Hypertension

The risk of cardiovascular diseases such as stroke and CAD is closely related to levels of BP.

The cardiovascular risks associated with high BP depend on the combination of risk factors such as age, sex, weight, physical activity, smoking, family history, serum cholesterol, diabetes mellitus and pre-existing vascular disease

**Definition of hypertension**

<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic blood pressure (mmHg)</th>
<th>Diastolic blood pressure (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optimal</td>
<td>&lt;120</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Normal</td>
<td>&lt;130</td>
<td>85</td>
</tr>
<tr>
<td>High normal</td>
<td>130–139</td>
<td>85–89</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade 1 (mild)</td>
<td>140–159</td>
<td>90–99</td>
</tr>
<tr>
<td>Grade 2 (moderate)</td>
<td>160–179</td>
<td>100–109</td>
</tr>
<tr>
<td>Grade 3 (severe)</td>
<td>≥ 180</td>
<td>&gt;110</td>
</tr>
<tr>
<td>Isolated systolic hypertension</td>
<td>140–159</td>
<td>&lt; 90</td>
</tr>
<tr>
<td>Grade 2</td>
<td>≥ 160</td>
<td>&lt; 90</td>
</tr>
</tbody>
</table>

**Pathogenesis**

Many factors may contribute to the regulation of BP:

Renal function, peripheral resistance, vessel tone, endothelial dysfunction, autonomic tone, insulin resistance, neurohumoral factors

**Risk factors**
Age, high salt intake, heavy consumption of alcohol, obesity and lack of exercise, Impaired intrauterine growth and low birth weight

In about 5% of cases, hypertension is secondary to a specific disease

**Cause of secondary hypertension**

- Alcohol
- Obesity
- Pregnancy

**Renal disease**
- Parenchymal renal disease
- Particularly glomerulonephritis
- Polycystic kidney disease

**Endocrine disease**
- Phaeochromocytoma
- Cushing’s syndrome
- Primary hyperaldosteronism (Conn syndrome)
- Glucocorticoid-suppressible hyperaldosteronism
- Hyperparathyroidism
- Acromegaly
- Primary hypothyroidism
- Thyrotoxicosis
- Congenital adrenal hyperplasia due to 11β-hydroxylase or 17α-hydroxylase deficiency
- Liddle syndrome
- 11β-hydroxysteroid dehydrogenase deficiency

**Drugs**
- Coarctation of the aorta

**How to measure blood pressure**

- Use a machine that has been validated, well maintained and properly calibrated
- Measure sitting BP routinely, with additional standing BP in older and diabetic patients and those with possible postural hypotension; rest the patient for 2 minutes
- Remove tight clothing from the arm
- Support the arm at the level of the heart
- Use a cuff of appropriate size (the bladder must encompass more than two-thirds of the arm)
- Lower the pressure slowly (2 mmHg per second)
- Read the BP to the nearest 2 mmHg
- Use phase V (disappearance of sounds) to measure diastolic BP
- Take two measurements at each visit
Clinical features

Hypertension is usually asymptomatic until the diagnosis is made at a routine physical examination or when a complication arises.

1. Sometimes clinical features may be observed that can give a clue to the underlying cause of hypertension. These include
   - Radio-femoral delay in patients with coarctation of the aorta.
   - Enlarged kidneys in patients with polycystic kidney disease.
   - Abdominal bruits that may suggest renal artery stenosis.
   - The characteristic facies and habitus of Cushing’s syndrome.

2. Examination may also reveal evidence of risk factors for hypertension, such as central obesity and hyperlipidemia.

3. Other signs may be observed that are due to the complications of hypertension. These include signs of left ventricular hypertrophy, accentuation of the aortic component of the second heart sound, and a fourth heart sound.

Investigations

The objectives of investigations:

- Confirm diagnosis
- Identify contributing factors & any underlying cause
- Assess other risk factors & quantify CV risk
- Detect any complications that are already present
- Identify comorbidity that may influence choice of antihypertensive therapy

Investigations (to all patients)
Urinalysis for blood, protein & glucose.

Blood urea, creatinine & electrolytes.

( Hypokalemia in hyperaldosteronism & diuretics ).

Blood glucose

Serum total & HDL cholesterol.

Thyroid function tests.

12 lead ECG (Left vent. hypertrophy LVH, CAD).

**Specialized investigations (NOT for all patients)**

Chest X ray: cardiomegaly, heart failure, coarctation of the aorta.

Echocardiography: (?LVH)

Renal ultrasound


Plasma renin activity & aldosterone: Aldosteronism

![Cushing’s syndrome](image)
Buffalo hump in cushing syndrome

Xanthelasma in hyperlipidemia
Chronic Kidney Disease (Uremia)

ECG of LVH – Deep S in V1, Tall R in V6 // st depression & T inversion in Lead I, aVL, V5 & V6