

Pregnancy-related hypertension and postpartum mental health: An integrated review

^{1*}Kiran Gairola, ²Kiran Bhat

^{1,2}Department of Biochemistry, Himalayan Institute of Medical Sciences, Swami Rama Himalyan University, Jolly Grant, Dehradun, Uttarakhand, India

Keywords	Abstract
Anxiety, cardiovascular risk, hypertensive disorders of pregnancy; maternal mental health; multidisciplinary care, preeclampsia	Hypertensive disorders of pregnancy (HDP) are a leading cause of maternal and perinatal morbidity and mortality worldwide. Emerging evidence highlights a significant association between HDP and maternal mental health, particularly anxiety. This review summarizes current knowledge on the epidemiology, pathophysiology, and management of HDP, with emphasis on its interaction with psychological factors. Physiological adaptations during pregnancy complicate the diagnosis and management of hypertension. Anxiety-related neuroendocrine, inflammatory, and autonomic mechanisms may contribute to the development and progression of HDP. In addition to adverse pregnancy outcomes, HDP is associated with long-term cardiovascular risk. Management requires a multidisciplinary approach combining pharmacological therapy with psychological interventions. Early identification and integrated care strategies may improve both maternal and neonatal outcomes. Long-term follow-up is essential for reducing future cardiovascular risk in affected women.

*Corresponding Author: kirangairola14@gmail.com

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1. Introduction

Hypertensive disorders complicate approximately 10% of pregnancies and remain a major contributor to maternal and neonatal morbidity and mortality (Baragou et al. 2014; Regitz- Berhe et al. 2018; Zagrosek et al. 2018). These disorders include gestational hypertension, preeclampsia/eclampsia, and chronic hypertension (Garovic et al. 2022). Their global burden is particularly high in low- and middle-income countries (Baragou et al. 2014; Berhe et al. 2019). HDP is associated with serious maternal

complications such as stroke, organ dysfunction, and placental abruption, as well as adverse fetal outcomes including intrauterine growth restriction, prematurity, and perinatal mortality (Arshad et al. 2011; Berhe et al. 2019; Gama et al. 2019). In addition to traditional risk factors such as obesity, advanced maternal age, and pre-existing disease, psychological factors are increasingly recognized as important contributors (Dachew et al. 2019; Raina et al. 2019; Thombre Kulkarni et al. 2019). Recent

research has focused on the bidirectional relationship between HDP and mental health, particularly anxiety (Dachew et al. 2019; Raina et al. 2019). This review provides a concise overview of the underlying mechanisms and management strategies.

Review

Physiological Changes in Pregnancy:

Normal pregnancy is characterized by systemic vasodilation leading to a reduction in blood pressure, particularly during the second trimester (Shen et al. 2017). Blood pressure subsequently rises toward baseline levels in late pregnancy. These physiological changes may obscure the diagnosis of hypertension, especially in women with pre-existing disease (Regitz-Zagrosek et al. 2018; Garovic et al. 2022).

In the postpartum period, blood pressure fluctuations continue, with a transient rise commonly observed within the first week after delivery (Garovic et al. 2022). Importantly, a significant proportion of HDP-related complications occur postpartum, highlighting the need for continued monitoring (Gama et al. 2019; McNestry et al. 2023).

2.2 HDP and Maternal Mental Health:

An increasing body of evidence supports a strong association between anxiety and HDP (Dachew et al. 2019; Raina et al. 2019; Thombre Kulkarni et al. 2019). Large cohort studies have demonstrated that maternal anxiety is associated with a higher risk of gestational hypertension, preeclampsia, and eclampsia (Raina et al. 2019; Thombre Kulkarni et al. 2019). The relationship appears to be bidirectional. While anxiety may predispose to HDP, the diagnosis of HDP itself can contribute to psychological distress (Christian et al. 2012; Cai et al. 2022). Chronic stress may worsen vascular function and contribute to poor pregnancy outcomes (Scalco et al. 2009; Hirooka, 2022). In contrast, the association between depression and HDP is less consistent, suggesting distinct underlying mechanisms (Cai et al. 2022; Tschiderer et al. 2024).

2.3 Pathophysiological Mechanisms: Neuroendocrine Pathways

Activation of the hypothalamic–pituitary–adrenal axis in response to stress leads to increased cortisol levels, promoting vasoconstriction and hypertension (Christian, 2012; Dreisoerner et al. 2021). Sympathetic overactivity further increases vascular resistance (Scalco et al. 2009; Hirooka et al. 2020).

Inflammation and Endothelial Dysfunction

Elevated pro-inflammatory cytokines and oxidative stress contribute to endothelial dysfunction, a hallmark of preeclampsia (Luo et al. 2014; Caroccia et al. 2021). Chronic stress may amplify these inflammatory responses (Christian, 2012; Cai et al. 2022).

Genetic and Epigenetic Factors

Genetic predisposition influences susceptibility to HDP and its long-term cardiovascular consequences (Ardissino et al. 2022; Tschiderer et al. 2024). Epigenetic modifications may mediate the effects of environmental and psychological stressors (Luo et al. 2014).

Autonomic Dysregulation

Reduced heart rate variability and increased sympathetic tone in anxious individuals contribute to sustained elevations in blood pressure (Scalco et al. 2009; Hirooka et al. 2020).

Gut–Brain Axis

Alterations in gut microbiota have been implicated in both hypertension and anxiety (Yang et al. 2019; Wu et al. 2020; Qian et al. 2022; Canyelles et al. 2023; Młynarska et al. 2024). Dysbiosis may influence blood pressure through metabolic and neuroendocrine pathways, although evidence remains evolving (Wu et al. 2020; Młynarska et al. 2024).

2.4 Management Strategies

Psychological Interventions

Non-pharmacological approaches such as relaxation techniques, yoga, and cognitive-behavioral therapy (CBT) have shown benefits in reducing stress and improving blood pressure control (Smkith et al. 2020; Sun et al. 2023; Zhang et al. 2023; Sun et al. 2024;). These interventions also enhance maternal coping and overall well-being (Sun et al. 2024).

Pharmacological Treatment

First-line antihypertensive agents include labetalol, methyldopa, and nifedipine (Garovic et al. 2022; Regitz-Zagrosek et al. 2024). Severe hypertension requires urgent management, often with intravenous therapy (Bolte et al. 2001).

Low-dose aspirin is recommended for high-risk women to reduce the incidence of preeclampsia (Garovic et al. 2022; Antonijevic et al. 2024). Emerging evidence suggests a potential role for metformin, although further studies are needed (Zhang et al. 2020).

Caution is required when prescribing psychotropic medications, particularly serotonin-norepinephrine reuptake inhibitors, due to possible effects on placental function and fetal development (Ganapathy, 2011; Antonijevic et al. 2016; Melov et

al. 2021).

Multidisciplinary Care

Effective management of HDP requires coordination among obstetricians, physicians, mental health professionals, and nursing staff (Bolte et al. 2001; Regitz-Zagrosek et al. 2018; Rivera-Romero et al. 2018). Early warning systems and structured monitoring protocols can significantly improve outcomes (Rivera-Romero et al. 2018; Garovic et al. 2022).

Long-Term Implications

Women with a history of HDP are at increased risk of cardiovascular disease, metabolic syndrome, and chronic kidney disease (Wu et al. 2017; Grandi et al. 2017; Crump et al. 2023; Bernardi et al. 2024; Tschiderer et al. 2024). Psychological stress may further exacerbate these risks through persistent inflammatory and neuroendocrine activation (Scalco et al. 2020; Cai et al. 2022). Postpartum follow-up should include cardiovascular risk assessment, blood pressure monitoring, and mental health evaluation (McNestry et al. 2023; Poon et al. 2023). Preventive strategies are essential to reduce long-term morbidity.

Conclusion:

Hypertensive disorders of pregnancy represent a complex interplay between vascular, metabolic, and psychological factors. Anxiety plays a significant role in both the development and progression of HDP

through multiple biological pathways. An integrated approach combining medical treatment with psychological support is essential for optimizing outcomes. Recognition of long-term risks and implementation of follow-up strategies are critical for improving women's health beyond pregnancy.

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