

Drugs Used for the Cure of High Blood Pressure” (Review)



CHEMISTRY

KEYWORDS : Hypertension, Diuretics, Vasodilators, Beta Blockers

DR SANJAY SHARMA

CHEMISTRY DEPARTMENT, DAV COLLEGE, AMRITSAR (INDIA)

ABSTRACT

Blood pressure is the force with which blood moves through arteries (the vessels which carry blood from heart to the rest of body). The high blood pressure may damage eyes, brain, heart, blood vessels, and kidneys. So hypertension must be managed to bring down the elevated blood pressure by change of life style or by using drug therapy

High blood pressure can cause damage to the vital organs of body so care must be taken to keep it within the normal range. Blood pressure up to the range of 140/90 can be managed by changing life style, that means by changing food habits and by leaving sedentary habits and involving the body in physical activities such as morning walk, acrobatics, yoga and meditation. The pressure above 140/90 needs drug therapy.

Treatment of high blood pressure with drugs; Every patient varies considerably in their response to different drugs. The effectiveness of drugs in individual patient varies according to characteristics, including age and race (Agodoa et al., 2001)

An ideal antihypertensive drug should be effective in reducing systemic blood pressure with prolonged effect, it should not induce adverse reaction on metabolism and should be able to facilitate the reversal of target organ damage. The proper monitoring and treatment of blood pressure takes care of heart enlargement, heart failure, strokes, and progression of kidney damage. In other words, the occurrence of cardiovascular disease can be markedly decreased. The major classes of antihypertensive drugs are:

DIURETICS; Diuretics, lower blood pressure by increasing the kidney's excretion of sodium, which in turn reduces the volume of blood. These drugs dilate blood vessels, which reduces pressure in the blood vessel walls. The metabolic side-effects of diuretics including hyperlipidaemia, insulin resistance and electrolyte disturbance are typically dose-dependent. The need for diuretics may be lessened with ACE inhibitors and ARBs (Dormans et al., 1996).

Examples ;Thiazide-type diuretics

Side effects of diuretics include muscle cramps, dehydration, dizziness, extreme tiredness, skin rash,

blurred vision, abnormal heart rate, and others

BETA BLOCKERS; These drugs, lower blood pressure by blocking responses from the beta nerve receptors. This serves to slow down the heart rate and to reduce the amount of blood that the heart pumps every minute. Beta blockers also block the effects of some of the hormones that regulate blood pressure. Beta blockers are more effective in younger patients with rapid heartbeats. The combination with even a low dose of diuretic will enhance their efficacy (Blumenfeld et al.,1999)The use of beta blockers have side effects which includes sexual Impotence, depression, vivid dreams, and feelings of lethargy.

Some examples of beta blockers are propranolol, atenolol, labetalol, carvedilol and metoprolol

Side effects include nausea,diarrhea,stomach cramps,vomiting and in some patients it can reduce sexual urge.

CALCIUM-CHANNEL BLOCKERS; They work by blocking the passage of calcium into the muscle cells that control the size

of blood vessels. All muscles need calcium in order to constrict; when the muscles of the arteries are prevented from constricting, blood vessels dilate, this reduces the blood pressure. A unique advantage of these agents involves lack of interference of their antihypertensive effect by NSAIDs, while other classes of antihypertensive drugs(Mehta & Lopez ,1987) have such problem.

Three types of CCB are now available: dihydropyridines, phenylalkylamines and

Benzothiazepines. They produce vasodilation(Angus&Wright,2000)

Examples; Amlodipine,felodipine,diltiazem,veramil,nifedine,nicardipine,nisoldipine and bepridil.

Side effects of calcium channel blockers are fatigue, headache, skin rash, diarrhea, constipation, edema, and others.

ANGIOTENSIN CONVERTING ENZYME (ACE) INHIBITORS;

Angiotensin II is a powerful vasoconstrictor it raises blood pressure by causing constriction of arterioles and also stimulates the release of aldosterone, the hormone that promotes the retention of sodium and fluid.These drugs are best for hypertensive patients with kidney disease, diabetes, or heart failure and for patients who suffers impotency from beta blockers.

Examples of ACE inhibitors;Benazepril (Lotensin), Captopril, Enalapril (Vasotec),Fosinopril,Lisinopril

(Zestril),Moexipril (Univasc),Perindopril (Aceon),Quinapril (Accupril),Ramipril (Altace),Trandolapril (Mavik)

Some of the side effects caused by ACE inhibitors are cough, kidney failure, skin rash, vomiting, diarrhea, fever, sore throat, etc.

ALPHA-BLOCKING DRUGS;These drugs block the alpha nerve receptors that promote constriction of the arterioles. Blocking constriction promotes dilation of vessels and lowers blood pressure. Alpha blockers inhibit the effects of norepinephrine (stress hormone) such drugs are best for treating patients with pheochromocytoma, the tumor that produces excessive amounts of adrenaline-like products.The major side effects include a drop in blood pressure(orthostatic hypotension) when a person(especially elders) abruptly stands up; this can result in fainting.

Examples Alpha blockers include doxazosin mesylate, prazosin hydrochloride , and terazosin hydrochloride .

Side effects-Alpha blockers may cause "first-dose effect." It develops pronounced low blood pressure and dizziness, which can make suddenly faint when you rise from a sitting or lying position. Other side effects include headache, pounding heartbeat, nausea, weakness, weight gain and small decreases in low-density lipoprotein (LDL) cholesterol (the "bad" cholesterol).

VASODILATORS; these drugs dilates arteries, thereby facilitating blood flow through them. These are usually prescribed along with other drugs such as a beta blocker and a diuretic. One drug in this category, minoxidil, is considered to promote of hair growth. This drug is a part of a remedy for baldness.

Examples hydralazine, nitroglycerin, minoxidil.

Side effects are headache,nausea or vomiting,diarrhea and loss of appetite

PERIPHERAL ADRENERGIC ANTAGONISTS

These drugs, lower blood pressure by inhibiting the release of norepinephrine. the oldest drug Reserpine, in this category, is derived from rauwolfia plants and has been used for many years as a sedative.

Examples; methoxime, methylnorepinephrine, midodrine, metaraminol, guanfacine, tizanidine Side effects includes include dizziness, lightheadedness, diarrhea, heartburn and a stuffy nose

CENTRALLY ACTING DRUGS;Drugs in this category reduce nerve impulses from the brain to the sympathetic nervous system. They work by dilating peripheral arteries; also cause the heart to beat more slowly. Patients who have been on a combination of a central-adrenergic agonist and a β -adrenergic blocker may be particularly susceptible if the central agonist is withdrawn while the β -blocker is continued(Mehta & Lopez 1987).

Examples of centrally acting drugs;clonidine,guanfacine and methyl dopa. , α -methyl dopa is favoured for treatment of hypertension during pregnancy (Lee et al.,1999)

They may cause a number of side effects, including muscle weakness, fatigue, drowsiness, depression, dry mouth, and constipation

Choice of drugs;Combination of low doses of two or more agents from different classes has been shown to provide additional effects and it minimizes dose-dependent side-effects. Low-dose combination of an ACE inhibitor and non-dihydropyridine

may reduce proteinuria more than either drug alone. In diabetics with nephropathy, a combination of an ACE inhibitor and CCB is better than either alone.

Drug usage and withdrawal; Decline in pressure should be relatively small and gradual. Attempt to control hypertension rapidly starting with larger doses often leads to undue fatigue.The blood pressure may be controlled with using a low dose in the initial stage.

Once daily dosing; Medications should be taken early in the morning to counter the abrupt rise in blood pressure that occurs on awakening in the morning.(Chobanian AV et al,2003, Kaplan ,2002)

Reduction and discontinuation of therapy; Once a good response has occurred and has been maintained for a year or longer, first decrease the dose of the drug used and, if this succeeds, withdrawal may be attempted with continued surveillance of blood pressure(Gonzalez et al ,1999, Nelson et al.,2001)

CONCLUSION; There is need to raise consciousness of the dangers of untreated high blood pressure and the importance of early effective treatment. Main problem regarding management of high blood pressure is that there are probably still are many people whose high blood pressure has not been diagnosed and also there are several millions of others who inspite of diagnosis, are not taking proper treatment. Some hypertension patients avoid medicines and they have to pay heavy price by getting their vital organs damaged. The medicines used for hypertension might have side effects, but the main effect (lowering of blood pressure) is highly beneficial as compared to side effects.

REFERENCE

- PREVENTION, DETECTION, EVALUATION AND TREATMENT OF HIGH BLOOD PRESSURE. HYPERTENSION, , 42:1206–1252. | DORMANS TP ET AL.(1996), VASCULAR EFFECTS OF LOOP DIURETICS. CA R D I O V A S C U L A R R E S E A R C H, , 32:988–977. | G O N Z A L E Z - J U A N A T E Y J R, E T A L.(1999), S T E P - D O W N O F E N A L A P R I L T R E A T M E N T F O R A R T E R I A L H Y P E R T E N S I O N. H Y P E R T E N S I O N, , 34:1287–1292. | KAPLAN NM.(2002), KAPLAN'S CLINICAL HYPERTENSION. 8TH ED. PHILADELPHIA, LIPPINCOTT WILLIAMS AND WILKINS. | LEE CC ET AL.(1999),THE EFFECTS OF RAMIPRIL ON SYMPATHETIC NERVOUS SYSTEM FUNCTION IN OLDER PATIENTS WITH HYPERTENSION. CLINICAL PHARMACOLOGY AND THERAPEUTICS, , 65:420–427. | MEHTA JL, LOPEZ IM.(1987), REBOUND HYPERTENSION FOLLOWING ABRUPT CESSATION OF CLONIDINE AND METOPROLOL. ARCHIVES OF INTERNAL MEDICINE,147,389–390. | NELSON M ET AL.(2001), A SYSTEMATIC REVIEW OF PREDICTORS OF MAINTENANCE OF NORMOTENSION AFTER WITHDRAWAL OF ANTIHYPERTENSIVE DRUGS. AMERICAN JOURNAL OF HYPERTENSION, , 14:98–105. |