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## EARLY DIAGNOSIS OF HYPERTENSION

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### Commentary Article

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### INTRODUCTION

Hypertension is caused due to the raise in blood pressure. It means that the blood is forced up against the wall of blood vessel. When the blood pressure is high, the harder the heart has to pump.

Blood Pressure is expressed by two measurements in arterial system [1];

- 1) Systolic Pressure - maximum pressure, left ventricle is contracted
- 2) Diastolic Pressure - minimum pressure, left ventricle is almost relaxed prior to next contraction

#### EPIDEMIOLOGY:

Nearly 1 billion people of the population had hypertension. It was common in both developed and undeveloped countries. Hypertension is more common in men and in those of low socio-economic status. Now days, blood pressure rates are more in children and adolescents.

It cause damaged to different organs and leads to cause illness to other organs such as renal failure, aneurysm, heart failure, stroke, heart attack [2-5].

Normal Blood Pressure;

- 100-140mm Hg - Systolic Pressure
- 60-90mmHg - diastolic Pressure

Initially it does not show any symptoms but sustained hypertension will cause major risk for coronary heart diseases, heart strokes chronic kidney diseases [6].

## **SIGNS AND SYMPTOMS:**

- 1) Head ache (at the back of the head particularly in the morning)
- 2) Lightheadedness
- 3) Vertigo
- 4) Tinnitus (hissing sound in the ears)
- 5) Altered vision (fainting episodes)
- 6) Changes in the optic fundus

## **HYPERTENSIVE CRISIS**

It is caused by the increase blood pressure equal to or greater than a systolic 180 and diastolic of 110 termed as malignant or accelerated hypertension. Visual deterioration and more likely to report headaches, breathless ness due to heart failure. When there is damage to one or more organs, an hypertensive emergency is diagnosed [7-9].

8-10% hypertension occurs in pregnancies. Two blood pressure measurements in six hours apart of greater than 140/90 mmHg are considered as a diagnostic of hypertension n pregnancy. They have pre-existing primary hypertension but high blood pressure in pregnancy leads to indicate the first sign of pre-eclamsia [10,11].It shows increase in blood pressure and presence of protein in urine. It occasionally progress to a life threatening condition known as eclampsia and has several complications which includes vision loss, brain swelling, seizures or convulsions, pulmonary edema and disseminated intravascular coagulation.

In children, failure to thrive, seizures, irritability, lack of energy and difficulty in breathing can be seen in neonates and young infants.

## **CAUSES:**

It is caused by two types mainly;

- 1) Primary Hypertension
- 2) Secondary Hypertension

**Primary Hypertension** occurs from the complex interaction of genes and also due to the changes in the environmental factors. It rises with aging and the risk in layer life is considerable. The intake of salt raises in the salt sensitive individuals, lack of exercisers, stress, obesity and depression. Low birth weight, maternal smoking and lack of breast feeding may be risk factors for hypertension.

**Secondary Hypertension** occurs mostly due to the diseases in the kidney. Due to the changes in the endocrine gland it leads to cause Cushing's syndrome, thyroidism, acromegaly, hyperaldisteronism, pheochromocytoma [12-16].

### **Others include;**

- Isolated systolic hypertension  
Increased systolic blood pressure at normal or decreased diastolic BP  
Pseudo hypertension ← rigid arteries in old age
- white coat hypertension – induced by stress at physical examination
- masked hypertension - false finding of normal blood pressure during the examination; opposite of white coat hypertension

### **PATHOPHYSIOLOGY:**

It mainly explains about the causes responsible for the hypertension. It is classified by the essential hypertension and secondary hypertension [17].90-95% is essential hypertension which tells that no medical cause is found. Secondary hypertension indicates that it is caused by the specific condition such as chronic kidney disease, narrowing of the aorta, kidney arteries and endocrine disorders [18,19].

Cardiac output and peripheral resistance are two determinants of arterial pressure. Cardiac output is determined by the stroke volume and heart rate .stroke volume which is related to the myocardial contractility and to size of vascular compartment i.e. auricles and ventricles of left and right compartments [20-22].

Peripheral resistance is determined by the changes in the functional and anatomic of small arteries and arterioles.

#### **1) Genetics:**

Due to the inheritance and changes in the gene mutations leads to cause increase in the blood pressure [23].

#### **2) Autonomic nervous system:**

It plays an important role in maintaining cardiovascular homeostatic through the volume, pressure and chemoreceptor signals. It is regulated by the peripheral blood vessels and by the kidney function which in turn affects the cardiac output, vascular resistance and retention of fluid.

When the sympathetic nervous system is increased, the rise in blood pressure leads to cause hypertension. Mainly it involves alterations in the baroreflex and chemo reflex pathways at both peripheral and central system [24 -26].

#### **3) Renin-angiotensin-aldosterone system:**

If the disturbance in the extra cellular fluid volume, peripheral resistance is caused then it leads to hypertension. Increase levels in Renin (circulating enzyme) in blood leads to cause hypertension which is normally in adult human is 1.98-24.6ng/L in the upright position [27].

#### **4) Endothelium dysfunction:**

Local nitric oxide and endothelin secreted by the endothelium are major regulators blood vessels. Any changes in the balance between the vasodilators and vasoconstriction leads to changes in the endothelium and increase in blood flow leads to cause hypertension [28-30].

### **Diet to be controlled for high blood pressure [31-35];**

1) Track what you eat:

People have to aware about how many calories they eat and drink each day.

2) Avoid Salt:

High intake of sodium diet elevates the blood pressure. Select the foods that have 5% or less of the daily value of sodium and avoid food that has 20% of sodium. Avoid canned foods, lunch meats and fast foods

3) Know what to eat:

It helps to control blood pressure Potassium, magnesium and fiber may help. Friuts and vegetables are low in sodium content.

### **DIAGNOSIS**

It is diagnosed on the basis of persistently increase blood pressure. Initial assessment of hypertensive people should have complete history and physical examination. For the assessment of kidney disease, serum creatinine is measured. Urine samples are tested in the determination of proteins in kidney diseases [34]. Electro cardio gram testing is done to check the heart condition from high blood pressure. A chest x-ray or echocardiogram may also performed to look for sign of damage to the heart or enlargement of the heart [35,36].

physical examination (BP measurement, eye ground examination, BMI calculation, listening to murmurs at large arteries, detailed examination of heart, lungs, stomach, searching for enlarged kidneys, palpation of glandula thyroid, resistance and abnormal pulsation of aorta, palpation of lower extremities to search for oedemas and pulsations, neurologic examination), laboratory examinations (ECG, urine, blood glucose, haematokrit, kallium, calcium, creatine in serum, lipid spectrum of serum) [37].

### **PREVENTION:**

To reduce the blood pressure, lifestyle changes are recommended before starting the use of anti-hypertensive drugs [38-42].

- maintain normal body weight for adults
- Reduce the intake of dietary sodium.
- Doing physical activities like yoga, exercises, aerobic exercises, brisk walking.
- limit alcohol consumption
- Intake of diet rich in fruit and vegetables.

### **TREATMENT:**

Anti-hypertensive drugs are used to treat hypertension. The first chemical compound used to treat hypertension is sodium thiocyanate but it has many side effects [43-46].

A well tolerated orally available agent was discovered that was chlorothiazide, the first thiazide diuretic which was developed from the antibiotic sulfanilamide which was available in 1958. beta-blockers, calcium channel blockers, angiotensin converting enzyme inhibitors, angiotensin receptor blockers and renin inhibitors were later developed as the anti-hypertensive drugs.

**1st choice drugs:**

1. Diuretics
2.  $\beta$ -blockers
3. Inhibitors of ACE
4. Blockers of AT1 receptors (ARB)
5. Calcium channel blockers

**2nd choice drugs** – mainly to drug combinations:

1.  $\alpha$ 1-sympatholytics;  $\alpha$ 2-sympathomimetics; direct
2. Vasodilators; potassium channel openers;
3. Agonists of I1 receptors in CNS; other mechanisms of action

Hypertension can be reduced by adjusting the life style by maintaining the proper diet and exercises which are the two key components. In order to control the hypertension, early diagnosis is compulsory. It can be done by increasing awareness among the people and enhance the frequency of screenings for the hypertension.

**Newer Medications:**

Currently physicians are prescribing fewer diuretics and certain beta-blockers, the first line agents for hypertension and giving more angiotensin-converting enzyme inhibitors (ACE) and calcium channel blockers (CCBs). Short acting dihydropyridine CCBs should be avoided for the hypertensive people. If the control is not achieved with the beta-blocker or diuretic or ACE inhibitor, then only CCBs should be added to the regimen.

For the prevention of the heart attack, the anti-hypertensive and lipid lowering treatment is used. But thiazide diuretic chlorthalidone was superior to other medications in order to prevent myocardial infarction, stroke, heart failure which is less expensive to control the blood pressure

Recent studies tell us that alpha blockers increase the risk of stroke and heart failure used for the treatment of hypertension initially it should be reassessed except for the patients who are undergoing treatment with benign prostatic hypertrophy ex: doxazosin.

For the treatment of hypertension, FDA approved the drug such as eplerenone (Inspra) which is a new class called as selective aldosterone receptor antagonists. It shows as effective as an amlodipine in the systolic hypertension treatment with the advantage of reduction in microalbuminuria in the patients with this condition at the baseline.

Recent research tells that eating probiotics regularly may improve the blood pressure. Probiotics are live microorganisms which occur naturally in the gut, which have more beneficial effects helps to reduce the high blood pressure and maintain the healthy blood pressure levels.

It lowers the systolic blood pressure by an average of 3.56 millimeters of mercury and diastolic blood pressure of 2.38 mm hg compared to adults who didn't consume probiotics. The consumption of probiotics with the daily bacteria of less than 10<sup>9</sup>-10<sup>12</sup> colony forming unit's leads to decrease the blood pressure

The positive effect can be seen by consuming probiotics by improving the total cholesterol and low density lipoproteins, reducing glucose in the blood and insulin resistance by regulating the hormones in the blood which in turn regulates the blood pressure and fluid balance.

Other alternatives to be taken for the control of hypertension are;

- Intake of Calcium and magnesium and Vitamins C and E
- Olive leaf extract & Electrical acupuncture

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