

DEFINITIONS

Hypertension:

Abnormal elevation of arterial blood pressure ($\geq 140/90$ mmHg).

Isolated systolic hypertension (ISH):

Systolic BP above 160 mmHg, with a diastolic BP below 90 mmHg.

Resistant hypertension:

BP that remains above goal ($\geq 140/90$ mmHg) in spite of concurrent use of three antihypertensive agents of different classes including diuretic or when BP are controlled with four or more antihypertensive agents.

Hypertensive emergencies:

Sever *symptomatic* and life-threatening hypertension (when systolic BP ≥ 180 mmHg and/or diastolic BP ≥ 120 mmHg).

Hypertensive urgencies:

Severe *asymptomatic* hypertension (when systolic BP ≥ 180 mmHg and/or diastolic BP ≥ 120 mmHg).

Accelerated-malignant hypertension:

Marked hypertension with retinal hemorrhages, exudates, or papilledema.

Hypertensive encephalopathy:

Severe and sudden rises in BP leading to signs of cerebral edema caused by breakthrough hyperperfusion.

White coat hypertension:

When office BP measurement are higher than BP reading during normal daily activities.

Masked hypertension:

Elevated out-of-office BP readings despite normal office readings.

ETIOLOGY

Essential hypertension:

It responsible for more than 95% of cases of hypertension (HT). The pathogenesis of essential hypertension is not clearly understood. It could be related to renal, increase in peripheral vascular resistance and increase sympathetic tone as a primary abnormality. Essential hypertension has a multifactorial etiology including:

Genetic factors: BP tends to run in families in around 50% of the cases.

Fetal factors: Low birth weight is associated with subsequent high BP.

Environmental factors:

- 1/ Obesity and lack of exercise.
- 2/ High salt intake.
- 3/ Alcohol consumption.
- 4/ Smoking
- 5/ Stress. (uncertain)

Humoral mechanisms: The autonomic nervous system, renin-angiotensin and natriuretic peptide are plays a role in the pathogenesis of essential HT.

Insulin resistance: This association called as 'metabolic syndrome'.

Secondary hypertension:

When the blood pressure elevation is the result of a specific and potentially treatable cause. It caused by:

Renal diseases:

These accounts for over 80% of the cases of secondary hypertension, and it include the following:

HYPERTENSION

Dr. Mohammed Hilal Al-Ali

L: 1

- Diabetic nephropathy.
- Chronic glomerulonephritis.
- Adult polycystic disease.
- Chronic tubulointerstitial nephritis.
- Renovascular disease.

Endocrine causes: These include:

- Primary hyperaldosteronism (Conn's syndrome).
- Adrenal hyperplasia.
- Pheochromocytoma.
- Cushing's syndrome.
- Acromegaly.
- Hyperparathyroidism.
- Primary hypothyroidism.
- Thyrotoxicosis.

Congenital cardiovascular causes:

- Coarctation of the aorta.

Drugs:

e.g. Oral contraceptives pills, anabolic steroids, corticosteroids and non-steroidal anti-inflammatory drugs.

Pregnancy: (pre-eclampsia)

MEASUREMENT OF BLOOD PRESSURE

- 1) Office or clinic BP measurement.**
- 2) Home BP monitoring (HBPM).**
- 3) Ambulatory BP monitoring (ABPM).**

Office or clinic BP monitoring:

Instruction during office BP measurement

- Avoid smoking and coffee consumption before BP measurement.
- Allow the patient to sit for 3-5 minutes before BP measurement.
- Use a machine that has been validated and well calibrated.
- Measure sitting or supine BP routinely.
- Standing BP in elderly, diabetic and for any patients with possible postural hypotension.
- Remove tight clothing from the arm.
- The cuff should be at the level of the heart whatever the position.
- Bladder size should cover at least 2/3 of the arm.
 - ✓ Normal diameter 12-13 cm wide & 35 cm long.
 - ✓ Smaller diameter causing overestimated BP (obese patients).
 - ✓ Larger diameter causing underestimated BP (thin patients).
- Lower the mercury slowly (2 mmHg/ second).
- Read the BP to the nearest 2 mmHg.
- Use phase V (disappearance of sound) to measure diastolic BP.
- Take two measurements at each visit 1-2 minutes apart.
- Measure BP in both arms at first visit to detect possible difference.
- If BP differs between the 2 arms, the higher reading is taken.

Home BP monitoring:

- BP taking at home by patients using semi-automatic devices.
- The machine used should be well calibrated and regularly compared with mercury sphygmomanometers.
- Advantages :
 - ✓ More informative regarding follow up drugs effects.
 - ✓ Improve patient's adherence to therapy.

HYPERTENSION

Dr. Mohammed Hilal Al-Ali

L: 1

- Disadvantages:
 - ✓ Patient becomes more obsessive & anxious regarding his BP readings.
 - ✓ May induce self-modification of the treatment regime.

Ambulatory BP monitoring:

- Automatic BP measurement obtained over 24 hours or more.
- Correlate more with evidence of target organ damage than casual measurement.
- Patient considers hypertensive when 24 hours BP \geq 130/80 mmHg.
- Indications:
 - ✓ White coat HT.
 - ✓ Masked HT.
 - ✓ Considerable variability of office BP over the same or different visits.
 - ✓ Autonomic, postural, post prandial and drug induced hypotension.
 - ✓ Identification of resistant HT.
 - ✓ Suspicion of nocturnal HT.

CLASSIFICATION OF HT

The new classification according to joint national committee 8 (JNC8) are as the following:

Classification	Systolic BP (mmHg)		Diastolic BP (mmHg)
<i>Normal</i>	< 120	and	< 80
<i>Prehypertension</i>	120 - 139	or	80 – 89
<i>Stage 1 HT</i>	140 - 159	or	90 – 99
<i>Stage 2 HT</i>	\geq 160	or	\geq 100
<i>Isolated systolic HT 1</i>	140 - 159	and	< 90
<i>Isolated systolic HT 2</i>	\geq 160	and	< 90

RISK FACTORS

Risk factors for developing hypertension can be classified as the following:

A) Modifiable risk factors:

- 1/ Overweight or obesity.
- 2/ Sedentary lifestyle.
- 3/ Unhealthy diet (high sodium intake).
- 4/ Excessive alcohol intake.
- 5/ Stress.
- 6/ Sleep apnea.
- 7/ Diabetes.

B) Non modifiable risk factors:

- 1/ Age.
- 2/ Race (more in Black and Japanese).
- 3/ Family history.

TARGET ORGAN DAMAGE

The adverse effects and complications of hypertension are mainly involving the following organs: the CNS, heart, retina, kidneys and blood vessels.

((1)) Central nervous system:

- 1) Stroke.
 - a) Cerebral hemorrhage.
 - b) Cerebral infarction.
- 2) Transient ischemic attack (TIA).
- 3) Subarachnoid hemorrhage.
- 4) Hypertensive encephalopathy.

((2)) Heart:

- 1) Left ventricular hypertrophy (LVH).
- 2) Coronary artery disease (CAD).
 - a) Angina.
 - b) Myocardial infarction (MI).
- 3) Heart failure (HF).
 - a) Systolic dysfunction.
 - b) Diastolic dysfunction.
- 4) Atrial fibrillation (AF).
- 5) Ventricular arrhythmias.

((3)) Retina:

Hypertensive retinopathy:

- 1) Grade 1: Arteriolar thickening, tortuosity and increased reflectiveness ('silver wiring').
- 2) Grade 2: Grade 1 plus constriction of veins at arterial crossings ('arteriovenous nipping').
- 3) Grade 3: Grade 2 plus evidence of retinal ischemia (flame-shaped or blot hemorrhages and 'cotton wool' exudates).
- 4) Grade 4: Grade 3 plus papilledema.

((4)) Kidneys:

- 1) Proteinuria.
- 2) Nephrosclerosis.
- 3) Chronic kidney disease (CKD).

((5)) Blood vessels:

- 1) Carotid atheroma.
- 2) Aortic aneurysm.
- 3) Aortic dissection.