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Review Article

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# "PREGNANCY-INDUCED HYPERTENSION: CLASSICAL CORRELATES AND AN AYURVEDIC MANAGEMENT APPROACH — AN INTEGRATIVE REVIEW"

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**ABSTRACT:**
**Background:** Hypertensive disorders of pregnancy, including gestational hypertension and preeclampsia, affect about 5% to 10% of pregnancies and remain a leading cause of maternal and perinatal death. Evidence-based obstetric care, including blood pressure monitoring, antihypertensive treatment, low-dose aspirin for high-risk women, magnesium sulphate and timely delivery, is life-saving. Ayurveda does not describe pregnancy-induced hypertension as a distinct disease, but several classical concepts bear on its features. **Objective:** To identify classical Ayurvedic correlates of pregnancy-induced hypertension, to examine the evidence for Ayurvedic and related interventions, and to define a safe, adjunctive role for Ayurveda within standard obstetric care. **Methods:** Classical texts (Charaka Samhita, Sushruta Samhita, Bhavaprakasha) were reviewed for antenatal regimen, oedema in pregnancy and Vata disorders. PubMed was searched for guidelines, reviews, meta-analyses, trials and experimental studies on hypertensive disorders of pregnancy, Ayurveda, medicinal plants, yoga, diet and supplementation. Findings were synthesised narratively. **Results:** Oedema in pregnancy (Garbhini shotha), disturbance of Vyana vata and Rakta, and convulsive Vata disorders offer partial conceptual correlates for gestational hypertension, preeclampsia and eclampsia. Supervised exercise and yoga reduce the incidence of hypertensive disorders in randomised trials. Calcium supplementation, long recommended, has recently been questioned. Evidence for Ayurvedic herbs is limited to reviews of plausible mechanisms and laboratory studies; no controlled trial of an Ayurvedic medicine in preeclampsia was identified, and pregnancy safety data are largely absent. **Conclusion:** Ayurveda may contribute antenatal lifestyle guidance, yoga and stress reduction as adjuncts. Herbal antihypertensive treatment is not supported and must never delay or replace standard obstetric management.

**KEYWORDS:** Pregnancy-induced hypertension, preeclampsia, Garbhini shotha, Garbhini paricharya, Vyana vata, integrative obstetrics

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## INTRODUCTION

Hypertensive disorders of pregnancy comprise chronic hypertension, gestational hypertension, preeclampsia and preeclampsia superimposed on chronic hypertension. Together they affect about 5% to 10% of pregnancies worldwide and remain a major cause of maternal and perinatal morbidity and mortality, with a rising burden attributable to obesity, advanced maternal age and evolving diagnostic criteria[1]. Gestational hypertension denotes new hypertension after 20 weeks of gestation; preeclampsia adds proteinuria or other evidence of maternal organ dysfunction or uteroplacental insufficiency, and eclampsia denotes seizures in this setting. The term pregnancy-induced hypertension, widely used in India, generally covers gestational hypertension and preeclampsia, and is used in that sense here.

The consequences extend well beyond delivery: a 2026 meta-analysis of more than 14 million women found that a history of hypertensive disorders of pregnancy was associated with a 45% higher risk of all-cause mortality, and a 64% higher risk after preeclampsia or eclampsia, although the certainty of evidence was rated very low[2].

Many pregnant women in South Asia consult Ayurvedic practitioners or use traditional products during pregnancy, often without informing their obstetrician[3]. It is therefore important for Ayurvedic clinicians to understand both the biomedical gravity of these disorders and the limits of Ayurvedic evidence. The aim of this review is to describe classical Ayurvedic concepts that correspond partially to pregnancy-induced hypertension, to examine critically the evidence for Ayurvedic and related interventions, and to propose an adjunctive management approach in which standard obstetric care remains primary.

## METHODOLOGY

This narrative review was prepared in two parts. First, the classical texts of Ayurveda, namely Charaka Samhita (Sharira sthana, chapter 8, and Vimana sthana, chapter 1), Sushruta Samhita (Sharira sthana, chapter 10) and Bhavaprakasha (Madhya khanda, Striroga adhikara), were studied with their standard commentaries for the antenatal regimen, complications of pregnancy and relevant Vata disorders[4–7]. Second, PubMed was searched for literature published up to October 2026 using combinations of the terms preeclampsia, pregnancy-induced hypertension, gestational hypertension, hypertensive disorders of pregnancy, Ayurveda, medicinal plants, garlic, yoga, exercise, calcium, aspirin and magnesium sulphate. Guidelines, reviews, meta-analyses, randomised controlled trials, experimental studies and case reports were considered. Every reference cited in this article was checked against its PubMed record for authors, title, journal, year, volume, pages and digital object identifier. Retracted publications identified during the search were excluded. The findings are synthesised narratively rather than statistically.

## CURRENT BIOMEDICAL UNDERSTANDING

### 1. Pathophysiology

Preeclampsia is fundamentally a disorder of the placenta and maternal endothelium. Defective trophoblast invasion and incomplete remodelling of the maternal spiral arteries leave a high-resistance uteroplacental circulation, producing placental hypoperfusion, ischaemia-reperfusion injury and oxidative stress. The stressed placenta releases anti-angiogenic factors, notably soluble fms-like tyrosine kinase-1 (sFlt-1) and soluble endoglin, which bind placental growth factor (PlGF) and vascular endothelial growth factor and cause widespread maternal endothelial dysfunction[1,8]. The sFlt-1/PlGF ratio is now the most validated biomarker for short-term risk stratification in suspected preeclampsia[1,8]. Immune maladaptation, obesity-related inflammation and insulin resistance contribute to this process[1].

### 2. Standard management

Pivotal trials have shaped current management. Low-dose aspirin is standard prophylaxis for women at high risk; a meta-analysis of 45 randomised trials with 20,909 women found that aspirin started at or before 16 weeks reduced preeclampsia (relative risk 0.57), severe preeclampsia and foetal growth restriction, with greater benefit at higher doses, whereas aspirin started after 16 weeks had a modest or no effect[9]. Recent trials have shown that treating mild chronic hypertension reduces the risk of preeclampsia, and studies of magnesium sulphate for seizure prophylaxis and of optimal timing of delivery define other key elements of care[10]. Magnesium sulphate is the most effective intervention for the prevention and treatment of eclampsia, although it remains underused in some primary care settings[11]. Postpartum follow-

up is also essential because of the long-term cardiovascular and mortality risks[2].

These measures depend on regular antenatal blood pressure measurement and urine testing, timely recognition of warning symptoms such as severe headache, visual disturbance, epigastric pain and sudden oedema, and rapid referral. Any Ayurvedic contribution must be built around, not in place of, this framework.

## CLASSICAL AYURVEDIC CORRELATES

### 1. Absence of a direct classical description

Blood pressure was not measured in classical times, and the texts do not describe a disorder defined by raised blood pressure in pregnancy. Correlations with pregnancy-induced hypertension must therefore be built from the clinical features the classical authors could observe, chiefly oedema, headache, giddiness, visual disturbance and convulsions, and from their physiological concepts. Such correlations are heuristic and should not be taken to imply that preeclampsia was understood or effectively treated in classical practice.

### 2. Garbhini shotha (oedema in pregnancy)

Oedema is the most visible feature traditionally associated with preeclampsia. Later compendia such as Bhavaprakasha list swelling (Shotha) among the complications of pregnancy (Garbhopadrava) and recommend treatment that does not harm the foetus[7]. Mild dependent oedema is common in normal pregnancy, whereas sudden or generalised oedema, especially of the face and hands, may signal preeclampsia. The classical category therefore covers both benign and dangerous states, and from a modern safety standpoint any woman with Garbhini shotha should have her blood pressure and urine protein checked before it is attributed to a benign cause.

### 3. Vyana vata, Rakta and the circulation

In Ayurvedic physiology, Vyana vata, the subtype of Vata pervading the whole body, governs the circulation of Rasa and Rakta through the vessels, and the heart (Hridaya) is the seat of Rasa and of Prana[4]. Contemporary Ayurvedic writers commonly interpret essential hypertension in terms of vitiated Vyana vata with involvement of Pitta and Rakta, and in pregnancy this interpretation can be extended to include the burden placed on the mother's channels (Srotas) by the growing foetus. The biomedical picture of increased vascular resistance and endothelial dysfunction[1,8] can be translated loosely into this language of obstructed and disturbed circulation. Again, this is a modern synthesis rather than a classical description.

### 4. Convulsive states

Eclampsia, with generalised seizures and loss of consciousness, resembles the convulsive Vata disorders, such as Akshepaka and Apatanaka, described in the classical texts. Contemporary Ayurvedic teaching sometimes uses these terms for eclampsia. The classical texts do not, however, link these disorders specifically to pregnancy, and eclampsia is an obstetric emergency for which magnesium sulphate and delivery are the established treatment[10,11]. No Ayurvedic intervention has any evidence-based role in its acute management.

### 5. Classical causative factors

The classical texts list factors that the pregnant woman should avoid, including excessive exertion, heavy and incompatible food, suppression of natural urges, sleeping by day and staying awake at night, anger, fear, grief and other emotional disturbance[4,5]. Charaka also cautions against habitual excessive use of salt in the diet[6]. Several of these overlap with modern risk factors or plausible contributors, such as psychological stress, poor sleep, obesity and unhealthy diet[1].

## EVIDENCE FOR AYURVEDIC AND RELATED INTERVENTIONS

### 1. Medicinal plants

A 2025 review in this journal discussed Indian medicinal plants with potential relevance to preeclampsia, including Anantamula (*Hemidesmus indicus*), Lashuna (garlic, *Allium sativum*), Gokshura (*Tribulus terrestris*), Haridra (*Curcuma longa*), Ashwagandha (*Withania somnifera*), rhubarb and particularly Shatavari (*Asparagus racemosus*). The authors described antioxidant, anti-inflammatory, endothelial-protective and nitric-oxide-enhancing mechanisms that address key pathways in preeclampsia, but emphasised that rigorous research is needed to confirm efficacy, safety and dosage[12]. A similar review of South African plants with angiotensin-converting enzyme inhibitory activity proposed their potential in hypertension in pregnancy[13]; it should be noted that pharmaceutical angiotensin-converting enzyme inhibitors are themselves avoided in pregnancy because of foetal toxicity, so this mechanism is a cause for caution rather than reassurance.

Laboratory evidence remains preliminary. In human umbilical vein endothelial cells exposed to plasma from women with severe preeclampsia, an ethanolic extract of pomegranate (Dadima, *Punica granatum*) fruit reduced a marker of lipid peroxidation, 8-iso-prostaglandin F2-alpha, though it did not alter nitric oxide[14]. Such findings support the oxidative stress hypothesis but say nothing about clinical benefit or safety.

Garlic is the only plant in this group with randomised clinical data in preeclampsia. A review of rigorous double-blind trials of garlic concluded that its evidence was not convincing across indications and that there were not enough data on preeclampsia to make clinical recommendations[15]. No randomised or controlled clinical trial of any Ayurvedic herb or classical formulation in gestational hypertension or preeclampsia was identified in this review.

**2. Antihypertensive herbs used in Ayurvedic practice**

Ayurvedic practitioners commonly use Sarpagandha (*Rauvolfia serpentina*), Arjuna (*Terminalia arjuna*), Jatamansi (*Nardostachys jatamansi*), Brahmi (*Bacopa monnieri*) and Shankhapushpi (*Convolvulus pluricaulis*) for hypertension in non-pregnant patients. None of these has been evaluated for efficacy or safety in pregnancy in a controlled trial identified in this review. Sarpagandha deserves particular mention: its principal alkaloid, reserpine, was an early antihypertensive drug but has been superseded in modern obstetric practice by agents with established pregnancy safety. The authors therefore advise against the use of these herbs for blood pressure control in pregnancy. Herbomineral formulations are also unsuitable in this context, given documented cases of heavy metal poisoning from unregulated Ayurvedic products[16].

**3. Calcium and calcium-based preparations**

Calcium supplementation has been recommended by the World Health Organization to prevent preeclampsia, largely on the basis of successive Cochrane reviews. The 2025 update of that review, however, reported that calcium supplementation may result in little or no reduction in preeclampsia, a change driven mainly by exclusion of trials on grounds of trustworthiness; a 2026 commentary argued that these exclusions were applied inconsistently and that reinstating two of the trials would significantly change the pooled estimate[17]. A meta-analysis of preconception interventions reported a lower risk of preeclampsia with calcium (relative risk 0.71)[18], and a systematic review of antenatal interventions found that calcium supplementation benefited selected outcomes in appropriately defined populations[19]. This debate is relevant to Ayurvedic practice, in which calcium-rich preparations such as Pravala (coral) and Mukta (pearl) pishti are widely prescribed in pregnancy for their cooling (Sheeta) and Pitta-pacifying properties. Whether these preparations deliver a meaningful dose of absorbable calcium, and whether they influence preeclampsia risk, has not been studied. Where calcium supplementation is indicated, standardised calcium supplements prescribed according to national guidelines should be preferred.

**4. Yoga and supervised exercise**

The strongest evidence for an intervention related to Ayurveda concerns yoga. A meta-analysis of 16 randomised trials with 5,939 pregnant women found that supervised exercise reduced the risk of hypertensive disorders of pregnancy (odds ratio 0.54), and in subgroup analysis yoga alone had a larger effect (odds ratio 0.28) than aerobic exercise alone, which was not significant[20]. A quasi-experimental study of 100 pregnant women, published in this journal, reported improved uterine artery Doppler indices and fewer cases of preeclampsia, diabetes and foetal growth restriction in the yoga group compared with routine care, although the non-randomised design limits confidence[21]. A broader meta-analysis of relaxation interventions in pregnancy, including yoga, found consistent reductions in maternal stress, anxiety and depressive symptoms and some evidence of improved maternal blood pressure and heart rate[22].

These findings are consistent with the classical emphasis on mental calm and moderate activity during pregnancy[4,5], and they suggest that supervised prenatal yoga is a reasonable, low-risk adjunct for women without obstetric contraindications. Yoga should be taught by instructors trained in prenatal practice, should avoid strenuous inversions and breath retention, and should never be used as treatment for established hypertension in place of medical care.

**5. Diet**

The classical antenatal regimen recommends light, easily digestible, nourishing food, milk and ghee in various months, and avoidance of heavy, excessively

hot, pungent and incompatible food[4,5]. In a woman at risk of preeclampsia, this can be harmonised with a diet rich in vegetables, fruits, whole grains and pulses, moderate in salt and limited in processed foods. Dietary trials specifically targeting preeclampsia prevention remain limited, and the review of antenatal interventions found heterogeneous effects of lifestyle and dietary interventions[19]. Ayurvedic dietary advice should therefore be framed as supportive of general antenatal health rather than as a specific preventive treatment.

## A PROPOSED ADJUNCTIVE APPROACH

On the basis of this evidence, the authors propose an integrative approach with three tiers. The first tier, applicable to every pregnant woman, is screening and safety. The Ayurvedic clinician should record blood pressure and enquire about headache, visual symptoms, epigastric pain and sudden swelling at each visit, and should refer any woman with blood pressure of 140/90 mmHg or above, proteinuria or warning symptoms to obstetric care without delay. All herbal and mineral products in use should be documented and shared with the obstetric team[3].

The second tier is preventive lifestyle care during pregnancy, consistent with Garbhini paricharya. This includes a regular daily routine with adequate sleep, a moderate diet as described above, avoidance of excessive salt[6], emotional support, and supervised prenatal yoga and breathing practices[20–22]. Women identified as high risk by their obstetrician should receive low-dose aspirin and other evidence-based prophylaxis as prescribed[9,10]; Ayurvedic care should reinforce adherence rather than offer alternatives.

The third tier applies to women with established gestational hypertension or preeclampsia. Here the Ayurvedic role is limited to supportive measures that do not interfere with obstetric management, such as stress reduction, dietary counselling and postnatal follow-up. No herbal antihypertensive or herbomineral preparation should be introduced. After delivery, women with a history of these disorders should be counselled about their increased long-term cardiovascular risk[2], and this is an area in which Ayurvedic lifestyle approaches may be evaluated more freely in non-pregnant women.

## DISCUSSION

This review shows that Ayurveda offers partial conceptual correlates for pregnancy-induced hypertension, namely oedema in pregnancy, disturbance of Vyana vata and Rakta, and convulsive Vata disorders, but no classical description of the disease as currently understood[4,7]. These correlations can help Ayurvedic clinicians recognise and communicate about warning features, but they do not provide a basis for independent treatment.

The evidence base for Ayurvedic interventions is uneven. For herbs, it consists of reviews of plausible mechanisms and laboratory studies[12–14], together with a negative assessment of garlic trials[15]. No controlled trial of an Ayurvedic medicine in preeclampsia was identified. This gap is especially important because preeclampsia is a progressive disorder in which delay can be fatal for mother and foetus. In contrast, the evidence for yoga and supervised exercise in preventing hypertensive disorders is reasonably consistent and derived from randomised trials[20], although the trials vary in their protocols and populations. The ongoing debate over calcium supplementation[17] illustrates that even widely accepted preventive measures need continual re-evaluation, and that Ayurvedic calcium-based preparations should not be assumed to share the benefits attributed to calcium supplements.

Several research priorities follow. Pregnancy safety data, including reproductive toxicology and pharmacokinetic studies, are needed before any Ayurvedic herb can be tested clinically in preeclampsia. Shatavari, which has received particular theoretical attention[12], is a reasonable candidate for such work, but this should begin with safety rather than efficacy studies. Randomised trials of standardised prenatal yoga protocols in Indian populations, with hypertensive disorders as the primary outcome, would test the most promising Ayurveda-related intervention directly. Studies are also needed on the calcium content and bioavailability of Pravala and Mukta preparations. Finally, postpartum lifestyle programmes informed by Ayurveda could be evaluated in women with a history of preeclampsia to address long-term cardiovascular risk[2].

From a clinical perspective, the most valuable contribution an Ayurvedic practitioner can make is to support early detection, reinforce adherence to obstetric

care and offer safe lifestyle measures. Standard obstetric care, including blood pressure monitoring, antihypertensive treatment, aspirin prophylaxis, magnesium sulphate and timely delivery, must remain primary.

## CONCLUSION

Pregnancy-induced hypertension has no direct classical description, but concepts such as Garbhini shotha, Vyana vata disturbance and convulsive Vata disorders provide partial correlates. Yoga and supervised exercise are supported by randomised evidence as preventive adjuncts, while Ayurvedic herbs lack clinical and pregnancy safety data and should not be used to treat raised blood pressure in pregnancy. Ayurveda can play a supportive role in antenatal lifestyle care and early recognition of warning signs, but standard obstetric management must remain the foundation of care for every woman with a hypertensive disorder of pregnancy.

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