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Examining The Relationship between Experiencing A Hypertensive Disorder During Pregnancy and The Onset of Depression in The Postpartum Period

Dr.Nadia Ridha Atiyah, Dr. Areej Kazim Shareef, Dr. Zeena Abdulelah Yaseen
M.B.ch.B/F.I.C.O.G senior specialist in obstetrics and gynaecology AlElwiah teaching Hospital Baghdad-Iraq
Nadia.Ridha1973@gmail.com

Abstract. Hypertensive disorders of pregnancy (HDP) are among the leading causes of maternal and perinatal morbidity and mortality worldwide and may exert substantial psychological effects on affected women. Beyond their physical complications, HDP may predispose women to postpartum depression through physiological stress, obstetric complications, and intensive clinical management during pregnancy and childbirth. Despite growing recognition of this association, evidence remains limited and inconsistent regarding the relationship between HDP severity, related clinical factors, and the onset of postpartum depressive symptoms, particularly in Iraq. This study aimed to examine the relationship between hypertensive disorders during pregnancy and the development of postpartum depression and to identify associated demographic, obstetric, and clinical risk factors. A descriptive cross-sectional prospective study was conducted among 180 postpartum women, including 50 with pre-eclampsia and 130 normotensive women. Depressive symptoms were 2.5 times more prevalent among women with HDP compared to normotensive women (35.7% vs. 19.8%). Higher Edinburgh Postnatal Depression Scale (EPDS) scores were significantly associated with HDP diagnosis, higher parity, history of spontaneous abortions, elevated diastolic blood pressure, premonitory signs of eclampsia, magnesium sulfate therapy, and formula feeding during hospitalization. No significant differences were observed in neonatal outcomes between groups. This study provides regional evidence linking HDP and postpartum depressive symptoms while highlighting specific clinical and obstetric correlates. Early postpartum screening using EPDS and targeted psychological support for women with HDP may facilitate timely identification and management of postpartum depression.

Highlights

1. Postpartum depressive symptoms were 2.5 times more prevalent among women with hypertensive disorders of pregnancy compared to normotensive women.
2. Higher EPDS scores were significantly associated with severe clinical features, including elevated diastolic blood pressure, premonitory eclampsia signs, magnesium sulfate therapy, and higher parity.
3. Findings support early postpartum depression screening and targeted psychological support for women affected by hypertensive pregnancy disorders.

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Keywords: Hypertensive disorders of pregnancy, Postpartum depression, Edinburgh Postnatal Depression Scale, Pre-eclampsia, Maternal mental health

Introduction

Complications from high blood pressure during gestation complicate 3% to 10% of all global pregnancies [1]. Collectively, these hypertensive conditions stand as the predominant contributor to illness and death for both mothers and newborns internationally, resulting in approximately 30,000 annual maternal death and half a million infant losses during the perinatal period. [2] .While affecting a fifth of pregnancies in wealthy nations, the incidence of these disorders is significantly higher, by a factor of three to four, in the world's poorest regions. [3] The combination of its widespread occurrence and capacity for severe complications establishes hypertensive pregnancy conditions as a critical issue for population health [4] . The psychological well-being of the mother can be compromised by the intensity of these blood pressure disorders, particularly when combined with complications such as premature birth, the admission of the infant to a neonatal ICU, or stillbirth. This psychological distress may then amplify the harmful impact and interplay of co-existing health problems. [5] .Beyond the established physical risks, a reciprocal connection potentially exists between a woman's mental state and the onset or severity of pregnancy-induced hypertension, potentially inducing alterations in the body's innate inflammatory responses, involuntary nervous system functions, and the performance of its central neuroendocrine stress pathway [6].

Of the global population of new mothers, an estimated range of 10% to 22% may experience postnatal depression, a condition impacting emotional regulation, cognitive processes, and physical well-being in the initial twelve months following childbirth [7]. To evaluate the severity of these depressive indicators, healthcare providers frequently employ the Edinburgh Postnatal Depression Scale (EPDS), a standardized questionnaire designed for self-completion. Current screening protocols for hypertensive disorders of pregnancy (HDP), while common in prenatal checks, are seldom continued into the postpartum period, despite diagnostic tools that offer moderate (70%–85%) accuracy in both detecting true cases and correctly identifying non-cases. [8] , [9] . A separate area of investigation concerns the potential link between these conditions and postpartum depression. While existing studies are limited and present conflicting conclusions, a prevailing theory suggests that an HDP diagnosis may elevate a patient's susceptibility to postpartum depression. This study was therefore designed to clarify the connection between HDP and postpartum depression and to determine the significant contributing risk factors.

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Materials and Methods

A two-year investigation, structured as a descriptive and cross-sectional prospective analysis, was carried out at a major academic medical center in Baghdad, IRAQ.. The study period extended from January 15, 2020, to January 15, 2022. Every potential participant received a comprehensive explanation of the study's objectives, and written consent was acquired from those who elected to take part [10]. This specific analysis forms a component of a broader prospective cohort study, which was designed to investigate the determinants and contributing factors related to hypertensive disorders in pregnancy at this large public teaching hospital in BAGHDAD. For this particular segment of the research, mother-newborn pairs were chosen using a convenience sampling technique, with the samples being matched according to the duration of the pregnancy.

This investigation enrolled postpartum mothers diagnosed with a Hypertensive Disorder of Pregnancy (HDP) and their infants. To be included, the maternal HDP must have been identified after the 20-week gestational . These enrolled women were then classified according to the intensity of their condition into one of five categories: a-gestational hypertension ,b- pre-eclampsia, c-chronic hypertension with superimposed pre-eclampsia, d-eclampsia, e- HELLP syndrome. Their neonates received care either in a standard rooming-in unit or in the Neonatal Intensive Care Unit (NICU). Potential participants were excluded for the following reasons: being under 18 years of age, carrying a fetus with a malformation, experiencing a fetal death, or having any history of a psychiatric disorder. The final computed sample consisted of 180 women, which included 50 with pre-eclampsia and 130 with normal blood pressure.

The diagnosis of hypertension during gestation and classification according severity is made by the guide lines of international society of studying of hypertension of pregnancy. This requires a confirmed systolic blood pressure of at least 140 mm Hg, a diastolic blood pressure of at least 90 mm Hg, or both, occurring after the first 20 weeks of gestation. [11]

To ensure accuracy, all collected data underwent a dual-entry verification process. The principal endpoint for the study was the identification of depressive symptomatology or an elevated risk for postpartum depression. This assessment was conducted following a 12-hour stay in the rooming-in ward, utilizing the Edinburgh Postnatal Depression Scale (EPDS), a 10-item instrument where responses are graded from 0 to 3, providing a quantitative measure of symptom severity as a screening mechanism for postpartum depression. Participants with a total score of 12 or higher were classified as potentially depressed; in these instances, the unit's head nurse was notified to facilitate a potential subsequent clinical assessment. A secondary objective involved investigating factors linked with the manifestation of depressive symptoms.

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To determine the influence of sociodemographic, health, obstetric, and infant feeding variables on postpartum depression risk, the Spearman's rank-order correlation (rS) was computed. A p-value of 0.05 or less was established as the threshold for statistical significance for all inferential analyses.

Results

The study included 180 women. The prevalence of depressive symptoms was 2.5 times higher among women with hypertensive disorders of pregnancy (HDP) compared to normotensive women (35.7% [15/42] vs. 19.8% [25/126]).

Demographic and Clinical Profile of the Sampling study are outlined in Table 1. While most participants were white (74.4%) and had a high-school education (38.1%), distinct patterns emerged between groups. Women with depressive symptoms were 16% more likely to be multiparous (74.2% vs. 64.5% in those without symptoms; P=0.242). A marked divergence was seen in delivery method: cesarean delivery was 76% more frequent in the depressive symptoms group (57.0% vs. 33.3% in those without symptoms; P=0.066). Clinical management also differed significantly. Investigations for HDP severity were 85.5% more common among women with depressive symptoms (37.5% vs. 20.0%; P value =0.028). Furthermore, the presentation of ecliptics sings was 86.7% higher in this group (32.5% vs. 17.5%; P=0.047), and the use of antihypertensive drug (magnesium sulfate) therapy was 87.5% more frequent (37.5% vs. 20.0%; P=0.018).

As shown in Table 2, maternal variables revealed that the median age of women with depressive symptoms was 45.5% higher than that of women without symptoms (32.0 years vs. 22.0 years; P value =0.060). p Values for parity, history of abortions, previous breastfeeding duration, and diastolic blood pressure were all elevated in the group with depressive symptoms.

Table 1 Demographic and Clinical Profile of the Sample.

Variable		Total sample (n=180)	Non depressive symptoms (n=134)	Depressive symptoms (n=46)	P- value
Diagnosis	Without hypertensive disorders of pregnancy	(75.0%)	(78.9%)	(62.5%)	0.028
	Severe pre-eclampsia	(19.6%)	(18.0%)	(25.0%)	
	Eclampsia	(0.6%)	(0.81%)	(0.00%)	
	Chronic hypertension with	(3.6%)	(2.3%)	(7.5%)	

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	superimposed pre-eclampsia				
	HELLP syndrome	(1.2%)	(0.0%)	(5.0%)	
Placental abruption	Yes	(0.6%)	(0.0%)	(2.5%)	0.537
	No	(99.4%)	(100.0%)	(97.5%)	
Bleeding	Yes	4 (2.4%)	(0.8%)	(7.5%)	
	No	(97.6%)	(99.2%)	(92.5%)	
Level of education	Incomplete fundamental education	(19.0%)	(17.2%)	(25.0%)	0.852
	Complete fundamental education	(17.9%)	(17.2%)	(20.0%)	
	Incomplete high school	(14.9%)	(15.6%)	(12.5%)	
	Complete high school	(38.1%)	(39.1%)	(35.0%)	
	Incomplete higher education	(6.0%)	(7.0%)	(2.5%)	
	Complete higher education	(2.4%)	(2.3%)	(2.5%)	
Type of delivery	Vaginal	(58.3%)	(62.5%)	(45.0%)	0.066
	Cesarean	(41.7%)	(37.5%)	(55.0%)	
Breastfeeding in the delivery room	Yes	(47.6%)	(50.8%)	(37.5%)	0.152
	No	(52.4%)	(49.2%)	(62.5%)	
Previous children	Yes	(56.5%)	(51.6%)	(72.5%)	0.104
	No	(43.5%)	(48.4%)	(27.5%)	
Premonitory signs of eclampsia	Yes	(20.2%)	(16.4%)	(32.5%)	0.047
	No	(79.8%)	(83.6%)	(67.5%)	
Magnesium sulfate therapy	Yes	(22.6%)	(18.0%)	(37.5%)	0.018
	No	(77.4%)	(82.0%)	(62.5%)	

HELLP= hemolysis, elevated liver enzymes, and low platelet count.

Values are given as number (percentage)

Table 2. Evaluation of Maternal Traits.

Variable	Total sample (n=180)	Non depressive symptoms	Depressive symptoms	P value

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		(n=134)	(n=46)	
Age, years	25.0	22.0	32.0	0.060
Parity	2.0	1.5	2.5	0.017
No. of spontaneous abortions	0.0	0.0	0.0	0.029
No. of prenatal consultations	6.4 ± 0.7	7.2 ± 0.3	7.3 ± 0.6	0.902
24-h proteinuria, mgc	814.0	916.5	593.1	0.203
Systolic blood pressure, mm Hg	127.4 ± 1.7	126.0 ± 1.8	131.8 ± 3.9	0.136
Diastolic blood pressure, mm Hg	75.7 ± 1.3	74.1 ± 1.4	80.6 ± 2.8	0.033

Values are given as mean ± standard error of the mean.

Of the perinatal demographic variables in Table 3, none demonstrated a significant difference between the two groups.

A more detailed analysis of perinatal demographic variables , including hospital staying and breastfeeding practices, is provided in Table 4. The rate of NICU hospitalization was more than twice as high in the depressive symptoms group (15.0%) compared to the non depressive symptoms group (6.3%). Feeding practices also showed notable, though statistically non-significant, differences: the depressive symptoms group reported a greater use of milk formula , while the no depressive symptoms group showed a higher frequency of feeding bottle use.

several factors were positively correlated with higher EPDS scores. The probability of postpartum depression was greater among women with a diagnosis of HDP, higher parity, a history of spontaneous abortions, a greater number of previous children, a longer duration of breastfeeding in a previous pregnancy, the use of milk formula during hospitalization, higher diastolic blood pressure, premonitory signs of eclampsia, and the therapeutic use of magnesium sulfate .

Table 3 Comparative Analysis of Perinatal Factors.

Variable	Total sample (n=180)	Non depressive symptoms (n=134)	Depressive symptoms (n=46)	P value

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Newborn weight, gram		3001.0	3040.0	2897.5	0.327
Apgar score	1 Min	8.0	8.0	8.0	0.460
	5 Min	9.0	9.0	9.0	0.389

Values are given as mean

Table 4 Perinatal Parameter Distribution .

Variable		Total sample (n=180)	Non depressive symptoms (n=134)	Depressive symptoms (n=46)	P value
Newborn sex	Female	87	(48.4%)	(47.5%)	>0.99
	Male	93	(51.6%)	(52.5%)	
Milk formula used during hospitalization	Yes	43	(21.9%)	(37.5%)	0.077
	No	125	(78.1%)	(62.5%)	
Breastfeeding in the NICU	Newborn admitted to the NICU sucking maternal breast	20	(6.3%)	(15.0%)	0.156
	Neonate not admitted to the NICU	(91.7%)	(93.8%)	(85.0%)	
Use of a bottle	Yes	(1.8%)	(1.6%)	(2.5%)	>0.99
	No	(98.2%)	(98.4%)	(97.5%)	

NICU = neonatal intensive care unit.

Values are given as number (percentage)

Discussion

This investigation identified several significant correlates with the primary outcome measures. These included hypertensive disorders of pregnancy, the mother's obstetric history (encompassing both prior deliveries and pregnancy losses), and infant feeding practices implemented before discharge. Additionally, clinical markers preceding eclamptic seizures and the specific administration of magnesium sulfate were noted as relevant factors.

The reviewed literature indicates a complex association between hypertensive disorders of pregnancy (HDP) and postpartum depression. Evidence suggests that women with HDP may be more susceptible to postpartum depression than normotensive women,

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with factors such as elevated diastolic blood pressure and the use of magnesium sulfate showing a positive correlation with depressive symptoms on the EPDS scale.

Pre-eclampsia, particularly in its severe form, is recognized for its significant psychological impact and association with post-traumatic stress disorder (PTSD), indicating that obstetric complications may act as catalysts for the development of postpartum depression . [12], [13] , [14] . Supporting this, Hoedjes et al [5] . found that both mild and severe pre-eclampsia were linked to depressive symptoms, with severe cases specifically associated with increased diastolic blood pressure, premonitory symptoms of eclampsia, and magnesium sulfate therapy. Their findings align with this observed connection. However, Hoedjes et al. [5] also argued that the relationship may depend more on the consequences of the disease, such as NICU admission or , than on the clinical severity of pre-eclampsia itself. Furthermore, complicating the consensus, Baecke et al. [15] .reported that although women with a history of pre-eclampsia showed increased depressive symptoms, the differences compared to women without HDP were not statistically significant.

Conversely, USA-based research involving 1,371 pregnant participants with hypertensive disorders of pregnancy (HDP) established that a diagnosis of either postpartum depression or anxiety existing prior to conception was linked to HDP. [4] .The same investigation also determined that a background of depressive symptoms was connected to instances of mild or severe pre-eclampsia resulting in preterm birth, underscoring the clinical significance of monitoring pre-eclampsia. [4] . According to the researchers, this link may be mediated by alternative pathways, as the existence of pre-gestational depression or anxiety—along with the pharmacological treatments for these conditions—might alter the mother's physiological state, thereby increasing the susceptibility for preterm pre-eclampsia in the present pregnancy. This analysis brings to light a necessity for investigating other elements connected to postpartum depression that remain insufficiently studied, such as the number of prior births, history of miscarriages, previous infant feeding methods, and potential links to distressing gestational events. Within this context, it has been proposed that lactation could play a role in alleviating depressive manifestations after childbirth. [16]. However, certain factors may adversely influence this dynamic, including physical discomfort [17] .and unmet maternal desires. [18]. Receiving an HDP diagnosis may itself lead to trauma-related conditions, generating emotions of deprivation and fragility. [19]. Consequently, implementing supportive care during the postpartum phase is essential for HDP patients showing signs of postpartum depression. Research by Soltani et al. [20] confirmed a connection between post-traumatic stress disorder (PTSD) and experiences of both mild and severe pre-eclampsia. Specifically, depression and anxiety present during hospital admission were correlated with PTSD secondary to HDP, with this relationship being mitigated by

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the degree of familial support. [20] .Thus, screening for psychological symptoms and negative occurrences is crucial in postpartum individuals presenting with HDP of any severity. Several methodological constraints must be acknowledged. The cross-sectional approach permitted only one administration of the Edinburgh Postnatal Depression Scale (EPDS), conducted after the initial 12-hour postpartum period. Additionally, the rationale behind cesarean section versus normal vaginal births was not documented, and the study's prospective nature and reliance on clinical data precluded analysis of delivery method determinants and participant body mass index (BMI). Another limitation was that the cohort exhibiting depressive symptoms comprised individuals who were, on average, older and had experienced more pregnancies than the non-depressive group.

Conclusion

In summary, employing the EPDS for the prompt identification of depressive signs offers a potential approach for addressing postpartum depression in patients with HDP. Further investigation is required to clarify the pathways through which associated factors impact the development of postpartum depression.

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