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# Hypertension in pregnancy

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## KEYWORDS

Hypertension;  
Human;  
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Preeclampsia;  
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## Summary

Hypertension is a common complication of pregnancy. Maternal and foetal outcomes depend upon the nature of the hypertension affecting the pregnancy, which can range from mild gestational hypertension to severe preeclampsia with its associated multi-systemic complications. Preeclampsia is a leading cause of maternal mortality. The World Health Organization estimates that, worldwide, over 100 000 women die from preeclampsia each year, and the condition has remained one of the leading causes of maternal death in the UK over recent decades. Features of substandard care were shown in 46% of the 14 deaths associated with preeclampsia or eclampsia in the last report on Confidential Enquiries into Maternal Deaths in the UK. Intracranial haemorrhage was the single largest cause of death, reflecting a failure of effective antihypertensive therapy and in particular ineffectual treatment of the raised systolic blood pressure. Although recent research has clarified the underlying aetiology of this condition, this has disappointingly not yet translated into a clinical useful prevention strategy. There is a clear need for greater awareness of the causes and optimal management of this common condition.

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## Introduction

Hypertension is a common disorder affecting 5–7% of all pregnancies. Women who are hypertensive and pregnant must be subdivided into those with chronic hypertension and those with pregnancy-induced or gestational hypertension.

Women with pregnancy-induced hypertension may be subdivided further in that the majority has non-proteinuric pregnancy-induced hypertension, a condition associated with minimal maternal or perinatal mortality/morbidity, whereas a minority has the major pregnancy complication of

preeclampsia. Preeclampsia is associated with significant maternal and perinatal morbidity and mortality. Correctly classifying hypertension is imperative as the aetiology and management of the three conditions are very different.

## Classification

There are a number of confusing definitions of hypertension in pregnancy. The most useful and most widely accepted classification system is based on the system proposed by Davey and MacGillivray (Table 1).

In this review, we will discuss the aetiology, diagnosis, investigation, management and outcomes of pregnancies complicated by these different types of hypertension.

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**Table 1** Classification of hypertension in pregnancy

Gestational hypertension	Gestational hypertension (no proteinuria) Gestational proteinuria (no hypertension) Preeclampsia (proteinuria and hypertension)
Preexisting hypertension and/or renal disease	Chronic hypertension (no proteinuria) Chronic renal disease (proteinuria $\pm$ hypertension) Chronic hypertension with superimposed preeclampsia
Unclassified hypertension and proteinuria	When there is not enough information at the time of presentation to classify

## Diagnosis of hypertension

The definition of hypertension is related to the blood pressure above which there are pathological consequences for both mother and foetus. Blood pressure falls in normal pregnancy, reaching a nadir in the second trimester when the diastolic blood pressure is on average 15 mmHg lower than prepregnancy levels. In the third trimester, the blood pressure rises again, reaching prepregnancy levels by term. Despite this, at any point in pregnancy, the absolute level is the best guide to foetal and maternal prognosis. The level currently adopted is a pressure of 140/90 mmHg. A diastolic blood pressure of 90 mmHg corresponds to the point of inflexion of the curve above which perinatal mortality is significantly increased. Women with untreated chronic hypertension may have a 'normal' blood pressure level, particularly in the first trimester when the normal haemodynamic changes of pregnancy lower their blood pressure to below this cut-off point.

## Measurement of blood pressure

Blood pressure should ideally be measured with the patient either sitting or, if supine, in the left lateral position, with a 30° tilt and the sphygmomanometer at heart level. The International Society for the Study of Hypertension in Pregnancy recommends Korotkoff 5 (K5; the disappearance of sounds) for defining the diastolic blood pressure as it corresponds more closely to the intraarterial pressure and is the most reproducible end-point in pregnancy. K4 (muffling of the sounds) is only used when no K5 exists. Two diastolic blood pressure recordings over 90 mmHg taken over 4 h apart are necessary to exclude transient rises secondary to stress and/or white-coat hypertension.

Many units rely on automated blood pressure recording devices. The most recent report on Confidential Enquiries into Maternal Deaths in the UK has highlighted the fact that the many automated blood pressure monitoring systems systematically underestimate systolic pressure in pre-eclampsia. Manual sphygmomanometers should be used to establish baseline blood pressure as a reference for automated monitoring in hospital for women with pre-eclampsia, unless the automated system has been validated in pregnancy.

## Proteinuria

Hypertension may be associated with proteinuria in 5–15% of cases and is associated with increases in both foetal and

maternal risks. It is in fact the most reliable indicator of foetal morbidity and mortality. The presence of proteinuria without hypertension is usually due to chronic renal disease. The healthy individual normally excretes a small amount of protein in the urine, although protein excretion may increase significantly in pregnancy and up to 0.5 g protein in a 24-h period is accepted as normal.

Proteinuria is normally screened for by the use of reagent strips. However, the concentration of protein in a random urine sample is dependent on several factors, including the volume of urine excreted. A midstream sample of urine may be used for urine analysis, but this is only a guide and may overestimate proteinuria in as many as 50% of samples. Indeed, dipsticks have about a rate of false-positive results of about 25% with trace measurements and 6% positive with +1 measurement. A dipstick reading of +1 (30 mg/dl) is often but not always associated with 300 mg/day proteinuria. False-positive results also occur with contamination from vaginal discharge, skin cleansers and very alkaline urine. In addition, a midstream urine sample should be used. Therefore, a 24-h measurement of protein:creatinine ratio is indicated in suspected cases of preeclampsia or renal impairment to both diagnose and accurately quantify the degree of proteinuria. In order to be of significance, this should contain at least 300 mg protein.

## Chronic hypertension

Chronic hypertension is defined as hypertension preceding pregnancy. Most women of reproductive age do not have an occasion to have their blood pressure taken preconceptionally, so chronic hypertension is often first revealed in the first half of pregnancy. Unlike pregnancy-induced hypertension, however, chronic hypertension does not resolve post-partum. Around 90% cases of chronic hypertension are considered to be essential. Secondary hypertension accounts for approximately 10% of cases, and a summary of the most common causes is listed in [Table 2](#).

## Investigation of the newly diagnosed hypertensive women in the first half of pregnancy

Essential hypertension is a diagnosis of exclusion. In women presenting with hypertension in the first half of pregnancy, it is mandatory to search for an underlying cause, if this has not already been established, as this has a major impact on both antenatal and post-natal management. A full history and clinical examination should be conducted, with particular emphasis on the presence of signs or symptoms

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