Blood pressure is the pressure of circulating blood against the walls of blood vessels. Most of this pressure results from the heart pumping blood through the circulatory system.
Blood pressure is taken using two measurements :
-Systolic(measured when the heart beats, when blood pressure is at its highest).
-Diastolic(measured between heart beats , when blood pressure is at its lowest).
It is measured in **millimeters of mercury (mmHg).**
Blood pressure is one of the vital signs—together with respiratory rate, heart rate, oxygen saturation, and body temperature—that healthcare professionals use in evaluating a patient's health.
Blood pressure that is too low is called **hypotension ,**pressure that is consistently too high is called **hypertension**, and normal pressure is called **normotension**.
Hypertension is diagnosed if, when it is measured on two different days, the systolic blood pressure readings on both days is ≥140 mmHg and/or the diastolic blood pressure readings on both days is ≥90 mmHg.

Epidemiology

- An estimated 1.28 billion adults aged 30-79 years worldwide have hypertension, most (two-thirds) living in low- and middle-income countries
- An estimated 46% of adults with hypertension are unaware that they have the condition.
- Less than half of adults (42%) with hypertension are diagnosed and treated.
- Approximately 1 in 5 adults (21%) with hypertension have it under control.
- Hypertension is a major cause of premature death worldwide.
- One of the global targets for non communicable diseases is to reduce the prevalence of hypertension by 33% between 2010 and 2030.

The British Hypertensive society classify blood pressure and hypertension as follow :(Similar thresholds have been published by the European Society of Hypertension and the WHO–International Society of Hypertension) :

18.85 Definition of hypertension

Category	Systolic BP (mmHg)	Diastolic BP (mmHg)
BP		
Optimal	< 120	< 80
Normal	< 130	85
High normal	130–139	85–89
Hypertension		
Grade 1 (mild)	140–159	90–99
Grade 2 (moderate)	160–179	100–109
Grade 3 (severe)	≥ 180	> 110
Isolated systolic hypertension		
Grade 1	140–159	< 90
Grade 2	≥ 160	< 90

Risk factors

Modifiable risk factors include unhealthy diets (excessive salt consumption, a diet high in saturated fat and trans fats, low intake of fruits and vegetables), physical inactivity, consumption of tobacco and alcohol, and being overweight or obese.

Non-modifiable risk factors include a family history of hypertension, age over 65 years and co-existing diseases such as diabetes or kidney disease.

Pathogenesis

Many factors may contribute to the regulation of BP and the development of hypertension, including renal dysfunction, peripheral resistance, vessel tone, endothelial dysfunction, autonomic tone, insulin resistance and neurohumoral factors.

1-Essential hypertension: 95% of cases, no specific underlying cause of hypertension can be found. Hypertension is more common in some ethnic groups, particularly African Americans and Japanese, and approximately 40–60% is explained by genetic factors.

2-Secondary hypertension : (5%) of cases , causes :
-alcohol -obesity -pregnancy -renal diseases
-Endocrine diseases -drugs

Hypertension has a number of adverse effects on the cardiovascular system.
In larger arteries (> 1 mm in diameter), the internal elastic lamina is thickened, smooth muscle is hypertrophied and fibrous tissue is deposited. The vessels dilate and become tortuous, and their walls become less compliant.
In smaller arteries (< 1 mm), hyaline arteriosclerosis occurs in the wall, the lumen narrows and aneurysms may develop. Widespread atheroma develops and may lead to coronary and cerebrovascular disease, particularly if other risk factors are present.

Clinical features

Hypertension is called a "silent killer". Most people with hypertension are unaware of the problem because it may have no warning signs or symptoms. For this reason, it is essential that blood pressure is measured regularly.
When symptoms do occur, they can include early morning headaches, nosebleeds, irregular heart rhythms, vision changes, and buzzing in the ears. Severe hypertension can cause fatigue, nausea, vomiting, confusion, anxiety, chest pain, and muscle tremors.
The only way to detect hypertension is to have a health professional measure blood pressure. Having blood pressure measured is quick and painless. Although individuals can measure their own blood pressure using automated devices, an evaluation by a health professional is important for assessment of risk and associated conditions

Investigations (Ix) :

The objectives are to:
• confirm the diagnosis by obtaining accurate, representative BP measurements
• identify contributory factors and any underlying causes
• assess other risk factors and quantify cardiovascular risk
• detect any complications that are already present
• identify comorbidity that may influence the choice of antihypertensive therapy.

Investigation of hypertension:
• Urinalysis for blood, protein and glucose
• Blood urea, electrolytes and creatinine
• Blood glucose

• Serum total and HDL cholesterol (HDL = high-density lipoprotein)
• Thyroid function tests
• 12-lead ECG (left ventricular hypertrophy, coronary artery disease)

Prevention

- Reducing salt intake (to less than 5g daily).
- Eating more fruit and vegetables.
- Being physically active on a regular basis.
- Avoiding use of tobacco.
- Reducing alcohol consumption.
- Limiting the intake of foods high in saturated fats.
- Eliminating/reducing trans fats in diet.

Management

-The objective of antihypertensive therapy is to reduce the incidence of adverse cardiovascular events, particularly CAD, stroke and heart failure.
-Randomized controlled trials have demonstrated that antihypertensive therapy can reduce the incidence of stroke and, to a lesser extent, CAD.
-The relative benefits (approximately 30% reduction in risk of stroke and 20% reduction in risk of CAD) are similar in all patient groups.

- Reducing and managing stress.
- Regularly checking blood pressure.
- Treating high blood pressure.
- Managing other medical conditions

Drug therapy

-Diuretics : sometimes called water pills, help rid your body of salt (sodium) and water. Most of these medicines help your kidneys release more sodium into your urine. The sodium helps remove water from your blood, decreasing the amount of fluid flowing through your veins and arteries. This reduces blood pressure.
There are three types of diuretics:

- Loop-acting diuretics : such as furosemide (Lasix)
- Potassium-sparing diuretics: spironolactone (Aldactone)
- Thiazide diuretics: hydrochlorothiazide

-ACE inhibitors prevent an enzyme in the body from producing angiotensin II, a substance that narrows blood vessels. This narrowing

can cause high blood pressure and forces the heart to work harder. Angiotensin II also releases hormones that raise blood pressure

- Captopril.
- Enalapril (Vasotec)
- Fosinopril.
- Lisinopril (Prinivil, Zestril)

They should be used with care in patients with impaired renal function or renal artery stenosis because they can reduce glomerular filtration rate and precipitate renal failure. Electrolytes and creatinine should be checked before and 1–2 weeks after commencing therapy.

-Angiotensin receptor blockers:(ARBs) work by blocking receptors that the hormone acts on, which are found in the heart, blood vessels and kidneys. Blocking the action of angiotensin II helps to lower blood pressure and prevent damage to the heart and kidneys.

- Candesartan (Atacand)
- Losartan (Cozaar)
- Telmisartan (Micardis)
- Valsartan (Diovan)

-Calcium channel blockers are medications used to lower blood pressure. They work by preventing calcium from entering the cells of the heart and arteries. Calcium causes the heart and arteries to squeeze (contract) more strongly. By blocking calcium, calcium channel blockers allow blood vessels to relax and open.

There are two distinct chemical classes of CCBs:

- dihydropyridines (such as nifedipine and amlodipine)
- nondihydropyridines (diltiazem and verapamil)

-Beta blockers, also known as beta-adrenergic blocking agents, are medications that reduce blood pressure. Beta blockers work by blocking the effects of the hormone epinephrine, also known as adrenaline. Beta blockers cause the heart to beat more slowly and with less force, which lowers blood pressure.

- Atenolol (Tenormin)
- Bisoprolol
- Carvedilol
- Labetalol
- Metoprolol

-Alpha blockers :are a type of blood pressure medication. They lower blood pressure by preventing a hormone called norepinephrine from tightening the muscles in the walls of smaller arteries and veins. As a result, the blood vessels remain open and relaxed. This improves blood flow and lowers blood pressure.

- prazosin
- indoramin
- doxazosin

-aspirin: antiplatelet therapy is a powerful means of reducing Cardiovascular risk but may cause bleeding, particularly intracerebral hemorrhage, in a small number of patients. The benefits are thought to outweigh the risks in hypertensive patients aged 50 years or over who have well-controlled BP and either target organ damage or diabetes or a 10-year cad risk of at least 15% (or 10-year cardiovascular disease risk of at Least 20%).

-Statins: are a class of drugs often prescribed by doctors to help lower cholesterol levels in the blood. By lowering the levels, they help prevent heart attacks and stroke. Studies show that, in certain people, statins reduce the risk of heart attack, stroke, and even death from heart disease by about 25% to 35%.

- atorvastatin (Lipitor)
- fluvastatin (Lescol)
- rosuvastatin (Crestor)
- simvastatin (Zocor)

Choice of antihypertensive drug

Trials that have compared thiazides, calcium antagonists, ACE inhibitors and ARBs have not shown consistent differences in outcome, efficacy, side-effects or quality of life. Beta-blockers, which previously featured as first-line therapy in guidelines, have a weaker evidence base. The choice of antihypertensive therapy is initially dictated by the patient's age and ethnic background, although cost and convenience will influence the exact drug and preparation used. Response to initial therapy and side-effects guide subsequent treatment. Comorbid conditions also have an influence on initial drug selection , for example, a β-blocker might be the most appropriate treatment for a patient with angina. Thiazide diuretics and calcium channel antagonists are the most suitable drugs for treatment in older people.

Combination therapy

Although some patients can be treated with a single Antihypertensive drug, a combination of drugs is often required To achieve optimal control ,Combination therapy May be desirable for other reasons; for example, low-dose Therapy with two drugs may produce fewer unwanted effects Than treatment with the maximum dose of a single drug.

3-Refractory hypertension

Refractory hypertension refers to the situation where multiple drug Treatments do not give adequate control of BP. Although this may Be due to genuine resistance to therapy in some cases, a more Common cause of treatment failure is non-adherence to drug Therapy. Resistant hypertension can also be caused by failure To recognize an underlying cause, such as renal artery stenosis Or phaeochromocytoma. There is no easy solution to problems With adherence but simple treatment regimens, attempts to Improve rapport with the patient and careful supervision can all Help. Spironolactone is a particularly useful addition in patients With treatment-resistant hypertension.

4-Accelerated hypertension

Accelerated or malignant hypertension is a rare condition that can complicate hypertension of any etiology. It is characterized by accelerated microvascular damage with necrosis in the walls of small arteries and arterioles (fibrinoid necrosis) and by intravascular thrombosis. The diagnosis is based on evidence of high BP and rapidly progressive end-organ damage, such as retinopathy , renal dysfunction (especially proteinuria) and/or hypertensive encephalopathy. Left ventricular failure may occur and, if this is untreated, death occurs within months.

Management

In accelerated phase hypertension, lowering BP too quickly may Compromise tissue perfusion due to altered autoregulation and can cause cerebral damage, including occipital blindness, and precipitate coronary or renal insufficiency. Even in the presence of cardiac failure or hypertensive encephalopathy, a controlled reduction to a level of about 150/90 mmHg over a period of 24–48 hours is ideal.