

Epidemiology of Hypertension

Hypertension - Statistics

- Global prevalence (2024): 1.4 billion adults aged 30–74 (≈33% of population)
 - Distribution: 2/3 live in low- & middle-income countries
 - Regional prevalence: WHO Eastern Mediterranean Region highest at 38%
 - 2015 data: 1 in 4 men & 1 in 5 women had hypertension
 - Control: <20% of hypertensives have their BP under control
 - Significance: Major cause of premature death globally
 - Global NCD target: Reduce hypertension prevalence by 33% between 2010–2030
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Disease Burden

- High BP affects ~40% of adults ≥ 25 yrs
 - Lifetime risk: Normotensive at 55 yrs \rightarrow 40% risk of developing hypertension
 - Mortality: 7.5 million deaths annually ($>12\%$ of all deaths)
 - DALYs: 57 million ($\approx 3.7\%$ of total)
 - EMRO (Eastern Mediterranean) region: 2 out of 5 adults affected
 - Complications: Heart attack, stroke, kidney failure, blindness, other vascular conditions
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Rule of Halves

Concept: Only a fraction of hypertensives are detected and treated adequately

Normotensive \rightarrow $\frac{1}{2}$ Undiagnosed hypertensives \rightarrow $\frac{1}{2}$

Diagnosed but untreated \rightarrow $\frac{1}{2}$ Diagnosed & treated \rightarrow $\frac{1}{2}$

Inadequately treated \rightarrow $\frac{1}{2}$ Adequately treated

Definition (WHO)

Hypertension:

- Systolic BP ≥ 140 mmHg and/or Diastolic BP ≥ 90 mmHg

Types:

- Primary (Essential): High BP with no identifiable medical cause
- Secondary: Due to other medical conditions (kidney, heart, arteries, endocrine)

BP Measurement & Errors

WHO Recommended Protocol:

- Sit, not supine
- Use consistent arm (right or left)
- Measure ≥ 3 times over ≥ 3 min, record lowest reading

- Single high reading \neq diagnosis \rightarrow requires observation

Errors:

- Observer error
- Instrumental error
- Subjective error

Risk Factors

Non-Modifiable	Modifiable
Age	Obesity
Sex	Salt intake
Genetics	Saturated fat intake
Ethnicity	Dietary fiber

	Alcohol
	Heart rate
	Physical inactivity
	Environmental stress
	Socio-economic status

Prevention Strategies

Primary Prevention

Goal: Reduce disease incidence by lowering risk factors

Population Approach:

- Target entire population → reduce average BP → reduce CV complications

Methods:

- Nutrition & DASH diet
- Exercise promotion
- Behavioral changes & self-care
- Health education

High-Risk Strategy

- Prevent BP from reaching treatment threshold
- Identify at-risk individuals: Family history, BP tracking

DASH Diet Plan

Dietary Approaches to Stop Hypertension (DASH)

- Focus: High fruits & vegetables, low-fat dairy, low saturated & total fat, cholesterol
- Limit alcohol & energy intake to body needs

Daily/Weekly Servings:

- Grains: 7-8
- Vegetables: 4-5
- Fruits: 4-5
- Low-fat dairy: 2-3
- Meat/poultry/fish: ≤ 2
- Fats & oils: 2-3
- Nuts/seeds/beans: 4-5 times/week
- Sweets: limited, low-fat

Impact:

- Comparable to mild antihypertensive therapy
- Population-wide BP reduction \rightarrow \downarrow CHD 15%,
 \downarrow Stroke 27%
- High-risk benefit: African Americans, elderly

Secondary & Tertiary Prevention

- Secondary: Early diagnosis & prompt treatment
- Tertiary: Limit disability & rehabilitation

Key Components:

- Early detection & screening for high-risk groups
 - Lifestyle interventions
 - Medication & therapy as needed
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Pakistan - National Cancer Control Program Model (Applied to NCDs)

Steps:

1. Assess magnitude (incidence, prevalence, mortality)
2. Evaluate strategies for control
3. Set priorities & measurable objectives

Control Measures:

- Primary: Tobacco control, lifestyle education, vaccination
- Early diagnosis & screening
- Therapy: Surgery, radiotherapy, essential drugs

- Palliative care: Pain & symptom management, home care
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Flowchart - Hypertension Prevention Approach

Primary Prevention → Reduce risk factors (diet, obesity, inactivity, salt/alcohol) → Population-wide education & lifestyle interventions → DASH diet + exercise

High-Risk Strategy → Identify at-risk individuals → Monitor BP → Early intervention

Secondary Prevention → Early diagnosis → Prompt treatment → Prevent complications

Tertiary Prevention → Manage complications → Rehabilitation → Improve quality of life

Exam Tips:

- Use tables & flowcharts for memorization

- Always mention risk factors, primary/secondary prevention, complications
 - DASH diet & lifestyle strategies are frequently asked points
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Tracking of Blood Pressure

- Definition: Phenomenon of persistence of rank order of BP over time
 - Meaning: Individuals with initially high BP tend to remain at higher levels into adulthood
 - Important for identifying high-risk groups early
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Secondary Prevention of Hypertension

Goal: Detect and control high BP in affected individuals

Components:

1. Early case detection → Screening followed by care

2. Treatment → Achieve BP <140/90 mmHg

3. Patient compliance

- Adherence to medication, diet, and lifestyle changes
- Improved by health education of patient, family, and community

Flowchart - Secondary Prevention:

Screening → Diagnosis → Treatment → Patient Compliance → BP Control → Reduced Complications

Levels of Prevention in Hypertension

Level	Focus	Examples
Primary	Reduce incidence	Lifestyle modification, DASH diet, exercise, population education
Secondary	Early detection & treatment	Screening, medication adherence, patient education

Tertiary	Complication management	Rehabilitation, management of organ damage, quality of life
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Epidemiology of Stroke

Definition (WHO)

Stroke:

“Rapidly developed clinical signs of focal disturbance of cerebral function; lasting >24 hours or leading to death, with no apparent cause other than vascular origin.”

- Excludes: TIA, subdural hemorrhage, tumors, poisoning, trauma
 - Transient Ischaemic Attack (TIA): lasts <24 hours
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Pathophysiology ⚡

Cerebral disturbance caused by:

- Artery stenosis
- Artery occlusion
- Artery rupture

Manifestations (depend on site & extent):

- Motor: Hemiplegia, paraplegia, monoplegia, multiple paralysis
 - Sensory: Nerve paresis, sensory impairment
 - Speech: Aphasia, dysarthria
 - Others: Coma, cognitive dysfunction
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Stroke Classification 📁

A. Ischemic Stroke (blockage) 🧩

- Lacunar infarct
- Carotid circulation obstruction

- Vertebro-basilar obstruction

B. Hemorrhagic Stroke (bleeding)

- Spontaneous intracerebral hemorrhage
- Subarachnoid hemorrhage
- Intracranial aneurysm
- Arteriovenous malformations (AVMs)

Flowchart - Stroke Classification:

Stroke →

- Ischemic → Lacunar infarct / Carotid obstruction / Vertebro-basilar obstruction
- Hemorrhagic → Intracerebral hemorrhage / Subarachnoid hemorrhage / Aneurysm / AVM

Etiology & Risk Factors

Modifiable:

- Hypertension 
- Diabetes

- Smoking 🚬
- Dyslipidemia
- Obesity
- Physical inactivity

Non-modifiable:

- Age >55 yrs
- Male sex
- Family history
- Genetic predisposition

Stroke Symptoms & Warning Signs 🚨

- Sudden weakness/numbness on one side
- Difficulty speaking or understanding speech
- Sudden vision problems
- Loss of balance or coordination
- Severe headache with no known cause
- TIA: Transient episodes of above symptoms (<24 hrs)

Mnemonic (FAST) for quick recognition:

- F → Face drooping
 - A → Arm weakness
 - S → Speech difficulty
 - T → Time to call emergency
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Stroke Prevention

Primary Prevention:

- Control BP, diabetes, cholesterol
- Quit smoking & alcohol
- Regular physical activity
- Healthy diet (DASH, Mediterranean)

Secondary Prevention:

- Detect high-risk individuals → Treat risk factors
- Antiplatelet therapy (aspirin, clopidogrel)
- Carotid interventions if needed

Tertiary Prevention:

- Rehabilitation → Physiotherapy, occupational therapy
- Prevent recurrence → Lifestyle, medication adherence
- Improve quality of life → Home care & support

Flowchart - Stroke Prevention:

Risk Factor Control → Early Detection → Medication /
Surgery → Rehabilitation → Reduced Recurrence

 Exam Tips:

- Always classify stroke ischemic vs hemorrhagic
 - Include risk factors, primary/secondary prevention, and symptoms
 - Use FAST mnemonic for short-answer questions
 - Flowcharts help memorize classification & prevention
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-> The End <-