

CONTROLLING HYPERTENSION: A BRIEF REVIEWRAVISANKAR P*, SHAJEEYA AMREN SK, ¹DEVADASU CH, ²DEVALA RAO G¹Vignan Pharmacy College, Vadlamudi, Guntur, India.²KVSR Siddhartha College of Pharmaceutical Sciences, Vijayawada, Andhra Pradesh, India.***Corresponding author: E.Mail: banuman35@gmail.com, Mobile: 09000199106****ABSTRACT**

Hypertension is one of the major causes of cardio vascular system (CVS) disease, kidney failure and mortality in all over the world. It is said that in our country there are 200 million patients have been suffering from hypertension but only half of them were aware of their illness and out of them only 30% are taking medications under constant medical care. This is one of the deadliest non communicable diseases in the world leading to around 9.4 million deaths occurred in every year. The estimated market share of anti-hypertensive agents is \$30 billion by 2016. Hypertension affects approximately 50 million individuals in the US and approximately 1 billion worldwide. There are significant health and economic gains achieved owing to early detection, adequate treatment and good control of hypertension. Hypertension prevails where ever weak health conditions exist all over the world irrespective of either advanced or low per capita income countries. It is alarming to know one in three American adults chronically suffering from high blood pressure. Many people don't aware that they have B.P till they badly affected because negligence of high blood pressure as no symptoms or warning signs appears and then only they abruptly rushed for the medical aid. Elevated chronic blood pressure enhanced cholesterol and blood sugar levels abnormally which causes serious damage to the arteries, kidneys, and heart. Fortunately, high blood pressure is easy to detect and treat due to invention of advanced medical instruments and techniques and introduction of new pharmaceutical drugs. People can keep blood pressure in a healthy range of normal conditions simply by altering lifestyle changes by reducing overweight, by regulating food habits with natural foods and regular practice of exercises and yoga. This report includes tips on how to use a home blood pressure monitor, as well as advice on choosing an appropriate drug treatment strategy based on the age and severity of B.P keeping in view any other medical problems existing in the body.

KEYWORDS: Blood pressure, Hypertension, Silent killer, DASH diet (Dietary Approaches to Stop Hypertension).

INTRODUCTION

Blood pressure is defined as the pressure of blood on the walls of the arteries when it circulates throughout the body. It is determined by the quantity of blood the heart pumps and the amount of resistance to blood flow in the arteries. The more blood the heart pumps and the narrower arteries resulting in high B.P. Hypertension is defined as a physical condition which indicates an increase in the arterial blood pressure above normal. Hypertension is the medical term nothing but high blood pressure where the blood pressure is consistently above 140/90 mm Hg which is a condition in which the arteries have persistently elevated blood pressure. At all times the human heart beats and pumps pure blood to the whole body through the arteries. Lifestyle changes can reduce blood pressure and cardiovascular risk. Many people in the world are suffering from hypertension due to excessive tension, nervousness, or stress and bad habits like smoking and drinking alcohol.

Hypertension usually does not exhibit any initial symptoms for many years but leads towards long term diseases hence it is otherwise known as "the silent killer." Uncontrolled or poorly treated high blood pressure increases the risk of problems of CVS diseases such as stroke, congestive heart failure, heart attack, and peripheral artery disease and kidney damage.

If once high blood pressure existed in the body its adverse conditions lasts lifelong and its ill effects come out after 30 years. 50% of high B.P patients are prone to get heart attack along with paralysis or brain haemorrhage. The hypertension medications can reduce but not permanently cure the disease. Research studies reveal that risk of dying due heart attack is directly linked to high B.P particularly systolic hypertension. Some people gain weight around their stomach known as apple shaped people. In some other people fat is accumulated around their hips and thighs are known as pear shaped people. Apple shaped people tend to have greater health risks for getting high B.P than pear shaped people.

Etiology: A new research reveals that the risk of dying the heart attack is closely connected especially with hypertension. The valued grounds of high B.P can't be discovered in 90% of the hypertension patients which is

known as primary or essential hypertension which tends to develop over several years. Generally elderly people are prone to elevated systolic level of B.P due to hardening of arteries.

Hypertension has become one of the major public serious problems in the world. Globally cardiovascular disease accounts for approximately 17 million deaths a year, nearly one third of the total of the B.P patients. Of these, complications of hypertension account for 9.4 million deaths worldwide every year. Hypertension is responsible for at least 45% of deaths due to heart disease (total ischemic heart disease mortality is shown in Fig. 1), and 51% of deaths due to stroke. In the United States only, an estimated 81% of people with high blood pressure have been diagnosed. People with a diagnosis of high blood pressure, about 73% received treatment, and of the people receiving treatment, approximately 51% of B.P patients enable adequately controlled blood pressure.

- Those age 55 with normal blood pressure will have a 90 percent lifetime risk of developing hypertension.
- Beginning with 115/75 – CVD risk doubles for each increment of 20/10mmHg.
- More than 50 million Americans have High Blood Pressure warranting some form of treatment.
- 30% adults are still not aware of their hypertension.
- More than 40% of individuals with hypertension are not initiating any treatment.
- 2/3 of patients on treatment are not controlled to defined BP levels of less than 140/90.
- Hypertensive patients are 2.5 times more likely to develop diabetes within 5 years. Hypertension (high blood pressure) is a condition where the blood pressure is consistently above 140/90mmHg.
- 90–95% of patients suffer from essential hypertension; with unknown cause.
- 5–10% of patients suffer with secondary hypertension, which is due disease or utilization of drugs.

Reasons of hypertension: Consistently there are no causes for high blood pressure can be identified, but sometimes it occurs as a result of an underlying disorder of the kidneys or a hormonal disorder. Obesity, a sedentary lifestyle, stress, smoking, thyroid disease, old age, hereditary and excessive consumption of alcohol or high salt intake in the diet all play their own role in the development of high blood pressure in people. But in most people, high blood pressure causes no symptoms. Certain medical drugs like stimulants, diet pills, medications utilized for allergy and cold tend to raise B.P.

Symptoms: High B.P usually shows no symptoms so that the B.P patients do not aware it until their B.P is measured as it is asymptomatic disease it shows certain symptoms. In most people despite the coincidental occurrence of certain symptoms that are widely but incorrectly attributed to high blood pressure: headache, nose bleeding, dizziness, flushed face, nausea, vomiting, shortness of breath, restlessness, Problems with vision, Chest pains, Breathing problems, Irregular heartbeat, Blood in the urine and fatigue. People with high blood pressure may have these symptoms but some of the symptoms occur just as frequently in people with normal blood pressure also.

Hurdles related with hypertension: Severe or long standing chronic high blood pressure if left untreated can cause damages the brain, eyes, heart, aneurysm, heart failure, stroke heart attack during middle age high B.P may raise the risk of cognitive decline later in life and kidneys occasionally, severe high blood pressure causes the brain swelling which condition is called hypertensive encephalopathy. Severe high blood pressure increases the workload of the heart and may cause chest pain and/or shortness of breath. Sometimes very high blood pressure causes the large artery that carries blood from the heart (the aorta) to tear, causing chest or abdominal pain. This leads to cardio vascular diseases so that such patients require emergency treatment. If high blood pressure is due to a pheochromocytoma, symptoms may include severe headache, anxiety, an awareness of a rapid or irregular heart rate (palpitations), excessive perspiration, tremor, and paleness. These symptoms result from high levels of the hormones epinephrine and norepinephrine, which are secreted by the pheochromocytoma.

Hypertension accelerates brain aging: Young and middle aged people with high blood pressure have a higher risk of accelerated brain aging. The risk appears to be there even for those whose elevated blood pressure is not considered enough for medical intervention. The team, led by Professor Charles De Carli, said they found evidence of structural damage in white matter, and also volume of gray matter among people with high blood pressure, including pre hypertensive patients in their 30s and 40s. They wrote that "(brain injury) develops insidiously over the lifetime with discernible effects".

Diagnosis: Hypertension may be diagnosed by a health professional who measures blood pressure with a device called a sphygmomanometer - the device with the arm cuff, dial, pump, and valve. The systolic and diastolic numbers will be recorded and compared to a chart of values. If the pressure is greater than 140/90 mm of Hg and it is considered as hypertension. A high blood pressure measurement, however, may be spurious or the result of stress at the time of the exam. In order to perform a more thorough diagnosis, physicians usually conduct a physical exam and ask for the medical history of the family of the patient. Doctors will need to know if you have any of the risk factors for hypertension, such as smoking, high cholesterol, or diabetes. If hypertension seems reasonable, tests such as electrocardiograms (ECG) and echocardiograms will be conducted in order to measure electrical activity of the heart and to assess the physical structure of the heart. Additional blood tests will also be required to identify possible causes of secondary hypertension and to measure renal function, electrolyte levels, sugar levels, and cholesterol levels.

Accurate BP measurement: When automated B.P equipment is used the patient should be asked to be seated calmly for about 5 minutes and then B.P should be measured for accurate calculations. Appropriate size cuff inflate 20-30 mm Hg above loss of radial pulse, deflate at 2mm Hg per second 1st sound SBP; Disappearance of Korotkoff sound (phase 5) is DBP Confirm Elevated blood pressure within 2 months (stage 1) – shorter for stage 2 if new onset of hypertension.

The five Korotkoff sounds: Korotkoff actually described five types of sounds:

1. The first Korotkoff sound is the snapping sound first heard at the systolic pressure. Clear tapping, a repetitive sound for at least two consecutive beats is considered the systolic pressure.
2. The second sounds are the murmurs heard for most of the area between the systolic and diastolic pressures.
3. The third sound was described as a loud, crisp tapping sound.
4. The fourth sound, at pressures within 10 mmHg above the diastolic blood pressure, was described as "thumping" and "muting".
5. The fifth Korotkoff sound is silence as the cuff pressure drops below the diastolic blood pressure. The disappearance of sound is considered diastolic blood pressure – 2 mmHg below the last sound heard.

The second and third Korotkoff sounds have no known clinical significance. Blood pressure is measured with an inflatable arm cuff and a pressure-measuring gauge. A blood pressure reading, given in millimeters of mercury (mm Hg), has two numbers. The first, or upper, number measures the pressure in your arteries when your heart beats (systolic pressure). The second, or lower, number measures the pressure in your arteries between beats (diastolic pressure).

When blood pressure is checked, two values are recorded. The higher value reflects the highest pressure in the arteries, which is reached when the heart contracts (during systole). The lower value reflects the lowest pressure in the arteries, which is reached just before the heart begins to contract again (during diastole). Blood pressure is written as systolic pressure/diastolic pressure—for example, 120/80 mm Hg (millimeters of mercury). This reading is referred to as "120 over 80." High blood pressure is defined as a systolic pressure at rest that averages 140 mm Hg or more, a diastolic pressure at rest that averages 90 mm Hg or more, or both. However, the higher the blood pressure, the greater the risk of complications even within the normal blood pressure ranges—so these limits are somewhat arbitrary. In most young people with high blood pressure, both systolic and diastolic pressures are high. In contrast, many older people with high blood pressure have high systolic pressure (140 mm Hg or more) with normal or low diastolic pressure (less than 90 mm Hg). This disorder is called isolated systolic hypertension.

Home testing kits: Usually certain patients get anxiety in medical clinics, which can cause the blood pressure to rise. This is called white coat hypertension. A reliable brand of home or portable blood pressure monitoring kits may show that your blood pressure taken at rest is in fact be recognized as accurate reading. Any one may buy a variety of testing kits so that you can monitor blood pressure at home or while you're out and about can be monitored. One should note that a blood pressure monitor that is reliable and gives accurate readings only to be chosen.

Aggravating factors: Obesity, a sedentary lifestyle, stress, smoking, and excessive amounts of alcohol or salt in the diet all can play a role in the development of high blood pressure in people who have an inherited tendency to develop it. Stress tends to cause blood pressure to increase temporarily, but blood pressure usually returns to

normal once the stress is over. An example is "white coat hypertension," in which the stress of visiting a doctor's office causes blood pressure to increase enough to be diagnosed as high blood pressure in someone who has normal blood pressure at other times. In susceptible people, these brief increases in blood pressure are thought to cause damage that eventually results in permanent high blood pressure, even when no stress is present.

Some causes of secondary hypertension:

Kidney disorders: Renal artery stenosis, Pyelonephritis, Glomerulonephritis, Kidney tumors, polycystic kidney disease (usually inherited), Injury to a kidney, Radiation therapy affecting the kidneys.

Hormonal disorders: Hyperthyroidism, Hyperaldosteronism, Cushing syndrome, Pheochromocytoma, Acromegaly.

Other disorders: Coarctation of the aorta, Arteriosclerosis, Preeclampsia (a complication of pregnancy), acute intermittent porphyria, acute lead poisoning.

Drugs: Non steroidal Anti-inflammatory drugs, Oral contraceptives, Cocaine, Corticosteroids, Cyclosporine, Erythropoietin, Alcohol abuse.

Blood pressure measurements are divided in to four general categories:

Normal blood pressure: The blood is treated as normal pressure if it's below 120/80 mm Hg. However, some doctors recommend 115/75 mm Hg as a better goal. It should be noted that once blood pressure rises beyond 115/75 mm Hg, the risk of cardiovascular disease begins to increase.

Pre hypertension: Prehypertension is a systolic pressure ranging from 120 to 139 mm Hg or a diastolic pressure ranging from 80 to 89 mm Hg. And it slowly goes up and get worse over the time.

Stage 1 hypertension: Stage 1 hypertension is a systolic pressure ranging from 140 to 159 mm Hg or a diastolic pressure ranging from 90 to 99 mm Hg.

Stage 2 hypertension: More severe hypertension, stage 2 hypertension is a systolic pressure of 160 mm Hg or higher or a diastolic pressure of 100 mm Hg or higher. Both systolic as well as diastolic numbers in a blood pressure reading are most important to diagnose and prescribe suitable medicines. But after age 50, the systolic reading is even more significant. Isolated systolic hypertension when diastolic pressure is normal but systolic pressure is high is the most common type of high blood pressure among people older beyond 50 years of age.

Resistant hypertension: If high B.P remains as it is without any change in spite of utilizing minimum three different category of high B.P medications out of them one must be diuretic, it is known as resistant hypertension which is resistant to treatment. If high B.P is controlled with four different types of B.P drugs at a time is also termed as resistant hyper thyroidism.

The doctor will likely take two to three blood pressure readings each at two or more separate appointments before diagnosing the severity of high blood pressure of the patient as blood pressure normally varies throughout the day depending on the stress and strain of the body and sometimes specifically during visits to the doctor, a condition called white-coat hypertension may appear with the patient. The patient should record the blood pressure at home and at work to provide additional information to the doctor to decide the high B.P condition.

Generally the doctor may recommend routine tests, such as a urine test (urinalysis), blood tests and an electrocardiogram (ECG) a test that measures your heart's electrical activity. If the patient constantly suffering from high blood pressure additional tests, such as a cholesterol test, to check for more signs of heart disease is needed.

Essential hypertension or primary hypertension: High blood pressure with unknown causes is called primary (formerly called essential) hypertension and between 85% and 95% of people with high blood pressure have primary hypertension. Several changes in the heart and blood vessels probably take place to enhance blood pressure. For instance, the amount of blood pumped per minute (cardiac output) may be increased, and the resistance to blood flow may be increased because blood vessels are constricted. Blood volume may be increased also. The reasons for such changes are not fully understood but appear to involve an inherited abnormality affecting the constriction of arterioles, which help control blood pressure. Other changes may contribute to

increases in blood pressure, including accumulation of excessive amounts of salt inside cells and decreased production of substances that dilate arterioles.

Family history: Blood pressure usually runs in families and children of hypertensive individuals are often affected.

Obesity: Overweight individuals have higher blood pressures than thinner individuals.

Sodium intake: Individuals with high salt consumption have higher blood pressures than those with lower sodium intake.

Stress: Acute pain and stress have been known to elevate blood pressure.

Secondary hypertension: High blood pressure with a known cause is called secondary hypertension. 5 to 15% of people with high blood pressure can have secondary hypertension. In many kidney disorders can cause high blood pressure because the kidneys are important organs in controlling blood pressure. For example, damage to the kidneys from inflammation or other disorders may impair their ability to remove enough salt and water from the body, increasing blood volume and blood pressure. Other kidney disorders that cause high blood pressure include renal artery stenosis (narrowing of the artery supplying one of the kidneys), which may be due to atherosclerosis, injury, or other disorders.

In a few people, secondary hypertension is caused by another disorder, such as a hormonal disorder, or by the use of certain drugs, such as using birth control pills (oral contraceptives). Hormonal disorders that cause high blood pressure include Cushing syndrome (a disorder characterized by high levels of cortisol), hyperthyroidism (an overactive thyroid gland), hyperaldosteronism (overproduction of aldosterone, often by a tumor in one of the adrenal glands), and, rarely, a pheochromocytoma (a tumor that is located in an adrenal gland and that produces the hormones epinephrine and norepinephrine). Severe hyperthyroidism can also cause systolic hypertension.

Arteriosclerosis interferes with the body's control of blood pressure, increasing the risk of high blood pressure as it makes arteries stiff, preventing the dilation that would otherwise return blood pressure to normal. The grounds for development of secondary hypertension are

- Pregnancy
- Alcohol
- Renal diseases
- Coarctation of the aorta
- Endocrine diseases
Ex: Conn's disease, Cushing's disease, acromegaly, hyperparathyroidism.
- Drugs e.g. combined oral contraceptives, NSAIDs, steroids, sympathomimetics.

Resistant hypertension: If the blood pressure remains stubbornly high and unchanged despite taking at least three different types of high blood pressure drugs, one of which should be a diuretic, it is called resistant hypertension which is resistant to treatment. People who have controlled high blood pressure by taking four different types of medications also are considered to have resistant hypertension. Having resistant hypertension doesn't mean that blood pressure will never get lower. The doctor or hypertension specialist can evaluate whether the medications and doses by the patient high blood pressure are appropriate or not. More over the doctor can review medications taken by the patient for other conditions. Some medications, foods or supplements can worsen high blood pressure or prevent the high blood pressure medications from working effectively. The patient always is open and honest with the doctor about all the medications or supplements used by him. If the patient skip doses due to not able to get the prescribed medications or due to occurrence of side effects or simply forget to take the medications as prescribed, doctor should be consulted for seeking correct solutions but not change the treatment without guidance of the doctor.

Hypertension in women: At about nearly half of all adults are women are suffering from high blood pressure after commencing menopause stage and starting at the age of 65, women are likely to get this disease than men. The birth control pills augment the blood pressure in some women. It's more likely to occur during pregnancy due to overweight or having a family history of high blood pressure or have mild kidney disease. The use of combination of birth control pills and cigarette smoking may be especially dangerous for some women.

Three types of hypertension during pregnancy: High blood pressure may exist before pregnancy or develops during pregnancy.

Chronic hypertension: If high blood pressure develops 20 weeks before pregnancy or during pregnancy or lasts more than 12 weeks after delivery which is known as chronic hypertension.

Gestational hypertension: If high blood pressure develops after 20 weeks of pregnancy, it's known as gestational hypertension which usually seduce to normal after delivery.

Preeclampsia: Sometimes chronic hypertension or gestational hypertension leads to preeclampsia, a serious condition characterized by high blood pressure and protein loss due to kidney problem after 20 weeks of pregnancy, left untreated, preeclampsia can lead to serious even fatal complications for mother as well as baby.

Preeclampsia affects the placenta, and it can affect the mother's kidney, liver, and brain. When preeclampsia causes seizures, the condition is known as eclampsia--the second leading cause of maternal death. Preeclampsia causes low birth weight, premature birth, and stillbirth. Most women, who develop signs of preeclampsia, are to be closely monitored to lessen or avoid related problems. The only way to "cure" preeclampsia is to deliver the baby.

Before becoming pregnant: Ensure blood pressure to be under control. Lifestyle need to be changed by limiting salt intake, regular practice of physical activity, lessening overweight may help to prevent or reduce high B.P. The doctor should be consulted and explained how hypertension might affect during the pregnancy and steps taken to prevent or lessen problems. If medicines are taken to regulate blood pressure whether to change the medicines or stop taking them during pregnancy. Using angiotensin-converting enzyme (ACE) inhibitors and Angiotensin II receptor antagonists must be discarded according to recommendations of experts but during pregnancy other blood pressure medications must be utilized unless the doctor directs. Before starting oral contraceptives doctor should be consulted to know the impending risks and ensure about the recording of blood pressure before prescribing the pills. Periodical checking of B.P for every 6 months or before if necessary is compulsory In case of pregnancy precautions and recommendations of the doctor must be adhered to manage blood pressure and ensure a normal pregnancy and a healthy baby as the high blood pressure is dangerous for both mother and baby. Before commencement of pregnancy, women with high blood pressure should follow the precautions as explained bellow.

- Get blood pressure under control
- Regulate diet and limit intake of salt
- Be active and exercise. Regular physical activity keeps blood pressure under control and physical condition.
- Lessening over weight may enable safer pregnancy and a healthier baby.
- Using tobacco and alcohol should be stopped.
- If on medication for high blood pressure (or any other condition), discuss all of medications, including over-the-counter drugs and supplements, with all of doctors.
- Never stop using prescribed medications without first consulting the doctor who recommended them.
- In case of failure to follow the above precautions there is likely hood of getting harm and low birth weight and early delivery of the infant.
- Depending on the severity of blood pressure the doctor decides its category and prescribes medicines based on the stage of high blood pressure and whether you also have other medical problems.

Diagnosis: Hypertension is diagnosed on the basis of a persistent high blood pressure. Once the diagnosis of hypertension has been made, physicians will attempt to identify the underlying cause based on risk factors and other symptoms, if present. Secondary hypertension is more common in preadolescent children, with most cases caused by renal disease. Primary or essential hypertension is more common in adolescents and has multiple risk factors, including obesity and a family history of hypertension. Laboratory tests can also be performed to identify possible causes of secondary hypertension, and to determine whether hypertension has caused damage to the heart, eyes, and kidneys. Additional tests for diabetes and high cholesterol levels are usually performed because these conditions are additional risk factors for the development of heart disease and may require treatment. Typical laboratory tests performed is shown in the following table.

Table.1.Laboratory tests to be performed for the diagnosis of hypertension

System	Tests
Renal	Microscopic urine analysis, protein urea, creatine
Endocrine	Serum sodium, potassium, TSH and calcium
Metabolic	Fasting blood glucose, HDL, LDL, Total cholesterol and triglycerides
Other	Electrocardiogram, Chest radiograph, Hematocrit

Medications to treat high blood pressure:

Thiazide diuretics: WHO and the US guidelines support low dose thiazide based diuretic as first line treatment. Diuretics, sometimes called water pills, are medications that act on your kidneys to help your body eliminate sodium and water, reducing blood volume as a result of which blood vessels do not hold much fluid thereby B.P is reduced. Thiazide diuretics are often the first but not the only choice in high blood pressure medications. If you're not taking a diuretic and your blood pressure remains high, talk to your doctor about adding one or replacing a drug you currently take with a diuretic.

Beta blockers: These medications reduce the workload on your heart and open your blood vessels, causing your heart to beat slower and with less force. When prescribed alone, beta blockers don't work as well in blacks or in older adults but they're effective when combined with a thiazide diuretic.

Angiotensin-converting enzyme (ACE) inhibitors: These medications help relax blood vessels by blocking the formation of a natural chemical that narrows blood vessels which lowers the high B.P and make the heart beat at a lower rate with less force.

Angiotensin II receptor blockers (ARBs): These medications help relax blood vessels by blocking the action not the formation of a natural chemical that narrows blood vessels as in the case of ACE inhibitors.

Calcium channel blockers: These medications help relax the muscles of your blood vessels by stopping calcium from entering cells. Some slow your heart rate. Calcium channel blockers may work better for blacks and older adults than do ACE inhibitors or beta blockers alone. Grapefruit juice interacts with some calcium channel blockers, increasing blood levels of the medication and putting you at higher risk of side effects. Talk to your doctor or pharmacist if you're concerned about interactions.

Renin inhibitors: Aliskiren (Tekturna) slows down the production of rennin, an enzyme produced in the kidneys which starts a several continuous chemical steps there by increases blood pressure. Tekturna works by reducing the ability of rennin to begin this process. Due to a risk of serious complications, including stroke, you shouldn't take aliskiren with ACE inhibitors or ARBs.

If the blood pressure trouble reaching with combinations of the above medications suitable drugs are to be prescribed by the doctor.

Alpha blockers: These medications reduce nerve impulses to blood vessels, reducing the effects of natural chemicals that narrow blood vessels.

Alpha-beta blockers: Apart from reducing nerve impulses to blood vessels, alpha-beta blockers slow the heartbeat to reduce the quantity of blood that should pump through the vessels.

Central-acting agents: These medications prevent your brain from signaling your nervous system to increase your heart rate and narrow your blood vessels.

Vasodilators: These medications work directly on the muscles in the walls of your arteries, preventing the muscles from tightening and your arteries from narrowing. Once your blood pressure is under control, a daily dose of aspirin should be taken to reduce the risk of cardiovascular disorders. To lessen the number of daily doses of medication the doctor usually prescribes a combination of low-dose medications instead of larger doses of one single drug. It is established fact that two or more blood pressure drugs often work better than one. Sometimes to find out the most effective and suitable medication or combination of drugs is a matter of trial and error. The details relating to Anti hypertensive drugs, trade names, usual dosage in mg and daily frequency are explained bellow.

Table.2. Different classes of antihypertensive drugs, dosage and trade names

Class	Drug name	Trade name	Usual dosage range, mg/day	Daily frequency
Thiazide drugs	Chlorothiazide	Diuril	125 - 500	1
	Chlorothalidone	Thalitone	12.5 - 25	1
	Hydrochlorothiazide	Microzide, Hydrodiuril	12.5 - 50	1
	Polythiazide	Renese	2.0 - 4.0	1
	Indapamide	Lozol	1.25 - 2.5	2
	Metolazone	Mykrox	0.5 - 1.0	2
	Metolazone	Zaroxolyn	2.5 - 5	1
Loop diuretics	Bumetanide	Bumex	0.5 - 2	2
	Furosemide	Lasix	20 - 80	2
	Toremide	Demadex	2.5 - 10	1
Potassium sparing diuretics	Amiloride	Midamor	5.0 - 10	1-2
	Triameterene	Dyrenium	50 - 100	1-2
Aldosterone receptor blocker	Eplerenone	Inspra	50 - 100	1-2
	Spirolactone	Aldactone	25 - 50	1-2
Beta blockers	Atenolol	Tenormin	25 - 100	1
	Betaxolol	Kerlone	5.0 - 20	1
	Bisoprolol	Zebeta	50-100	1
	Metoprolol	Lopressor	50-100	1-2
	Nadolol	Corgard	40-120	1-2
	Propranolol	Inderal	40-160	1-2
	Timolol	Blocadren	20-40	1-2
Beta blockers with intrinsic sympathomimetic activity	Acebutolol	Sectral	200 - 800	1-2
	Penbutolol	Levatol	10-40	1
	Pindolol	Visken	10-40	1-2
Combined alpha and beta blocker	Carvedilol	Coreg	12.5 - 50	1-2
	Labetalol	Normodyne	200-800	1-2
ACE inhibitor	Benazepril	Lotensin	10-40	1-2
	Captopril	Capoten	25-100	1-2
	Enalapril	Vasotec	2.5-40	1-2
	Fosinopril	Monopril	10-40	1
	Lisinopril	Prinivil, Zestril	10-40	1
	Moexipril	Univasc	7.5-30	1-2
	Perindopril	Aceon	5-14	1-2
	Quinapril	Accupril	10.0- 40	1
	Ramipril	Altace	2.5 - 20	1
	Trandolapril	Mavik	4-10	1
Angiotensin II Antagonist	Candesartan	Atacand	8.0-32	1
	Eprosartan	Teveten	400-800	1-2
	Irbesartan	Avapro	150-300	1
	Losartan	Cozaar	25.0-100	1-2
	Olmesartan	Benicar	25-100	1
	Telmisartan	Mincardis	20-40	1
	Valsartan	Diovan	80-320	1
Calcium channel blockers Non-dihydropyridines	Diltiazem ER	Cardizem CD	180-420	1
	Verapamil IR	Calan, Isoptin	80-320	1
	Verapamil LA	Calan SR, Isoptin SR	120-360	2
	Verapamil	Verelan PM	120-360	1-2
Calcium channel blockers (CCBs) dihydropyridines	Amlodipine	Norvasc	2.5-10	1
	Felodipine	Plendil	2.5-10	1
	Isradipine	Dynacirc CR	60-120	1
	Nicardipine	Cardene SR	30-60	2
	Nifedipine SR	Adalat CC, Procardia XL	10.0-40	2
	Nisoldipine	Sular	1.0-16	1

Table.2. Different classes of antihypertensive drugs, dosage and trade names continuation..

Class	Drug name	Trade name	Usual dosage range, mg/day	Daily frequency
Alpha -1 blocker	Doxazosin	Cardura	10-20	1
	Prazosin	Minipress	10-20	1
	Terazosin	Hytrin	1.2	2-3
Central alpha -2 agonist and centrally acting drugs	Clonidine	Catapres	0.1-0.8	1-2
	Clonidine Patch	Catapres TTS	0.1-0.3	2
	Methyldopa	Aldomet	250-1000	1 Weekly
	Reserpine	Adelphane	0.05-0.25	2
	Guanfacine	Tenex	0.5-2	1+/-
Direct vasodilators	Hydralazine	Apresoline	25.0-100	2
	Minoxidil	Loniten	2.5-8	1-2

Table.3. Logical combinations of various classes of antihypertensive drugs

	Diuretic	β -blocker	Calcium channel blocker	ACE inhibitor	α -blocker
Diuretic	--	√	--	√	√
β -blocker		--	√*	--	√
Calcium channel blocker	--	√*	--	--	√
ACE inhibitor		--		--	√
α -blocker	√	√	√	√	--

* Verapamil + beta-blocker = absolute contra-indication

Table.4. Marketed drug combinations for the treatment of hypertension

Combination type	Fixed dose combinations, mg	Trade name
ACE inhibitors and CCBs	Amlodipine/ Benazepril hydrochloride	Lotrel
	Enalapril maleate / Felodipine	Lexxel
	Trandolapril / Verapamil	Tarka
ACE inhibitors and diuretics	Benazepril/ Hydrochlorothiazide	Lotensin
	Captopril/ Hydrochlorothiazide	Capozide
	Enalapril/ Hydrochlorothiazide	Veseretic
	Lisinopril/ Hydrochlorothiazide	Zestoretic
	Moexipril/ Hydrochlorothiazide	Uniretic
	Quinapril/ Hydrochlorothiazide	Accuretic
ARBs and diuretics	Candesartan/ Hydrochlorothiazide	Atacand
	Eprosartan/ Hydrochlorothiazide	Teveten
	Irbesartan/ Hydrochlorothiazide	Avalide
	Losartan / Hydrochlorothiazide	Hyzaar
	Telmisartan / Hydrochlorothiazide	Micardis
	Valsartan / Hydrochlorothiazide	Diovan
Beta blocker and diuretics	Atenolol/ Chlorothalidone	Tenoretic
	Bisoprolol / Hydrochlorothiazide	Ziac
	Propranolol / Hydrochlorothiazide	Inderide
	Metoprolol/ Hydrochlorothiazide	Lopressor
	Nadolol/ Bendroflumethiazine	Corzide
	Timolol / Hydrochlorothiazide	Timolide
Centrally acting drugs and diuretics	Methyldopa / Hydrochlorothiazide	Aldoril
	Reserpine / Chlorothiazide	Diupress
	Reserpine / Hydrochlorothiazide	Hydropress
Diuretics and diuretics	Amiloride/ Hydrochlorothiazide	Moduretic
	Spironolactone/ Hydrochlorothiazide	Aldactazide
	Triamterene/ Hydrochlorothiazide	Dyazide, maxzide

Preventing high blood pressure: The high blood pressure can be prevented by eating healthily food, maintaining a healthy weight proportion to ones height performing regular exercise, avoidance of drinking alcohol and strictly prohibit smoking and lastly regular monitoring of high B.P.

Diet: Prohibit or cut down the quantity of salt in the food and eat plenty of fruits and vegetables as salt raises blood pressure. . Eating a low-fat diet that includes lots of fiber (for example, wholegrain rice, bread and pasta) and plenty of fruits and vegetables which helps lower blood pressure which are packed with full of vitamins, minerals and fiber that keep your body in good condition.

Prohibition of excess consumption of salt: If high B.P people limiting sodium intake by discarding table salt, Cooking salt and salty processed foods can reduce B.P by 5 mg Hg. Salt a small quantity of salt (sodium chloride) is essential for survival as the human body depends on sodium to transmit nerve impulses, contract muscle fibers, with the aid of potassium, to keep balance of fluids levels in all the cells within the body. Some tribes living in the South America Yanomamo Indians consume a mere 200 mg, or about one-tenth of a teaspoon of salt per day. Thousands of years ago, when humans roamed the earth gathering and hunting, sodium was scarce. But potassium abundantly found naturally in many plant-based foods especially the so-called Paleolithic diet provided about 16 times more potassium than sodium.

Today, the average American diet contains about twice as much sodium as potassium particularly the preponderance of salt hidden in processed foods. This sodium-potassium imbalance constitutes a major contribution to enhance high blood pressure. Numerous scientific study trials on prevention of hypertension suggest that changing the balance between these two minerals can help the heart and arteries healthy as the higher the ratio of sodium to potassium, the greater the chance of getting heart attack or stroke which ultimately leads to bypass surgery or angioplasty, or dying of cardiovascular disease. Therefore to reverse the ratio, choose foods with a high proportion of potassium to sodium which are shown in the following table.

Table.5. Potassium-to-sodium ratio in various food items

Food	Potassium-to-sodium ratio	Food	Potassium-to-sodium ratio
Banana	422 to 1	Oatmeal, regular	18 to 1
Black beans, cooked without salt	305 to 1	Quaker's Instant Oatmeal	0.5 to 1
Orange	232 to 1	Cantaloupe	17 to 1
Grape fruit juice	126 to 1	Halibut, baked	8 to 1
Peanuts, dry roasted, no salt	93 to 1	Spinach, boiled	7 to 1
Peanuts, dry roasted, with salt	0.8 to 1	Salmon, baked	6 to 1
Avocado	69 to 1	Salmon, canned	0.8 to 1
Raisins	68 to 1	V8, low-sodium	6 to 1
Baked potato, plain, with skin	54 to 1	V8, regular	1 to 1
Fast-food French fries	2.5 to 1	Carrots, raw	5 to 1
Peanut butter, without salt	42 to 1	Milk, 1%	3 to 1
Peanut butter, with salt	1.4 to 1	Cheerios	0.9 to 1
Brussels sprouts, steamed	35 to 1	Marinara sauce, prepared	0.8 to 1
Applesauce (jar), no salt	31 to 1	Pork and beans, canned	0.7 to 1
Applesauce (jar), with salt	2.2 to 1	Fast-food cheeseburger	0.4 to 1
Cornflakes	0.1 to 1	French bread	0.2 to 1

Alcohol: Avoid drinking alcohol completely if not possible limiting to NHS assigned quantity of 3 to 4 units for men and 2 to 3 units for women. Otherwise blood pressure will rise over the time. Therefore staying within the recommended levels is the best way to reduce your risk of developing high blood pressure.

Moreover alcohol is also high in calories, which enables to gain weight as well as B.P in human beings. This will also increase your blood pressure.

Caffeine: Drinking more than four cups of coffee a day may increase your blood pressure so there is dire need to cutting down caffeine mixed rich drinks.

Weight: The over weight of the body forces the heart to work harder to pump blood throughout body, which can raise your blood pressure. Find out if you need to reduce weight as per the measurements of BMI healthy weight calculator. Always it is worthy to remember that just losing a few pounds will make a big difference to your blood pressure and overall health. Even a small amount of reduction of weight can make big difference in lowering or preventing high B.P.

Exercise: Being active and doing regular exercise lowers blood pressure by keeping your heart and blood vessels in good condition. Regular exercise can also help to lose weight, which in turned lower your blood pressure. Adults should do minimum half an hour every day and at least 150 minutes of moderate-intensity aerobic activity (i.e. cycling or fast walking) in a week which make you feel warm and slightly out of breath. Physical activity can include anything from sport to walking and gardening.

Relaxation therapies: Relaxation therapy and exercise can reduce blood pressure which includes:

- Stress management, meditation or yoga.
- Cognitive behavior therapy (CBT), which focuses on how thoughts and beliefs can affect the way, and feel and how to cope with problems. CBT is increasingly available on the NHS so check with your GP.
- Biofeedback, where a small monitor constantly shows the heartbeat or blood pressure and referrals for biofeedback may be obtained through a GP.

Smoking: Smoking indirectly causes high blood pressure and keeps at much higher risk of a heart attack and stroke. Like high blood pressure smoking much causes the arteries to narrow. Smoking coupled with high blood pressure will narrow the arteries much more quickly and enhance the risk of a heart or lung disease in the future. So stop smoking inevitably.

Natural remedies for high blood pressure: Irrespective of use of medicines prescribed by the doctor for the treatment of high blood pressure one must make lifestyle changes to lower the blood pressure which include eating a healthier diet with less salt (the Dietary Approaches to Stop Hypertension, or DASH, diet), losing weight, exercising more and quitting smoking.

Coping and support: High blood pressure isn't a problem that you can treat and manage for the rest of your life keeping blood pressure under control. By adopting the following tips one can manage B.P properly. Take your medications properly and promptly without brake duly following the doctor's advice to bring your blood pressure to a safe level constantly. Follow healthy habits by eating and getting regular physical activity and quitting alcohol and smoking. Stress management is highly essential. Release negative thoughts, maintain good relationships, and remain patient and optimistic.

Sticking to lifestyle changes is difficult task particularly when any symptoms of high blood pressure are unnoticed. So always remember the risks associated with uncontrolled high blood pressure which may help to ensure the support of your family as well as friends. Lifestyle changes and natural remedies may help to control high blood pressure apart from the recommend medications to lower high blood pressure if not untreated high blood pressure may damage organs in the body and increase the risk of heart attack, stroke, brain hemorrhage, kidney disease, and vision loss.

DASH (Dietary Approaches to Stop Hypertension) eating plan: Diet rich in fruits, vegetables, and low fat dairy foods, can substantially regulate blood pressure in individuals suffering hypertension and high normal blood pressure.

The DASH Diet includes:

- 7-8 servings of grains and grain products
- 4-5 servings of vegetables
- 4-5 servings of fruits
- 2-3 servings of low fat dairy products
- 2 or less servings of meat, poultry and fish
- 2-3 servings of fats and oils
- Nuts, seeds and dry beans 4-5 times /week
- Limited 'sweets' low in fat.

By adopting a diet rich with fruits, vegetables, and low-fat dairy products and reduction of saturated and total fat enable to drop systolic blood pressure by 8-14 points.

Adaptable modification	Proposed recommendation	Reduction range of systolic B.P
Weight reduction	BMI maintenance 18.5 - 24.9	5-20 Hg/10-weight loss
Adopt DASH diet	Reduction of saturated and total fat, consuming more fruits, vegetables and low dairy food	8-14 mm Hg
Reducing sodium content	Sodium intake must be limited 100mEQ/L	2-8 mm Hg
Physical activity	Engage regular aerobic activity	4-9 mm Hg
Reducing alcohol consumption	Avoid alcohol totally if not possible limiting the alcoholic consumption as suggested already.	2-4 mm Hg

Following different types of Medicinal herbs, vegetables and other things that help lower blood pressure

1) Garlic: In a meta-analysis of seven randomized controlled trials of garlic supplements, three trials showed a significant reduction in systolic blood pressure and four in diastolic blood pressure. Researchers concluded that garlic powder supplement may be of clinical use in patients with mild high blood pressure. Garlic supplements should only be used under the supervision of a qualified health practitioner. Garlic can thin the blood (reduce the ability of blood to clot) similar to aspirin so that people taking garlic should be stopped in the weeks before and after any type of surgery. Garlic may interact with many drugs and supplements such as the prescription drugs such as Coumadin (warfarin) or Trental (pentoxifylline), aspirin and vitamin E.

2) Coenzyme Q10 (CoQ10): There is some evidence that the supplement CoQ10 may help to reduce high blood pressure. A 12 week double-blind, placebo-controlled trial of 83 people with systolic hypertension examined the effect of CoQ10 supplements (60 mg twice daily). After 12 weeks, there was a mean reduction in systolic blood pressure of 17.8 mm Hg in the CoQ10-treated group. Another study conducted at the University of Western Australia looked at the effect of CoQ10 on blood pressure and glycemic control in 74 people with type 2 diabetes. Participants were randomly assigned to receive either 100mg CoQ10 twice daily, 200 mg of the fenofibrate drug, both, or neither for 12 weeks. CoQ10 significantly reduced systolic and diastolic blood pressure (mean reduction 6.1 mm Hg and 2.9 mm Hg respectively). There was also a reduction in HbA1C, a marker for long-term glycemic control.

3) Beetroot juice: A research team from Queen Mary, University of London, wrote in the journal Hypertension that drinking a cup of beetroot juice every day can reduce blood pressure in hypertensive patients. The foods containing high in nitrates are Beetroot, Fennel, Cabbage, Lettuce, Radishes, and Carrots. Lead author, Amrita Ahluwalia, Ph.D., said "Our hope is that increasing one's intake of vegetables with high dietary nitrate content, such as green leafy vegetables or beetroot, might be a lifestyle approach that one could easily employ to improve cardiovascular health".

4) Hawthorn: The herb hawthorn is often used by traditional herbal practitioners for high blood pressure. In a randomized controlled trial conducted by researchers in Reading, UK, 79 patients with type 2 diabetes were randomized to receive either 1200 mg of hawthorn extract a day or placebo for 16 weeks. Medication for high blood pressure was used by 71 percent of the patients. At the end of the 16 weeks, patients taking the hawthorn supplement had a significant reduction in mean diastolic blood pressure (2.6 mm Hg). No herb-drug interactions were reported for more about using this herb for health.

5) Fish Oil: Preliminary studies suggest that omega-3 fatty acids from fish oil may have a modest effect on high blood pressure. Although fish oil supplements often contain both DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid), there is some evidence that DHA is the ingredient that lowers high blood pressure. Omega-3 fatty acids have a crucial role in the body.

6) Folic Acid: Folate is a B vitamin necessary for formation of red blood cells. It may help to lower high blood pressure in some people, possibly by reducing elevated homocysteine levels. One small study of 24 cigarette smokers found that four weeks of folic acid supplementation significantly lowered blood pressure.

7) Cinnamon: Cinnamon not only prevents heart disease, it can also prevent diabetes. The Center for Applied Health Sciences in Ohio conducted a study of 22 subjects, half of which were given a 250mg of water soluble cinnamon daily while the other half were given placebo. It was discovered that those who drank cinnamon had a 13 to 23 percent increase in antioxidants connected with lowering blood sugar levels.

8) Onions: Onions contain quercetin, an antioxidant flavonol found to prevent heart disease and stroke. In a research study published in the Journal of Nutrition, subjects with hypertension experienced a decrease in their blood pressure by 7mmHg systolic and 5 mmHg diastolic as against to those who are given placebo.

9) Olives: This herb is a significant part of the Mediterranean diet, recognized to be one of the healthiest in the world. Oil made from olives has been found to reduce blood pressure. In a study conducted on the importance of olive oil, Dr. L. Aldo Ferrara, Associate Professor at the Federico II University of Naples in Italy discovered that the daily use of 40 grams of olive oil reduced the dosage of blood pressure medication in hypertensive patients by about 50 percent. Polyphenols in extra-virgin olive oil was credited for the significant reduction of blood pressure.

10) Oregano: This herb contains the compound carvacrol which has been proven to be effective against blood pressure. In a study conducted on animal subjects, by researchers from Eskisehir Osmangazi University in Turkey, carvacrol was found to reduce heart rate, mean arterial pressure as well as the systolic and diastolic blood pressures.

11) Cardamom: In one study published in the Indian Journal of Biochemistry and Biophysics, 20 subjects newly diagnosed with primary hypertension were administered 3 g of cardamom powder. After the end of the 3 months, all the subjects experienced feelings of well-being without any side effects. Moreover, the study was able to demonstrate that blood pressure was effectively reduced. It also improved antioxidant status while breaking down blood clots without significantly altering blood lipids and fibrinogen levels.

12) Karpuravalli: *Coleus forskohlii* is the *Karpuravalli* plant that is grown in many home gardens in South India. In research studies, it has been found to relax the smooth muscles of the arteries and this helps to lower blood pressure. It is also said to make the heartbeat stronger and slow down the pulse. Certain studies have evaluated the action of *Karpuravalli* tablets and chewable pills are found to reduce blood pressure in the elder people.

13) Drum Sticks: Obtained from the *Moringa oleifera* plant, drum sticks, called *Sahjan* in Hindi, are known for their high content of protein and valuable vitamins and minerals. Studies have found that extracts from the leaves of this plant help to reduce both systolic and diastolic blood pressure. The best way to harness this benefit is to cook drumsticks with lentils or dal.

14) Amla: Traditionally, the amla plant has been used to lower blood pressure. Recent studies have found that aqueous extracts of the leaves of the *amla* plant help to reduce diastolic and systolic blood pressure; *amla* extracts also show the ability to reduce levels of cholesterol in the blood and the liver and this could contribute to its antihypertensive action. It is believed that the vitamin C content of *amla* may also play a role in widening the blood vessels and this may help to reduce blood pressure. *Amla* is an important component of the *Triphalam* mixture that is commercially available.

15) Radish: Also called *mooli* in Hindi, it is a common vegetable that is used in Indian kitchens and has been shown to have antihypertensive action. This action may be a result of the high content of the mineral potassium which helps to counter the BP-increasing effects of a high-sodium diet. Radish can be cooked as a stir fry dish or even better, be eaten raw in a salad or grated and mixed with yogurt to give a tasty *raita*.

16) Sesame: In experiments, sesame or *til* seed has shown an ability to reduce both diastolic and systolic blood pressure. Sesame oil contains sesamin and sesaminol and these are believed to play a major role in reducing the oxidative stress in the body; this has an anti-inflammatory effect on the arterial walls, contributing towards a lowering of the blood pressure. Recent studies have found that combining sesame oil with rice bran oil helps to reduce blood pressure in hypertensive patients more effectively than taking antihypertensive medication alone.

17) Rauwolfia or Sarpagandha: Traditional medicine practitioners have used Rauwolfia in treating insomnia, snakebite, insanity and high blood pressure. The alkaloid reserpine extracted from this plant was one of the first potent treatments for hypertension. This helps to widen the blood vessels and lowers the heart rate; both these effects ensure the blood pressure keeps low. Although both the root powder and tablets are available, it is vital Rauwolfia is taken under the supervision of a doctor because of its potent action.

18) Flaxseed or Alsi: Flaxseed or linseed is rich in a compound called alpha linolenic acid that is one of the important omega-3 fatty acids. Several studies have found that people with hypertension who include flaxseed in their diet have lower levels of cholesterol and also exhibit a lowering of blood pressure.

While these herbal remedies have shown promising results against hypertension, it is vital to remember that several factors can affect how well these remedies act. Therefore, if you suffer from high blood pressure and are on antihypertensive therapy, you ought to consult your doctor about using these remedies. Most importantly, never forget the other measures that can help keep your blood pressure within control – a diet rich in vegetables and fruits, cutting down on high fat dairy and meat products, eating less salt, having regular exercise and using techniques to keep the mind free of stress.

19) Ayurvedic Medicine: In Ayurveda, the traditional medicine of India, high blood pressure is treated according to each person's dosha, or constitutional type. The pitta type may have a flushed face, red eyes, headaches, light sensitivity, irritability, and nosebleeds. The kapha type may have excess weight, water retention, high cholesterol, sluggishness. The vata type may feel cold, have gas, bloating, or constipation, insomnia, or nervousness, worry, or anxiety.

20) Traditional Chinese Medicine: In traditional Chinese medicine, high blood pressure is often attributed to a problem with the circulation of vital energy in the body. Chinese medicine practitioners believe that depression, anger, obesity, and high intake of fatty foods are some of the causative factors. A combination of acupuncture and herbs is often recommended. Foods thought to have medicinal properties that may help to reduce high blood pressure include water chestnut, turnip, honey, Chinese celery, hawthorn berries, and mug beans. Emotions also play a role in our health.

21) Alternative medicine: Although diet and exercise are the best tactics to lower your blood pressure, some supplements also may help to decrease it. These include Alpha-linolenic acid, Blond psyllium, Calcium, Cocoa, Cod-liver oil. While it's best to include these supplements in your diet as foods, you can also take supplement pills or capsules. Some supplements can interact with medications, causing harmful side effects, such as an increased bleeding risk that could be fatal. You can also practice relaxation techniques, such as yoga or deep breathing, to help you relax and reduce your stress level. These practices can temporarily reduce your blood pressure.

22) Yoga: Dr. Debbie Cohen and colleagues from the University of Pennsylvania reported at the "28th Annual Scientific Meeting" that yoga is effective in reducing blood pressure. Telemonitoring improves uncontrolled hypertension - researchers reported significant improvements in the health of hypertensive patients who used telemonitoring, which can be used at home. Patients use a portable system allowing them to record and send their blood pressure readings straight to the doctor's office in real time. "Switching off" high blood pressure in the body - scientists from University of California San Diego have designed molecules that could eventually be used in medications that "switch off" high blood pressure in the human body.

23) Lifestyle changes: Below are some changes you could make to your lifestyle to reduce high blood pressure. Some of these will lower your blood pressure in a matter of weeks, others may take longer.

- Cut your salt intake to less than 6g (0.2oz) a day. Find out how you can reduce the amount of salt in your diet.
- Eat a healthy, low-fat, balanced diet, including plenty of fresh fruit and vegetables. Get tips on eating more healthily.
- Be active: being physically active is one of the most important things you can do to prevent or control high blood pressure. Get tips on being more active.
- Cut down on drinking alcohol. Get tips on cutting down, download a drinks diary and keep track of your drinking.
- Stop smoking. Smoking greatly increases your chances of getting heart and lung diseases hence quitting is inevitable.

- Lose weight. Find out what your ideal weight is using the BMI healthy weight calculator.
- Drink less coffee, tea or other caffeine-rich drinks such as cola. Drinking more than four cups of coffee a day may increase your blood pressure.
- Try relaxation therapies, such as yoga, meditation and stress management. These treatments are not normally provided by the NHS.
- The more healthy habits you adopt, the greater effect there is likely to be on lowering your blood pressure. In fact, some people find that, by sticking to a healthy lifestyle, they do not need to take any medicines at all. The blood pressure chart is shown in the following figure.

CONCLUSION

The WHO identified hypertension is the leading cause mortality. More than 50% of hypertensive population worldwide is unaware of their condition. To address these problem national societies, local governments, professional societies, nongovernmental organizations and private industries, doctors, pharmacists promoted hypertension awareness among the public through several medias such as internet, T.V and public rallies. Dietary as well as lifestyle changes can improve B.P control and decrease the risk of health complications. Although drug treatment still often necessary in people for whom lifestyle changes are not effective or not enough. Even though modulation of renin secretion, glomerular filtration rate, and renal absorption of sodium was done, the sympathetic innervations of the kidneys play an important role in the pathogenesis of hypertension. Renal nerve ablation technology is being developed for treatment of drug-treatment-resistant hypertension worldwide. Different experimental studies gave evidence that the infusion or injection of stem or progenitor cells may decrease scar formation, fibrosis may exert synergistic effects by enhancing both neovascularization and cardiac regeneration. In addition, predominantly bone marrow-derived cells were shown to enhance blood flow, thereby providing a novel therapeutic option for the prevention and/or treatment of heart failure.

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