

# Hypertension in pregnancy and Pre-eclampsia

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## Introduction

Hypertension in pregnancy is common, complicating more than 10 percent of all pregnancies.<sup>1</sup> Hypertension can be a sign of preeclampsia, a multisystem disorder specific to pregnancy also characterised by proteinuria; it affects about 4% of all pregnancies, and can result in serious morbidity and mortality to both mother and fetus. Pregnancy-induced hypertension (without proteinuria) maybe the first sign of pre-eclampsia. Pre-existing hypertension can result in pregnancy complications such as fetal growth restriction, even without pre-clampsia supervening.<sup>1,2</sup> In the latest report on Confidential Enquiries into Maternal and Child Health (CEMACH), there were 18 direct deaths attributed to preeclampsia and eclampsia. The biggest impact pre-eclampsia has to the baby is related to the need to deliver preterm, as this is the only cure.

## Definitions of hypertension in pregnancy and preeclampsia<sup>3</sup>

- **Hypertension:** consecutive diastolic blood pressure readings of  $\geq 90$  mmHg on more than one occasion at least 4 hours apart or a single DBP of  $\geq 110$  mmHg
- **Proteinuria:**  $\geq 300$  mg excreted protein in a 24-hour collected urine or two clean-catch urine specimens at least 4 hours apart with 2+ proteinuria by dipstick
- **Gestational hypertension/pregnancy-induced hypertension:** hypertension after the 20<sup>th</sup> week of pregnancy in a previously normotensive woman
- **Preeclampsia:** hypertension with proteinuria

## Risk factors which predispose women to developing preeclampsia<sup>4</sup>

- First pregnancy
- Previous preeclampsia
- $\geq 10$  years since last baby
- Aged  $\geq 40$  years
- Raised body mass index before pregnancy and at booking
- Family history of preeclampsia (mother or sister)
- Booking DBP  $\geq 80$  mmHg
- Proteinuria at booking
- Multiple pregnancy
- Underlying medical conditions
  - Pre-existing hypertension, renal disease, diabetes, or anti-phospholipid syndrome

## Diagnosis

Hypertension (BP  $\geq$ 140/90 mmHg on at least 2 occasions or  $\geq$ 160/110 mmHg on one occasion) and proteinuria ( $>$ 0.3 g/24h) are diagnostic.

## Clinical Features

Preeclampsia is a pregnancy-specific multisystemic condition of unknown aetiology. Its two cardinal features are the result of endothelial cell activation and subsequent vasoconstriction resulting in *hypertension* and glomerular damage causing *proteinuria*.

**It is important to remember that no single symptom or sign can be relied on to diagnose the condition, and that its course and onset are variable and unpredictable, affecting either the mother or baby predominantly.**

Clinical symptoms, (*may be absent even in severe disease*), include:

- frontal headaches
- visual disturbances
- epigastric or right upper quadrant pain,
- nausea or vomiting
- oedema of the face and limbs.

Clinical signs:

- oedema
- epigastric or right upper quadrant tenderness
- hyper-reflexia
- confusion

Investigations may reveal:

- raised uric acid
- raised transaminase and creatinine
- low platelet count

## Complications

These include fetal growth restriction, placental abruption, disseminated intravascular coagulopathy (DIC), HELLP syndrome (haemolysis, elevated liver enzymes and low platelet count), liver rupture, pulmonary oedema, renal failure, eclampsia and cerebral haemorrhage.

## Management

### Pre-conception

- Weight loss in overweight women should be encouraged prior to conception as there is an increase of both pre-eclampsia and gestational hypertension with increasing BMI.<sup>5</sup>
- Anti-hypertensive therapy in women with chronic hypertension should be reviewed; consideration should be given to stopping or changing therapy such as ACE inhibitors, diuretics and Beta blockers.<sup>6</sup>

### Antenatal Visits

- Risk factors for pre-eclampsia which should be identified (see above.)
- *Such women need early referral to the Obstetric team.*
- Severe hypertension (systolic >160 mmHg) should be avoided and women should be informed that most therapy is not teratogenic or harmful.
- At each antenatal visit with a healthcare professional, blood pressure and urinalysis should be performed to detect new hypertension and proteinuria
- Pre-eclampsia should be considered if there are symptoms of headaches, visual disturbances, epigastric pain or vomiting.
- Fetal compromise (reduced fetal movements, reduced symphysial fundal height) should be sought in all women where pre-eclampsia is considered.

## Investigations

**Blood pressure, followed by urinalysis for proteinuria and liver function tests, are the best clinically relevant test in predicting maternal and fetal complications of preeclampsia.**<sup>7</sup>

If a woman is thought to be at risk of preeclampsia, uterine artery Doppler ultrasonography performed at the same time as her anomaly scan at 20 weeks' gestation should be considered. Bilateral arterial notching with high resistant flow is associated with severe early onset of the disease.<sup>8</sup>

Mercury sphygmomanometry is recommended for measuring blood pressure in pregnancy and preeclampsia. Automated devices tend to underestimate readings in women with preeclampsia. However, self-measurement automated devices such as the Microlife 3BTO-A(2)<sup>9</sup> and the Omron M7<sup>10</sup>, and robust devices for hospital use such as

the Dinamap ProCare 400<sup>11</sup> that have been assessed for accuracy in preeclampsia specifically, may be used.

At each antenatal visit where a blood pressure is measured, a urinalysis should be undertaken to test for proteinuria. An early morning or community sample of urine is the most accurate for dipstick urinalysis. *A 24-hour collection remains the best method to confirm significant proteinuria, but PCR (protein creatinine ratios) are better than dipstick as they control for urine concentration.*

Women suspected to have preeclampsia by their healthcare professional should be referred for urgent obstetric review. Measurement of platelets, aspartate aminotransferase (AST), (or alanine aminotransferase (ALT)) and serum creatinine at the initial assessment, establish a baseline and monitor disease progression and in established disease will diagnose HELLP syndrome.<sup>12-13</sup> A raised serum uric acid in women with hypertension is associated with superimposed preeclampsia and poor fetal outcome.

Monitoring of fetal growth may be done on a two- to four-week basis depending on the level of suspicion. Umbilical artery Doppler ultrasonography is the best test for predicting an at-risk fetus in women with preterm new hypertension and once abnormal is usually done on a one- to two-weekly basis. The use of umbilical artery Doppler for fetal assessment is associated with a trend towards a reduction in perinatal death, fewer inductions and fewer admissions to hospital.<sup>14</sup>

### **Prophylactic strategies**

Antiplatelet agents, particularly low-dose aspirin, has been shown to reduce the risk of both preeclampsia and serious adverse outcomes by 10%.<sup>15</sup> Calcium (1 gram per day) is sometimes prescribed in high risk women as some studies have shown a 50% decrease in the rates of pre-eclampsia.<sup>16</sup>

### **Antenatal management of hypertension**

Antihypertensive therapy does not alter the progression of preeclampsia but may prevent cerebrovascular haemorrhage, which remains the leading cause of death associated with preeclampsia and eclampsia in the UK.<sup>17</sup> CEMACH recommends treating systolic hypertension of  $\geq 160$  mmHg with antihypertensives.<sup>17</sup> Clinicians usually aim for blood pressure to be maintained between 140-150 mmHg systolic and 90-100 mmHg diastolic. Methyldopa, labetalol and nifedipine are the medications of choice.

A medical review on a Day Assessment Unit is recommended with a named obstetric consultant in women with abnormal bloods, Dopplers, and new hypertension without proteinuria. Women with new hypertension or new proteinuria benefit from weekly

follow-up to monitor disease progression and ensure blood tests and/or Dopplers are not becoming abnormal. Serial assessment of the fetus with ultrasound measurements of fetal size, umbilical artery Doppler and liquor volume is also important.<sup>18</sup>

### **Intrapartum Management**

Delivery is the treatment for preeclampsia but the decision to do is a careful balance of maternal wellbeing and fetal maturity at gestations of under 34 weeks.

Blood pressure should be checked every 15 minutes until the woman is stabilized and blood sent for full blood count, liver and renal function tests; clotting studies are not usually necessary if the platelet count is over  $100 \times 10^6/L$ .<sup>19</sup> An in-dwelling catheter and intravenous fluid may facilitate close fluid balance, limiting intake to 80 ml/hour thus reducing the likelihood of pulmonary oedema.<sup>20</sup> Women in labour require continuous electronic fetal monitoring. Oral or intravenous labetalol, oral nifedipine (not sublingual) or intravenous hydralazine may be used for acute management of hypertension.<sup>19</sup> Magnesium sulphate is recommended for eclampsia, and in cases of severe pre-eclampsia (eg with symptoms, severe hypertension or abnormal blood tests). Its increased use is associated with a decrease in deaths from eclampsia in the UK.<sup>21</sup>

In the third stage, it is advisable to avoid ergometrine as it may increase blood pressure and it should be managed with syntocinon. A vaginal delivery is safer than a Caesarean Section if it can be achieved. A regional block is preferred to a general anaesthetic.

### **Postpartum Management**

Pre-eclampsia may occur for the first time after delivery. Up to 44% of eclampsia occur in the postpartum period, and women with pre-eclampsia should be closely monitored for 48 hours following delivery.<sup>22</sup>

Postpartum hypertension may be managed by using beta-blockers, calcium channel antagonists or ACE inhibitors; methyldopa is avoided because it causes depression and possible psychosis in the postnatal period. Blood pressure increases up to 4 days postpartum.

Community review by a healthcare professional is recommended within the first two weeks following discharge, and women with severe hypertension (SBP > 160 mmHg) should be treated urgently.<sup>23</sup> At the 6-week postnatal visit, women should have a blood pressure and urinalysis measurement. The majority will have their medication tailored off by this time as their blood pressure returns to the pre-pregnancy state. However, hypertension in women with severe preeclampsia may take up to six months to resolve. Women with pre-eclampsia have a higher risk of cardiovascular disease in later life.

### **Summary**

The hallmarks of management of hypertensive disorders of pregnancy in the antenatal period are close surveillance and timely delivery. Very high-risk women will benefit

from prophylactic aspirin. Accurate measurement of blood pressure and proteinuria, and the judicious use of antihypertensive therapy are essential to reduce morbidity and mortality. Urgent referral should be made in any suspected cases, even if not typical.

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