healthy development of our children.

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