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Healthy Heart Beat : Healthy Blood Pressure. Control your Blood Pressure : Control your life.

The term Hypertension (HTN) is a condition in which the Blood Pressure (BP) (the force of the Blood against the Artery walls) is higher than the average found in a normal healthy human being.

The disease develops over a period of several years. Narrowed arteries cause more resistance and increase in BP.

HTN is due to the high force exerted by circulating blood against the walls of the arteries.

BP is written as two numbers. The first (systolic) number represents the pressure in blood vessels when the Heart contracts. The second (diastolic) number represents the pressure in the vessels when the heart rests between the two beats. This force can damage blood vessels & lead to heart attack, brain stroke, kidney damage or nerve damage.

Most people with HTN do not exhibit any symptoms or sign, even if BP readings reach dangerously high levels.

Never neglect a headache or a bleeding from nose or shortness of breath, which could be because of high BP.

Types of hypertension:

1.**Primary hypertension :** High blood pressure that is caused without any specific disease is called primary or essential hypertension. It can result from multiple factors, including blood plasma volume and the activity of hormones that regulate blood volume and increased pressure in blood vessels. It is also influenced by environmental factors like stress and lack of exercise.

2.**Secondary hypertension :** If high blood pressure is caused due to another condition e.g. diseases of Kidney, Diabetes, Obstructive Sleep Apnea, Cushing syndrome, Hyperthyroidism, Pregnancy, Obesity, etc.

Definition of BP Measurement according to the guidelines issued by the American Heart Association (AHA) in 2017:

BP Measurement	Definition
SBP	First Korotkoff sound
DBP	Fifth Korotkoff sound
Pulse Pressure	SBP minus DBP
Mean arterial pressure	DBP plus one third pulse pressure
Mid-BP	Sum of SBP and DBP, divided by 2

	Systolic BP (mmHg)	Diastolic BP (mmHg)
Normal blood pressure	Less than 120	Less than 80
Elevated	Between 120 and 129	Less than 80
Stage 1 hypertension	Between 130 and 139	Between 80 and 89
Stage 2 hypertension	≥ 140 mm Hg	≥ 90 mm Hg
Hypertensive crisis	Over 180	Over 120

BP is taken as average of ≥2 careful readings obtained on ≥ 2 occasions.

Risk factors :

- **Age.** Until about age 64, HTN is more common in men. Women are more likely to develop HTN > 65 years age .
- **Race.** Serious complications are more common in people of African heritage and occur at an earlier age than in Whites.
- **Family history.** High blood pressure tends to run in families.
- **Being overweight or obese.** The more you weigh, the more blood you need, to supply oxygen and nutrients to the tissues. As the amount of blood blow through your blood vessels increases, so does the pressure on your artery walls.
- **Not being physically active** increases the risk of being overweight and tend to have higher heart rates. The higher the heart rate, heart must work harder with each contraction and stronger the force exerted on the arteries.
- **The chemicals in tobacco** can damage the lining of Artery walls. This can cause the arteries to narrow and increase risk of heart disease. Secondhand smoke can also increase the heart disease risk.
- **Too much salt (Sodium) in diet** can cause body to retain fluid, which increases the blood pressure.
- **Less Potassium in diet** or loss of Potassium due to dehydration leads to Sodium build up in blood culminating in HTN.
- **Having more than one drink a day for women and more than two drinks a day for men may affect blood pressure.**
- **High Level of Stress** can lead to a temporary increase in BP.

Common CVD Risk Factors in Patients with Hypertension :

Modifiable Risk Factors	Relatively Fixed Risk Factors
Current cigarette smoking, second hand smoking	Chronic Kidney Disease
Diabetes Mellitus	Family history
Dyslipidemia/ hypercholesterolemia	Increased age
Overweight/obesity	Low socioeconomic/educational status
Physical inactivity/low fitness	Male gender
Unhealthy diet	Obstructive Sleep Apnoea Syndrome

Investigation of all patients (after 9 to12 hour fasting) : Hematocrit, Blood Urea, Serum Electrolytes, Serum Calcium, Creatinine or corresponding estimated Glomerular Filtration Rate (GFR), Blood Glucose, Lipid Profile, that includes High-Density Lipoprotein Cholesterol and Low-Density Lipoprotein Cholesterol, Triglycerides Urinalysis for Blood, Protein and Glucose, 12-lead ECG.

Investigation of selected patients : CXR PA View, Ambulatory BP, Renal Ultrasound, Renal Angiography, Urinary Catecholamines, Urinary Cortisol & Dexamethasone Suppression Test, Plasma Renin activity, Aldosterone.

Management : For some, lifestyle changes are sufficient to control BP. Others require medication to control BP. **Develop strategies** to manage unavoidable stress. Do at least 150 min of moderate aerobic exercise or 75 min of vigorous-intensity exercise at least 5 days a week (walking, jogging, cycling or swimming).

A. Primary prevention and Dietary Approaches to Stop HTN (DASH) recommendations :

1. **Healthy diet**:
   - Promoting a healthy lifestyle with emphasis on proper nutrition for infants and young people;
   - Eating Foods rich in Potassium, Calcium, Magnesium, Fiber, and Protein
   - Reducing salt intake to less than 5 g of salt per day (just under a teaspoon) and less cholesterol.
   - Eating five servings of fruit and vegetables per day;
   - Reducing Saturated, Trans fats, total fat intake, full-fat dairy products and tropical oils e.g. palm kernel and palm oils.
   - Limited intake of alcohol, pickles, *pappad*, frozen foods, ready to eat foods, bakery products (bread, biscuits), packaged foods, sauces.
2. **Limit intake of Alcohol** to no more than one standard drink per day, sugar- sweetened beverages, sweets.
3. **Regular moderate-intensity dynamic aerobic exercise** for children and young people for 30 minutes.
4. **Maintaining a normal body weight**: every 5 kg of excess weight lost can reduce SBP by 2 to 10 points.
5. **Stopping tobacco use** and exposure to tobacco products.
6. **Managing stress in healthy ways** such as through meditation, physical exercise and positive social contact.

B. Secondary prevention : The goal is to detect and control HTN thereby reducing the risk of complications.

Early case detection by regular checks up of BP : If HTN is detected early it is possible to minimize the risk of complications e.g. heart failure, stroke and kidney failure. Self-care is important for all but it is particularly so for people who have limited access to health services due to geographic, physical or economic reasons.

- **The aim of treatment** should be to obtain BP below 140/90 mmHg and ideally BP of 120/80 mmHg.
- **Patient compliance** (in terms of taking medicine, following diets and other life style changes) should be improved through information, education and communication (IEC) of patients, families and community.

Key steps for BP Measurements & Instructions on Home Blood Pressure Monitoring (HBPM) procedures:

Steps	Key steps for proper BP Measurement	Specific Instructions
Step 1	Properly prepare the patient	**1. Make Patient relax on chair and not on sofa (legs uncrossed, back straight) for >5 min.** **2. Avoid caffeine, exercise and smoking for 30 min before measurement.** **3. Ensure patient has emptied the bladder.** **4. Patient and observer should not talk during rest period or during measurement.** **5. Remove all clothing covering the location of cuff placement.** **6. Measurements made while the patient is sitting or lying on an examining table do not fulfil these criteria.** 7. **Measurements taken on the first day are discarded and the average value of all the remaining measurements is taken to confirm diagnosis.**

Steps	Key steps for proper BP Measurement	Specific Instructions
Step 2	Use proper technique for BP measurements	**1. Use BP measurement device that has been validated and ensure that the device is calibrated periodically.** **2. Support the patient's arm (e.g., resting on a table/desk) with upper arm at Heart level.** **3. Position the middle of the cuff on the patient's upper arm at the level of the Right Atrium (the midpoint of the sternum).** **4. Bottom of cuff should be placed directly above Antecubitan Fossa (bend of elbow).** **5. Use the correct cuff size, such that the bladder encircles 80% of the arm and note if a larger or smaller-than-normal cuff size is used.** **6. Either the stethoscope diaphragm or bell may be used for auscultatory readings.**
Step 3	Take the proper measurements needed for diagnosis and treatment of elevated BP/hypertension	**1. At first visit, record BP in both arms. Use the arm that gives the higher reading.** **2. Separate repeat measurements by 1–2 min. in morning before taking medication and in evening before dinner.** **3. For Auscultatory determinations, use palpated estimate of Radial Pulse obliteration pressure to estimate SBP. Inflate the cuff 20–30 mm Hg above this level for auscultatory determination of the BP level.** **4. For auscultatory readings, deflate the cuff pressure 2 mm Hg per second and listen for Korotkoff sounds.**
Step 4	Properly document accurate BP readings	**1. If using auscultatory technique, record SBP and DBP as onset of first Korotkoff sound and disappearance of all Korotkoff sounds respectively using the nearest even number.** **2. Note the time of most recent BP measurements taken before medication.**
Step 5	Average the readings	**Use an average of ≥ 2 readings obtained on ≥ 2 occasions to estimate the level of BP.**
Step 6	Provide BP readings	**Provide patients the SBP/DBP readings both verbally and in writing.**

For HBPM Patient training should occur under medical supervision & include :

Information about hypertension	Selection of equipment	Acknowledgment that individual BP readings may vary substantially	Interpretation of results

Different types of devices used to measure BP : Electronic, Mercury and Aneroid Devices. Auscultatory devices (Mercury, Aneroid) are not useful for HBPM because patients rarely master the technique.

- Monitors with provision for storage of readings in memory are preferred. Use appropriate cuff size to fit the arm.
- If differences of Left/right arm are significant, instruct patient to measure BPs in the arm with higher readings.

WHO recommendations regarding Diagnosis :

1. Use affordable and reliable electronic devices that have the option to select manual readings. Semi-automatic devices enable manual readings to be taken when batteries run down.
2. Mercury devices should be phased out in favour of electronic devices as mercury is toxic material.
3. Aneroid devices such as Sphygmomanometers should be used only if they are calibrated every six months.

Corresponding Values of SBP/DBP for Clinic, HBPM, Daytime, Night time and 24-Hour ABPM Measurements :

Clinic	HBPM	Daytime ABPM	Night time ABPM	24-Hour ABPM
120/80	120/80	120/80	100/65	115/75
130/80	130/80	130/80	110/65	125/75
140/90	135/85	135/85	120/70	130/80
160/100	145/90	145/90	140/85	145/90

ABPM = Ambulatory Blood Pressure Monitoring; BP = Blood Pressure; DBP = Diastolic Blood Pressure, HBPM = Home Blood Pressure Monitoring and SBP = Systolic Blood Pressure.

Sd/-
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