

To Study Competitive Analysis of Antihypertensive Drugs

*Sachin Gholap

Padmashree Dr. D.Y. Patil University, CBD Belapur, Navi Mumbai, India

*Correspondence Author:

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Abstract:

Hypertension is not a disease in keeping with the scenario of most developing countries, India has long passed the stage of hypertension. It has crossed the dividing line in which it is a problem associated with individuals, and is now a very large public health problem, growing year after year. It involves a collective response which includes the setting up of a complete infrastructure which involves attention to prevention as well as making hypertension care "Available, Accessible and Affordable" to all persons with hypertension. This explains the causes, the effects, the symptoms, the prevention and the treatment for hypertension. focuses on the objectives and the research methodology of the project study respectively.

Key Words: Hypertension,

Introduction:

Hypertension is a chronic condition of condition due to its role in the causation of causation of coronary heart disease, stroke and other vascular complications.

High blood pressure (HBP) or hypertension means high pressure (tension) in the arteries. Arteries are vessels that carry blood from the pumping heart to all the tissues and organs of the body. Normal blood pressure is below 120/80; blood pressure between 120/80 and 139/89 is called "pre-hypertension", and a blood pressure of 140/90 or above is considered high. Blood pressure is the force applied against the walls of the arteries as the heart pumps blood through the body. The pressure is determined by the force and amount of blood pumped and the size and flexibility of the arteries. Although the body can tolerate increased blood pressure for months and even years, eventually the heart may enlarge (a condition called hypertrophy), which is a major factor in heart failure.

Hypertrophic cardiomyopathy is the thickening of the muscles that make up the heart. The thickening may interfere with the normal functioning of the heart by:

- Narrowing the outflow of the ventricle
- Reducing the ability of the heart to relax and fill with blood during the relaxation phase

- Impairing the ability of the valves of the heart to function properly

There are two types of pressure systolic pressure and diastolic pressure.

A) Systolic Pressure: The systolic pressure is the force that blood exerts on the artery walls as the heart contracts to pump out the blood. High systolic pressure is now known to be a greater risk factor than diastolic pressure for brain, heart, kidney, and circulatory complications and for death, particularly in middle-aged and elderly adults. The wider the spread between the systolic and diastolic measurements, the greater the danger.

B) Diastolic Pressure: The diastolic pressure is the measurement of force as the heart relaxes to allow the blood to flow into the heart. High diastolic pressure is a strong predictor of heart attack and stroke in young adults. Health dangers from blood pressure may vary among different age groups and depending on whether systolic or diastolic pressure (or both) is elevated. Some studies suggest that in people over 45 years old, every 10 mm Hg increase in pulse pressure increases the risk for stroke rises by 11%, cardiovascular disease by 10%, and overall mortality by 16%. (In younger adults the risks are even higher.)

High Blood Pressure Affect the Body: High blood pressure adds to the workload of the heart and arteries. The heart must pump harder and the arteries must carry blood that's moving under greater pressure. If high blood pressure continues for a long time, the heart and arteries may no longer work as well as they should. Other body organs, including the kidneys, eyes, and brain also may be affected. People can live with hypertension for many years without having any symptoms. That's why high blood pressure is often called "the silent killer." Though a person may not have any symptoms, it doesn't mean that the high blood pressure isn't affecting the body. Having high blood pressure puts a person at more risk for strokes, heart attacks, kidney failure, loss of vision, and atherosclerosis (hardening of the arteries). In rare cases, severe hypertension can sometimes cause headaches, visual changes, dizziness, nosebleeds, and nausea.

Antihypertensive Drugs:

Antihypertensive drugs are medicines that help lower blood pressure in people whose blood pressure is too high. Untreated, high blood pressure can lead to diseases of the heart and arteries, kidney damage, or stroke, and can shorten life expectancy. Evidence suggests that reduction of the blood pressure by 5 mmHg can decrease the risk of stroke by 34%, of ischaemic heart disease by 21%, and reduce the likelihood of dementia, heart failure, and mortality from cardiovascular disease. There are many classes of antihypertensives, which lower blood pressure by different means; among the most important and most widely used are the thiazide diuretics, the ACE inhibitors, the calcium channel blockers, the beta blockers, and the angiotensin II receptor antagonists or ARBs. The fundamental goal of treatment should be the prevention of the important endpoints of hypertension, such as heart attack, stroke and heart failure.

Many different types of drugs are used, alone or in combination with other drugs, to treat high blood pressure. The major categories are:

1. Angiotensin-converting enzyme (ACE) inhibitors, such as benazepril (Lotensin), captopril (Capoten), enalapril (Vasotec), lisinopril (Prinivil, Zestril), quinapril (Accupril), and ramipril (Altace). ACE inhibitors work by preventing a chemical in the blood, angiotensin I, from being converted into a substance that increases salt and water retention in the body. These drugs also make blood vessels relax, which further reduces blood pressure.

2. Angiotensin II receptor antagonists, such as losartan (Cozaar) and losartan with hydrochlorothiazide (Hyzaar). These drugs act at a later step in the same process that ACE inhibitors affect. Like ACE inhibitors, they lower blood pressure by relaxing blood vessels.
3. Beta blockers, such as atenolol (Tenormin), metoprolol (Lopressor), nadolol (Corgard), propranolol (Inderal), and timolol (Blocadren). Beta blockers affect the body's response to certain nerve impulses. This, in turn, decreases the force and rate of the heart's contractions, which lowers blood pressure.
4. Blood vessel dilators (vasodilators), such as hydralazine (Apresoline) and minoxidil (Loniten). These drugs lower blood pressure by relaxing muscles in the blood vessel walls.
5. Calcium channel blockers, such as amlodipine (Norvasc), diltiazem (Cardizem), isradipine (DynaCirc), nifedipine (Adalat, Procardia), and verapamil (Calan, Isoptin, Verelan). Drugs in this group slow the movement of calcium into the cells of blood vessels. This relaxes the blood vessels and lowers blood pressure.
6. Diuretics, such as chlorthalidone (Hygroton), furosemide (Lasix), hydrochlorothiazide (Esidrix, HydroDIURIL), and metolazone (Zaroxolyn). These drugs control blood pressure by eliminating excess salt and water from the body.
7. Nerve blockers, such as alpha methyl dopa (Aldomet), clonidine (Catapres), guanabenz (Wytensin), guanadrel (Hylorel), guanethidine (Ismelin), prazosin (Minipress), rauwolfia derivatives (Reserpine), and terazosin (Hytrin). These drugs control nerve impulses along certain nerve pathways. This allows blood vessels to relax and lowers blood pressure.

S- amlodipine is an enantiomer of amlodipine, which blocks calcium ions outside the cardiac muscle cells and vascular smooth muscle cells via the calcium channel of cytomembrane. It directly dilates vascular smooth muscle, resting hypertension. The mechanism of remitting angina pectoris is not yet determined completely. It can decrease myocardial ischemia through dilation of the peripheral small artery, decreasing peripheral resistance, causing the reduction of energy consumption, and oxygen requirement of cardiac muscle and dilating the coronary artery and coronary small artery at normal and ischemic areas, increasing the oxygen supply of the cardiac muscle of the coronary spasm patients.

Side Effects:

- Headache

- Fatigue
- Skin rash
- Weakness
- Abdominal pain
- Nausea
- Flushing

Nifedipine blocks the slow calcium channels on cell surface and prevents flow of calcium ions into the cells. It causes peripheral and coronary vasodilatation and reduction of afterload, peripheral resistance and blood pressure, but with consequent increase blood flow and reflex coronary increase in heart rate. This leads to an increased supply in myocardial oxygen and cardiac output. Nifedipine has little or no effect on cardiac conduction, negative inotropic activity and antiarrhythmic activity.

Side Effects:

- Headache
- Eye pain
- Mental depression
- Fever
- Weakness
- Palpitation
- Muscle cramp

Lacidipine is one of the most vascular selective of the dihydropyridines. It has a long duration of action because of lipophilicity, its storage in the deep lipid compartment of the membrane and is continuous release to receptor. Antihypertensive effect, apart licidipine has also shown to have anti-atherosclerotic, antioxidant, platelet anti-aggregant and blockade of endothelin -1 induced vasoconstriction effects.

Side Effects: Plasma quinidine levels may be reduced and levels of theophylline and phenytoin increased.

Amlodipine relaxes coronary vascular smooth muscle produces coronary vasodilation by inhibiting the entry of calcium ions into the —slow channels or voltage-sensitive areas of the vascular smooth muscle and myocardium during depolarization. It also increases myocardial oxygen delivery in patients with vasospastic angina.

Side Effects:

- Headache
- Fatigue
- Nausea
- Rash

Atenolol is a cardioselective β -blocker. It's competitively blocks response to β -adrenergic stimulation and selectively blocks β_1 -receptors.it

does not effect on β_2 -receptors expect in high dose. It does not have membrane-stabilizing or partial agonist activity. Its cardioselectivity is dose related. Atenolol reduces resting and exercise-induced heart rate as also myocardial contractility. Resting cardiac output but not exercise-induced output is increased to some extent. Peripherally β -blockade may result in vasoconstriction due to unopposed α activity. Coronary flow will be reduced but this may not be significant expect in vasospastic angina. Atenolol reduces systolic and diastolic blood pressure. The BP and HR results in reduced myocardial work and oxygen requirement.

Prevention of Hypertension:

The degree to which hypertension can be prevented depends on a number of features including: current blood pressure level, changes in end/target organs (retina, kidney, heart - among others), risk factors for cardiovascular diseases and the age at presentation. Unless the presenting patient has very severe hypertension, there should be a relatively prolonged assessment period within which repeated measurements of blood pressure should be taken. Following this, lifestyle advice and non-pharmacological options should be offered to the patient, before any initiation of drug therapy. The process of managing hypertension according the guidelines of the British Hypertension Society suggest that non-pharmacological options should be explored in all patients who are hypertensive or pre-hypertensive. These measures include; Regular exercise improves blood flow and helps to reduce resting heart rate and blood pressure. Several studies indicate that low intensity exercise may be more effective in lowering blood pressure than higher intensity exercise. These steps are highly effective in reducing blood pressure, although drug therapy is still necessary for many patients with moderate or severe hypertension to bring their blood pressure down to a safe level

- Reducing sodium (salt) in the diet may be effective: It decreases blood pressure in about 33% of people (see above). Many people use a salt substitute to reduce their salt intake. [136]
- Additional dietary changes beneficial to reducing blood pressure include the DASH diet (dietary approaches to stop hypertension) which is rich in fruits and vegetables and low-fat or fat-free dairy foods.
- This diet has been shown to be effective based on research sponsored by the National Heart, Lung, and Blood Institute. In addition, an increase in daily calcium intake has the benefit of increasing dietary potassium, which

theoretically can offset the effect of sodium and act on the kidney to decrease blood pressure. This has also been shown to be highly effective in reducing blood pressure.

- Discontinuing tobacco use and alcohol consumption has been shown to lower blood pressure. The exact mechanisms are not fully understood, but blood pressure (especially systolic) always transiently increases following alcohol or nicotine consumption. Besides, abstinence from cigarette smoking is important for people with hypertension because it reduces the risk of many dangerous outcomes of hypertension, such as stroke and heart attack. Note that coffee drinking (caffeine ingestion) also increases blood pressure transiently but does not produce chronic hypertension. [citation needed]
- Reducing stress, for example with relaxation therapy, such as meditation and other mindbody relaxation techniques, by reducing environmental stress such as high sound levels and over-illumination can be an additional method of ameliorating hypertension.
- Jacobson's Progressive Muscle Relaxation and biofeedback are also used, particularly, device-guided paced breathing, although meta-analysis suggests it is not effective unless combined with other relaxation techniques.

Prognosis:

Prognosis is a medical term to describe the likely outcome of an illness. It is based upon several factors including genetics, dietary habits, and overall lifestyle choices. If individual's conscious of their condition take the necessary preventive measures to lower their blood pressure, they are more likely to have a much better outcome than those who do not.

Complications:

Hypertension is a risk factor for all clinical manifestations of atherosclerosis since it is a risk factor for atherosclerosis itself. It is an independent predisposing factor for heart failure coronary artery disease, stroke, renal disease and peripheral arterial disease. It is the most important risk factor for cardiovascular morbidity and mortality in industrialized countries. The risk is increased for:

- Cerebrovascular accident (CVAs or strokes)
- Myocardial infarction (heart attack)
- Hypertensive cardiomyopathy (heart failure due to chronically high blood pressure)
- Left ventricular hypertrophy - thickening of the myocardium (muscle) of the left ventricle of the heart
- Hypertensive retinopathy - damage to the retina

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