



# HYPERTENSION AND ITS MANAGEMENT

# DEFINITION

- Hypertension might be defined as that level of blood pressure at which the institution of therapy reduces blood pressure–related morbidity and mortality.<sup>(1)</sup>

or

- Hypertension is defined as systolic blood pressure  $\geq 140$ mm Hg or diastolic blood pressure  $\geq 90$  mmHg <sup>(2)</sup>

# Or

- "a progressive cardiovascular syndrome arising from complex and interrelated etiologies," which features early markers that are "often present before blood pressure elevation is sustained." (3)

# Prevalence

- Hypertension afflicts 38 & 64% of men & 37&74% of women between the age of 45 to 74
- Risk increases sharply with age <sup>(8)</sup>

# Risk factors <sup>(4)</sup>

- Genetics
- Behavioral
- Environmental factors

# JNC-VII Classification of blood pressure <sup>(4)</sup>

<b><i>Blood Pressure Classification</i></b>	<b><i>Systolic (mmHg)</i></b>	<b><i>Diastolic (mmHg)</i></b>
Normal	<120	and <80
Prehypertension	120-139	or 80-89
Stage 1 hypertension	140-159	or 90-99
Stage 2 hypertension	$\geq 160$	or $\geq 100$

# Pathophysiology <sup>(1,5)</sup>

$$BP = CO \times TPR$$

Factors contributing to these hemodynamic alterations include:

- Susceptibility to renal retention of excess sodium
- Sympathetic system hyperactivity
- RAAS
- Endothelial cell dysfunction

# Causes <sup>(4)</sup>

A) Essential hypertension (primary or idiopathic)  
80–95% of hypertensive patients

## B) Secondary Causes

- Drug-induced or related causes
- Chronic kidney disease
- Primary aldosteronism
- Chronic steroid therapy and Cushing's syndrome
- Pheochromocytoma
- Coarctation of the aorta
- Obstructive sleep apnea



# Other variants

- White coat hypertension- transient & persistent elevation in BP when it is taken in physician's office
- Isolated systolic hypertension- SBP  $\geq$  140 & DBP  $\geq$  90mm Hg
- Resistant hypertension- Hypertension that remains above 140/90 mmHg despite the use of three antihypertensive drugs in a rational combination at full doses and including a diuretic is known as 'resistant'.

# Why is hypertension a problem? <sup>(4)</sup>

- Increased risk for CVD
- Heart
  - Left ventricular hypertrophy
  - Heart failure

# Contd...

- Brain
  - Stroke or transient ischemic attack
- Chronic kidney disease
- Peripheral arterial disease
- Retinopathy

# Treatment

## GOALS

- Treating SBP and DBP to targets that are  $<140/90$  mmHg is associated with a decrease in CVD complications.
- In patients with hypertension and diabetes or renal disease, the BP goal is  $<130/80$  mmHg.

# Lifestyle Modifications <sup>(1)</sup>

- Weight reduction - Attain and maintain BMI < 25 kg/m<sup>2</sup>
- Adopt DASH eating plan -Diet rich in fruits, vegetables, and low-fat dairy products with reduced content of saturated and total fat
- Dietary sodium reduction - < 6 g NaCl/d
- Moderation of alcohol consumption - 2 drinks/day in men and 1 drink/day in women

# Pharmacologic Treatment (1)

## Anti hypertensive drugs

- Thiazide diuretics
- Loop diuretics
- Potassium-sparing diuretics
- Aldosterone receptor blocker
- BBs
- ACEIs
- Angiotensin II antagonist
- CCBs



## LIFESTYLE MODIFICATIONS

Not at Goal Blood Pressure (<140/90 mmHg)  
(<130/80 mmHg for patients with diabetes or chronic kidney disease)

## INITIAL DRUG CHOICES

Without Compelling Indications

With Compelling Indications

**Stage 1 Hypertension**  
(SBP 140–159 or DBP 90–99 mmHg)

Thiazide-type diuretics for most. May consider ACEI, ARB, BB, CCB, or combination.

**Stage 2 Hypertension**  
(SBP  $\geq$ 160 or DBP  $\geq$ 100 mmHg)

Two-drug combination for most (usually thiazide-type diuretic and ACEI, or ARB, or BB, or CCB).

**Drug(s) for the compelling indications**  
(See table 8)

Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed.

## NOT AT GOAL BLOOD PRESSURE

Optimize dosages or add additional drugs until goal blood pressure is achieved. Consider consultation with hypertension specialist.

# CARDIAC REHABILITATION



# Pre exercise screening (2), (9)

## Medical evaluation

- Blood pressure monitoring
- Individual & family history
- Physical examination
- Assessment of major risk factors
- Target organ damage
- CVD complications



# Exercise testing <sup>(2)</sup>

- For diagnosing and managing hypertension
- GXT is usually recommended for adults over 40 yrs of age
- Borderline resting BPs
- Normal response- progressive increase in SBP typically 8 to 12 mm Hg/MET, DBP usually decreases or remains unchanged

# Contd....

- BP value exceeding 180/120 mm Hg at 50% of max handgrip & treadmill values exceeding 180/80 mm Hg at 50% intensity or 220/80 mm Hg at 100% intensity are considered hypertensive responses
- Termination – 250/115mm Hg

# Exercise prescription

- Frequency : endurance training frequency between 3 to 7 days/week
- Intensity : aerobic training : moderate-40 to 70 %  $VO_{2max}$   
resistance training at 30 to 50 % of 1 RM
- Duration : 30 to 60 min continuous or intermittent exercise
- Type : primarily aerobic activity supplemented by resistance exercise

# Contd..

- Aerobic training- any activity that uses large muscle groups, can be maintained continuously, and is rhythmical e.g. walking, jogging, running, or cycling
- Resistance training-light weight lifting
- This leads to a decrease of 6 to 8 mm Hg in BP in SBP & DBP

# Precautions

- Monitor BP before, during and after exercise
- Extend the warm up and cool down period to prevent hypotension upon cessation of activity
- Use borg scale
- Adequate fluid replacement
- For individual with documented episodes of ischemia during exercise, the exercise intensity should be set ( $\geq 10$  beats·min<sup>-1</sup>) below the ischemic threshold.
- Avoid the Valsalva maneuver during resistance training

# Mechanism

- $MAP = CO \times TPR$
- Decrease in TPR (increase in  $r$  or greater distensibility of vasculature)
  - Decreased sympathetic and increased parasympathetic tone
  - Decreased HR
  - Lower blood catecholamines and plasma renin activity
- Due to:
  - neurohumoral & structural changes
  - altered vascular responsiveness to vasoactive stimuli

# Hypertension in pregnancy <sup>(10)</sup>

It is a chronic medical problem & is associated with increased maternal and perinatal mortality and morbidity

It can be:

- Gestational hypertension
- Pre-eclampsia
- Chronic hypertension



# Treatment <sup>(7)</sup>

- Pharmacological agents

ACE inhibitors & angiotensinII receptor blocker are moderately terotogenic & fetotoxic – Contraindicated

Labetolol- Ist choice

Methyldopa, nifidipine – Alternative

low-dose aspirin, reduce the risk of pre-eclampsia by 10% in high risk women

- Dietary supplementation
- Lifestyle modification.

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