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A Review on Antihypertension Drug on Herbal Plants

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Abstract

The use of alternative therapies, herbs, and supplements occurs at a very high rate among patients attending a variety of health care settings. Such therapy may cause significant interactions or effects on hypertension and other cardiovascular disorders and needs to be considered by clinicians. In this brief review, we highlight several commonly used alternative therapies that may have a clinical impact in the hypertensive patient. Several problems hinder our complete awareness of these effects .These problems include patients not informing physicians about alternative treatment from the herbal use, which may occur the lack of constituents with specific scientific standards for the bioactivity and bioequivalence of many herbals or supplements, and the multiple names that each bioactive substance show a therapeutic effect under a given mechanism of each drug which effect the body with a particular dose. regarding herbals therapies in the hypertension clinic it show the therapeutic effect which may increase the activity. Therefore herbal drugs including garlic, and licorice all may cause important consequences in the hypertensive patient. Added care is needed in monitoring the use and effects of herbal and alternative therapies in the hypertensive population.

Keywords: Hypertension, Herbals, Bioactivity , Cardiovascular

1.1 DEFINITION

Hypertension is defined as the pressure exerted by the column of blood on the wall of arteries. Most common cardiovascular disease can result in target organ damage[1], cause increased incidence of renal and cardiac failure as well as stroke[2]. Hypertension has show a many significance order-

1. Hypertension is a life style disorder commonly encountered in clinical practice
2. Hypertension is one of the major causes of disability and death all over the world.
3. Hypertension causes heart attacks, strokes, kidney failures and other disorder if it iectedandrem a in sun treated.

There have been other national surveys that have evaluated antihypertensive drug prescribing trends.

In many cases, hypertension does not cause any symptom until it causes complications such as heart attack and stroke and plays a role of silent killer in the body.

So it is important to realize that you may have high blood pressure and only way to find it out that get your blood pressure checked a tregular in tervals.

1.2 HOW THE HYPERTENSION IS FORM?

Essential Hypertension is the most prevalent type of Hypertension, affecting 90 to 95% of hypertensive patients.[3] Although no direct cause has identified itself, there are many factors such as sedentary

lifestyle, stress, visceral obesity, potassium deficiency (hypokalemia),[4] obesity,[5] (more than 85% of cases occur in those with a body mass index greater than 25),[6] salt (sodium) sensitivity,[7] alcohol intake,[8] and vitamin D deficiency that increase the risk of developing Hypertension [9] Risk also increases with aging,[10] some inherited genetic mutations,[11] and having a family history of Hypertension.[12]

An elevation of renin, an enzyme secreted by the kidney, is another risk factor,[13] as is sympathetic nervous system over activity.[14]
Insulin resistance, which is a component of syndrome X, or the metabolic syndrome, is also thought to contribute to Hypertension. Consuming foods that contain high fructose corn syrup may increase one's risk of developing Hypertension.[15]

1.3 HOW IT IS REACTED FROM THE BODY?

Hypertension is usually symptomless and often not regarded as a disease in its own right. However, it is a major risk factor in a number of potentially fatal conditions and debilitating disorders:

- Coronary heart disease
- Stroke
- Heart failure
- Chronic kidney disease
- Aortic aneurysm
- Retinal disease
- Peripheral vascular disease

1.4 WHERE IT IS CO-RELATE WITH A GIVEN BCS CLASSIFICATION SYSTEM?

The Biopharmaceutics Classification System (BCS) categorizes drugs into one of four biopharmaceutical classes according to their water solubility and membrane permeability characteristics and broadly allows the prediction of the rate-limiting step in the intestinal absorption process following oral administration.

1.5 CLASSIFICATION - (BCS CLASSIFICATION)

INTRODUCTION -The introduction of the Biopharmaceutics Classification System (BCS) in 1995 was the result of continuous efforts on mathematical analysis for the elucidation

1.5.1 Class I

- The drugs of this class exhibit high absorption number and high dissolution number.
- The rate-limiting step is drug dissolution, and if dissolution is very rapid, then the gastric-emptying rate becomes the rate-determining step.
- These compounds are well absorbed, and their absorption rate is usually higher than the excretion rate.

Examples include metoprolol, diltiazem, verapamil, and Propranolol[16,17]

1.5.2 Class II

- The drugs of this class have a high absorption number but a low dissolution number. In vivo drug dissolution is then a rate-limiting step for absorption except at a very high dose number.

- The absorption for Class II drugs is usually slower than for Class I and occurs over a longer period of time.
- In vitro–in vivo correlation (IVIVC) is usually accepted for Class I and Class II drugs. The bioavailability of these products is limited by their solvation rates.
- Examples include glibenclamide, phenytoin, danazol, mefenamic acid,nifedinpine, ketoprofen, naproxen, carbamezapine, and ketoconazole.[16,17,18]

1.5.3 Class III

- *Drug permeability is the rate-limiting step for drug absorption, but the drug is solvated very quickly.
- These drugs exhibit a high variation in the rate and extent of drug absorption. Since the dissolution is rapid, the variation is attributable to alteration of physiology and membrane permeability rather than the dosage form factors.
- If the formulation does not change the permeability or gastrointestinal duration time, then Class I criteria can be applied.
- Examples include cimetidine,ranitidine, acyclovir, neomycin B, atenolol, and captopril.[16,17,18]

1.5.4 Class IV

- These compounds have poor bioavailability.
- They are usually not well absorbed through the intestinal mucosa, and a high variability is expected. Fortunately,extreme examples of Class IV compounds are the exception rather than the rule, and these are rarely developed and marketed.
- Examples include hydrochlorothiazide, taxol.[16,17,18]

1.5.2 TABLE OF BCS CLASSES

CLASS	PERMEABILITY	SOLUBILITY	REFERENCE
Class-1	High	High	19
Class-2	High	Low	19
Class-3	Low	High	19
Class-4	Low	Low	19

1.5.3 BCS CLASS BOUNDARIES

Class boundary parameters (i.e., solubility, permeability,and dissolution) are for easy identification and determination of BCS class. [20,21,22]

Solubility: A drug substance is considered highly soluble when the highest dose strength is soluble in 250 mL or less of water over a pH range of 1–7.5 at 37 °C [20,22,23,24]

Permeability: A drug substance is considered highly. permeable when the extent of absorption in humans is greater than 90% of an administered dose, based on mass-balance or compared with an intravenous reference dose. [23,24]

Dissolution: A drug product is considered rapidly dissolving when 85% or more of the labeled amount of drug substance dissolves within 30 min using USP Apparatus 1 or 2 in a volume of 900 mL or less of buffer solutions[23,24].

2.1 TYPES OF HYPERTENSION

Hypertensions are mainly two types

2.1.1.Primary or essential hypertension (90-95%) has no specific cause which may contribute to increase in blood pressure.

- Increased sympathetic nervous system activity.
- Increased production of sodium-retaining hormones and vasoconstrictors.
- Deficiencies of vasodilators such as prostacyclin and nitric oxide.
- Inappropriate or increased renin secretion,resulting in increased production of angiotensin-II and aldosterone.
- Genetic predisposition

2.1.2. Secondary hypertension(5-10%) is caused by underlying diseases like renal damage, pheochromocytoma, muscular disorders etc. that affect the kidneys, arteries, heart or endocrine system.

- Cardiovascular diseases have emerged as an important health problem in India. High blood pressure (BP) is a major risk factor and a better control can lead to prevention of 300,000 of the 1.5 million annual deaths from cardiovascular diseases in India. Poor adherence to medications is a major public health problem and remains one of the main unresolved issues in the management of hypertension .
- A medicinal plant can be described as any plant in which one or more of its organs contain substances that can be used therapeutic purposes or which are precursors for the synthesis of useful drugs.

Renal: acute glomerulonephritis, chronic nephritis, polycystic disease, diabetic nephropathy and hydronephrosis

Endocrine: Acromegaly, Hypothyroidism, Hyperthyroidism, Hypercalcaemia (hyperparathyroidism)

Cortical: Cushing syndrome, primary aldosteronism, congenital adrenal hyperplasia, apparent mineralocorticoid excess (liquorice)

Medullary: Phaeochromocytoma, Extra-adrenal chromaffin tumours, Carcinoid

Exogenous hormones: estrogen, glucocorticoids, mineralocorticoids, sympathomimetics, tyramine- containing food, monoamine oxidase inhibitors

Systolic hypertension: Increased cardiac output Aortic valvular insufficiency, Arteriovenous fistula, patent ductus arteriosus Thyrotoxicosis, Rigidity of aorta Iatrogenic hypertension

Pregnancy-induced hypertension

Neurological disorders: Increased intracranial pressure – brain tumours –encephalitis – respiratory acidosis

2.1.3. Signs and symptom: Symptoms of high blood pressure are headaches, catching your breath after exertion,ringing in ears, fatigue, heart palpitations, flushed face,nosebleeds, strong need to urinate often, blurry vision and dizziness.

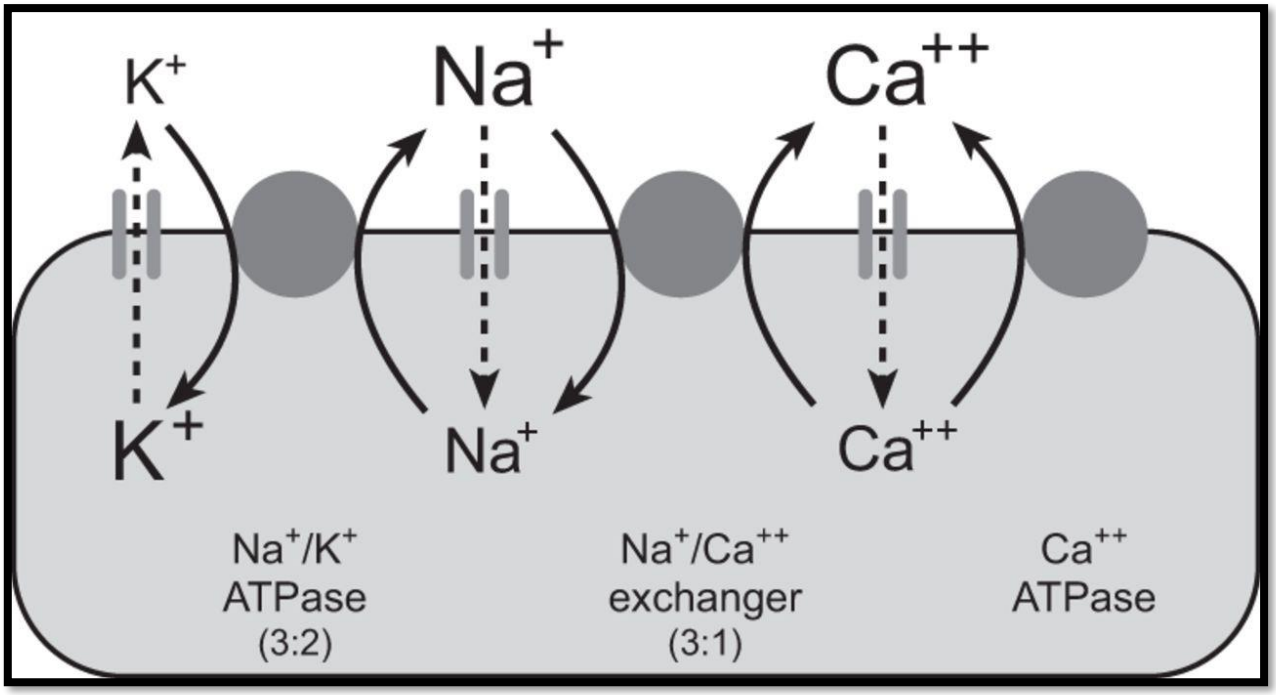

Fig no.1 –Mechanism of action of the drug on the human body

2.2 CLASSIFICATION OF HYPTERTENSION [25]

1. DIURETICS -Thiazide : Hydrochlorothiazide,chlorthalidone,indapamide.
   High ceiling:Furesamide,etc.[25]
   k^+sparing :spironolactone, Amiloride
2. ACE INHIBITORS-Captopril,Enalapril,Lisinopril, Perindopril,Ramipril,Fosinopril etc.[25]
3. ANGINOTENSIN (AT_1 receptor) BLOCKERS;Losartan ,Candansartan, irbessartan, Valsartan , Telmisartan[25]
4. DIRECT RENIN INHIBITORS ; Aliskiren[25]
5. CALCIUM CHANNEL BLOCKERS ;Verapamil, Diltiazem, Nifedipine, Felodipine, Amlodipine etc
6. **β** -ADRENERGIC BLOCKERS ; Propranplol, Metoprolol, Atenolol etc
7. **β + α** ADRENERGIC BLOCKERS ; Labetalol, Carvediol.
8. **α** ADRENERGIC BLOCKERS ; Prazosin, Terazosin , Doxazosin , Phentolamine, phenoxybenzamine
9. CENTRAL SYMPATHOLUTICS; Clonidine, Methyldopa
10. VASODIALATORS
    ARTERIOLAR: Hydralazine, Minoxydil, Diazoxide
    ARTERIOLAR+VENOUS : Sodium nitroprususide

(1)**DIURETICS-** *Diuretics are drugs which cause a net loss of Na^+ and water in urine.

*However,Na^+balance is soon restored,even with continuning diuretic action, by compensatory homoeostatics mechnism of the body,albeit with a certain degree of persisting Na^+deficit and reduction in extracellular fluid volume.[25]

1.1 FUROSEMIDE-It is a prototype drug.

- The development of this rapidly acting highly efficacious oral diuretics was a brekthrough.

- Its maximal natriuretics effect is much greater than that of others classes .[25]
- furesamide response goes on increasing with increasing dose:upto 10 L of urine may be produced in a day.
- It is active even in patients with relatively serves renal failure.
- The onset of action is prompt (i.v.2-5 min..,i.m.10-20 min.., oral 20-40 min.)and duration short (3-6 hours).[25]

MECHANISM OF ACTION -The major site of action is the thick AscLH(there called loop diuretic) where furesamide inhibits Na^+-K^+-$2Cl^-$cotranspoet .

PHARMACOKINETICS -

- Furesamide is rapidly absorbed orally but bioavilability is about 60%.
- Lipid -splubility is low ,and it is highly bound to plasma protiens.
- It is mainly excreated unchanged by glomerular filtration as well as tubular secreation.

DOSE-Usually 20-80 mg ones daily in the morning.In renal insufficiency , upto 200mg 6 hourly has been given by i.m./i.v. route .In pulmonary edema 40-80mg may be given i.v.

1.2 CHLORTHALIDONE -IT is a particularly long acting compound with a t1/2 40-50 hours, used exclusively as antihypertensive.

1.3 METOLAZONE -It common with loop diuretics, it is able to evoke a clinically useful response even in serve renal failure(g.f.r ~15 ml/min),and has

2 ACE INHIBITORS -

- The ACE inhibitors are one of the first choice drugs in all grades of essential as well as renovascular hypertention.
- most patients requir relatively lower doses (enalpril 2.5-10mg/day or equilent) which are well tolerated.
- Used alone they control hypertention in ~50%patients,and addition og a diuretics /B blockers extend efficacy to ~90%.
- As antihypertensive, use of ARBs has outstripped that of ACE inhibitors .

3 DIRECT RENIN INHIBITORS

- Aliskiren the only available member of the latest class of RAS inhibitors .which act by blocking catalytic activity of renin and inhibiting production of ANGINOTENSIN-1 and ANGINOTENSIN -2.
- Inhibitors of the renin-angiotensin system (RAS),including ACE- inhibitors, ARBs and now direct rennin inhibitor (DRI) are commonly used in the treatment of hypertension.[26]

4 CALCIUM CHANNEL BLOCKERS

- CCBs which include both dihydropyridines (DHPs) eg,nifedipine and amlodipine and non-dihydropyridines (verapamil and diltiazem), are among the most widely prescribed agents for the management of essential hypertension.
- Several large outcome risk trials and comprehensive meta-analyses have found that CCBs reduce the

cardiovascular morbidity and mortality associated with uncontrolled hypertension, including stroke.[27]

- Conditions favoring the choice of a DHP CCB for hypertension include: advanced age, isolated systolic hypertension, angina pectoris, peripheral vascular disease, carotid atherosclerosis, and pregnancy. Whereas, diltiazem or verapamil should be considered for use in patients with angina pectoris or supraventricular tachycardia.
- Several recent large clinical trials have confirmed CCBs efficacy not only in lowering blood pressure but also in reducing cardiovascular morbidity and mortality in hypertensive patients with a normal or high cardiovascular risk profile.
- In clinical trials such asALLHAT, VALUE or ASCOT, an amlodipine-based therapy was at least as effective, when not slightly superior, in lowering blood pressure and sometimes more effective in preventing target organ damages than blood pressure lowering strategies based on the use of diuretics, β-blockers and blockers of the RAS.[28]

1.1 FELODIPINE- It differs from nifedipine in having greater vascular selectively , larger tissue distribution and longer $t^{1/2.}$

- The extended release preparation is suitable for ones daily administration .

DOSE -5-10MG od,max 10mg bd .

1.2 NIFEDIPINE -It is the prototype DHP with a rapid onset and short duration of action .The overriding action of nifedipine is arteriolar dilatation -t.p.r decreases.BP falls

DOSE-5-20mg bd -tds oral

ADVERSE EFFECTS-Flushing ,anke edema,headache,drowsiness ,hypotention .

PHARMACOLOGICAL ACTIONS AND ADVERSE EFFECTS

The common property of all three subclasses of CCBs is to inhibits ca^{2+} mediated slow channel component of action potential in smooth /cardiac muscl cell.

a. Smooth muscle(especially vascular) relaxation .
b. Negative chronotropic ,inotropic and dromotropic action on heart.

6 β - ADRENERGIC BLOCKERS

The exact mechanism by which β-blockade reduces
blood pressure is not completely understood.

- Hemodynamically,these drugs decrease cardiac output; and the slowing of heart rate was originally thought to be of clinical importance, particularly in hypertensive patients with tachycardia. But, at the same time, peripheral resistance is increased slightly and sodium reabsorption by the kidney is increased.
- The ability of β-blockers to inhibit activity of the RAS by reducing the release of renin from the juxtaglomerular cells of the kidney may contribute to their blood pressure lowering effects, especially in patients with medium or high levels of plasma renin activity.
- β-Adrenergic receptor antagonists may lower blood pressure by other mechanisms also, including alteration of the control of the sympathetic nervous system at the level of the CNS, altered baroreceptor sensitivity, altered peripheral adrenergic neuron function, and increased prostacyclin biosynthesis. β-blockers became widely accepted for the treatment of hypertension.

- Carvdilol and nebivolol has been shown to have survival benefits in patients with heart failure, including patients who are elderly and have heart failure but preserved systolic function.
- In many ways, β-blockers have demonstrated strong benefits in patients with a variety of cardiovascular conditions.

7 β + α ADRENERGIC BLOCKERS

1.1 LABETALOL-

- It is a combined a and b blockers ;reduce t.p.r and acts and acts faster than pure b blockers .it has been used i.v.for rapid BP reduction in hyperadrenergic states,cheese reactions,clonidine withdrawal ,eclampsia etc.[29]
- oral labetalol therapy is restricted to moderately servere hypertension not responding to a pure b-blockers ,becouse side effects of both a blockers and b blocker occur with it

SIDE EFFECTS

Nasal stuffiness ,vivid dreams and epigastric pain may occur.
This drug should not be used in bronchial asthma.[29]
DOSE-labetalol 100 mg tid orally ,increasing upto 200mg tid ir qid after 1 or 2 weaks.

1.2 CARVEDILOL-

- This non selective b+weak selective a_1 blockers produces vasodialation and has additionl antioxidant /free radical scavenging properties.
- carvediol is afrequently selected drug for long -term treatment of CHF,and is approved as an antihypertensive as well.
- Side effects are similar to labetalol ;enzymes may rise in some.

8 α -ADRENERGIC BLOCKERS [29]

1.1 PRAZOSIN (HYPOVASE)

- Prazosin acts by a competitive postsynaptic alpha$_1$-adrenoceptor blockade.
- It does not block the presynaptic inhibitory effects, which allow reflex action to overcome the postural hypotension usual with a-blockers .

ADVERSE REACTIONS-

Although prazosin is fairly well tolerated,servre postural hypotension can occur.paroxysmal tachycardia and vivid dreams can also occue .sexual dysfuction is rare.
DOSE- 2mg tid for 4to6 weaks.later, graded increments ,but total daily dose not to exceed 20mg.

1.2 DOXAZOSIN(CARDURA)

- Doxazosin is a water soluble quinazoline analogue to prazosin with selective a_1-adrenoceptor inhibiting actions.
- It has no directs actions on the vascular smooth muscle.
- Doxazosin is effective in the treatment of mild to moderate hypertension,when used monotherapy on in combination with other antihypertensive.

- Single daily doses are adequate .it is well absorbed orally;bioavailability is 65%plasma levels peak within 3 hours ;and its half life is 19 to 22 hrs because of a low hepatic clearance.

DOSE -initially 1mg once daily,increased to 2,4,or 8mg ones daily untill BP is controlled . The mean optimal dose is 2to 4 mg ones daily.[29]
ADVERS REACTIONS-Mild to moderate, and disappear on continued thereapy .Lethargy ,fatigue fluid retension ,blurred vision and dry mouth may accure due to $a_{1\text{-receptor}}$ inhibition .dizziness is most prevalent ,but syncope occurs rarely.

9 CENTRAL SYMPATHOLYTICS-

1.1 CLONIDINE-

- It is an imidazoline derivatives having complex actions.Clonidine is a partial agonist with high affinity and high intrinsic activity at $a_{2\ \text{receptors}}$ especially a_{2A} subtype in brainstem.
- This decrease sympathetic out flow ---> fall inBP and bradycardia .[25]

PHARMACOKINETICS-Clonidine is well absorbed orally ;peak occurs in 2-4 hrs 1/2to 2/3 of an oral dose is excreated unchnged in urine ,the rest as metabolites , plasma t 1/2 is 8-12 hrs .Effects of a single dose lasts for 6-24 hrs.

DOSE -Starts with 100ug od or bd ,max.300ug tds ,orally or i. m.

ADVERSE EFFECTS -Sedation ,mental depression ,distributed sleep;dryness of mouth ,nose and eyes ,constipation .
-Impotence, salt and water retation ,bradycardia.

INTEATRACTION- tricyclic antidrepssants and chlorpromazine abolish the antihypertensive action of clonidine ,probably by blocking a receptors on which clonidine acts.

USE- clonidine was a popular antihypertensive in the late 1960_s and 1970_s, but frequent side effects , risk of withdrawal hypertention and development of tolerance have relegated it to a 3rd or 4th choice drug.

- There is no data on prognostic benifits ,if any ,of clonidine.
- It is occasionally used in combination with a diuretics.

10 VASODILATORS-

- This are the drug which directly and indirectly acts on blood vessels and dilate both artry and vein.

MECHNISM OF ACTIONS -Directs acts on artry and dialate them and decrese total periferial resistance .

PHARMACOLOGICAL ACTIONS-

a. **a.**Blood vessels are dialted.
b. b.heart-low BP

PHARNACOKINETICS –

1. Well absorbed orally .
2. peak concentration occur in 1-2 hrs.
3. Excreated through urine.

ADVERSE EFFECTS-Flushing ,headache ,edema ,CHF.

1.1 MINOXIDIL-

- It is a powerfull vasodilator ,the pattern of action resembling hydralazine i.e.direct relaxation of arteriolar smooth muscle with little effects on venous capacitance .
- minoxidil is a prodrug -converted to an active metabolite which is an opener of ATP operated k+ chnnels ;acts bt hyperpolarizing smooth muscle.
- Minoxidil is indicated only rarely in sever or life-threating hypertension.

USE-Minoxidil is a drug which is discoverd for the treatment of hypertention .It cause directs relation of arterior and smooth muscle but now day this used for treatmentof allopecia.

SIDE EFFECTS -Local irritation ,itching ,burning.

1.2 SODIUM NITROPRUSSIDE-It is a rapidly (within second)and consistently acting vasodilators ;has brief duration of action(2-5min)so that vascular tone can be titrated with the rate of i.v.infusion .

- Little reflex tachycardia is produced in supine posture.Plama renin is increased.
- In patients with heart failure and ventricular dilation ,nitoprusside improves ventricular functions and c.o.mainly by reducing aortic impendance (afterload),but also by lowering atrrial filling pressure (perload).
- sodium nitroprusside acts on both artry as well as vein.

ADVERSE EFFECTS -Nervousness and vomiting

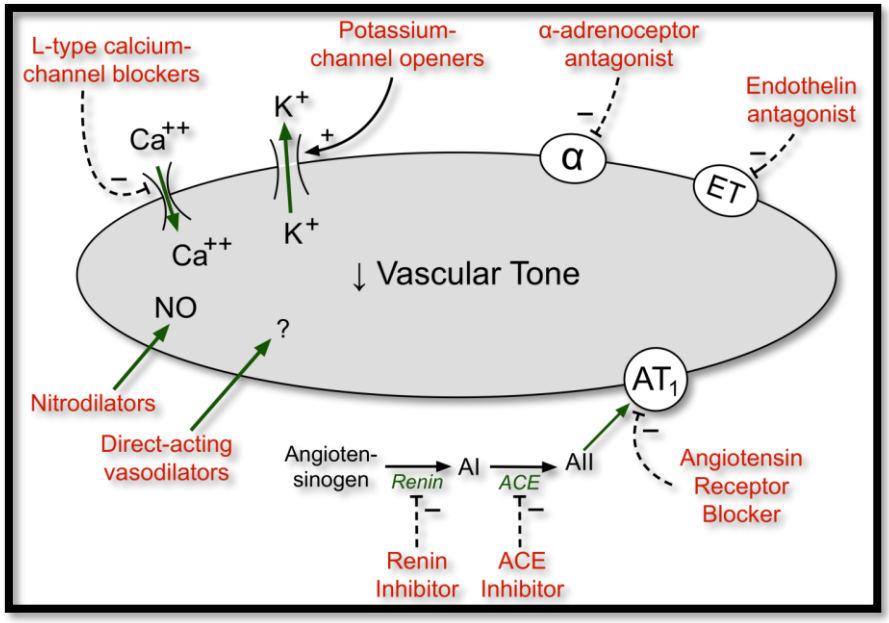

Fig.No.2-Mechanism of action of antihypertensive drug

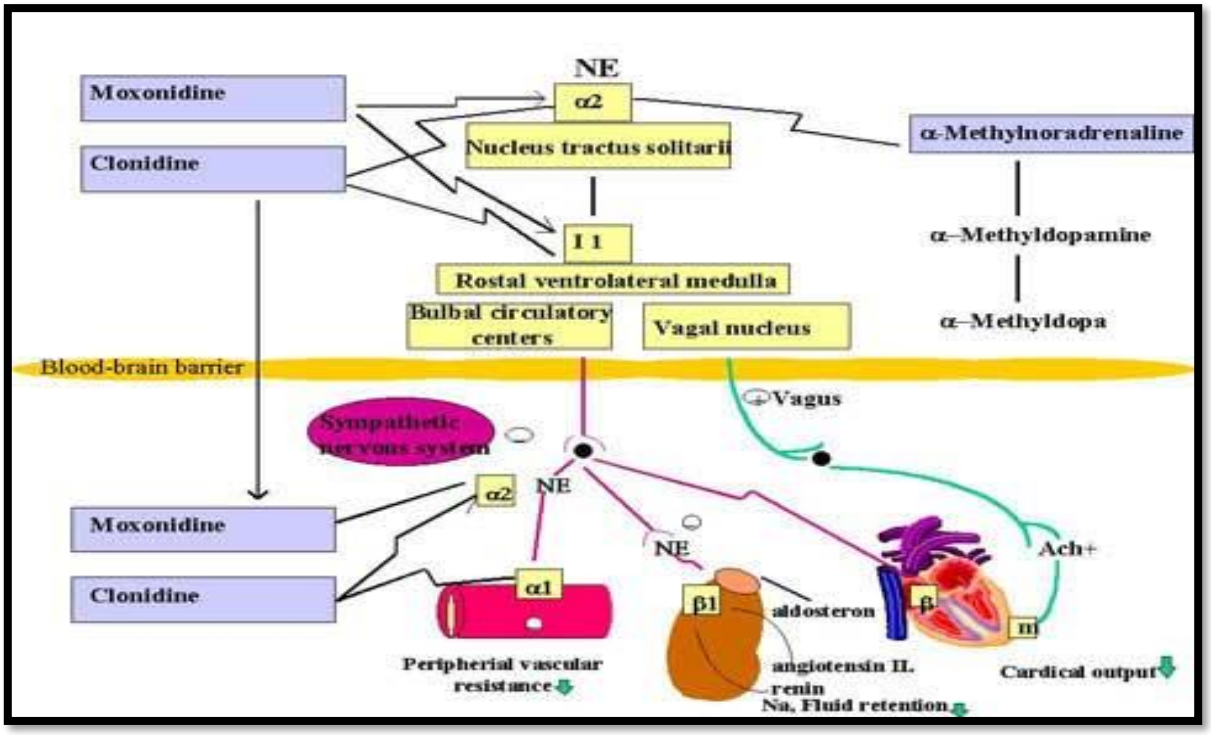

Fig.No 3-mechnism of action on hypertension in body

2.3 PREVENTION-There is an increasing body of evidence to support various lifestyle changes to prevent hypertension.There are two approaches to preventing hypertension:

Whole population

The aim is to prevent hypertension by lowering average blood pressure by relatively small amounts across a whole population. It has been estimated that a reduction as small as 2mmHg in average adult systolic blood pressure could save more than 14,000 UK lives per year. This can be achieved by encouraging enough people to change their lifestyles
sufficiently to reduce their blood pressure.Main lifestyle changes include:

- Reduce salt intake (to an average of 6g/day for adults)
- Increase fruit and vegetable intake
- Increase habitual physical activity to recommended levels
- Keep alcohol intake within recommended benchmark limits
- Control weight

a. Reduce salt for cooking by 50%.
b. Substitute natural foods for processed foods.
c. No sprinkling of salt on dining table.
d. Avoid salty snacks such as pickles, chutneys, papad,salted nuts.
e. Use salt substitutes containing potassium.
f. Avoid medications such as antacids as these are rich in salt.

It is now agreed that reducing salt intake is an essential part of dietary policy. The universal recommendation is to consume less than 10 gms of NaCl per day. The lower the better.
WHO recommends 5 gms or less especially in populations known to have a high salt intake or a high

prevalence of blood pressure.

LITTERATURE SERVAY

S.NO	AUTHOUR NAME	EXPERIMENT	RESULT	YEAR
1	D. A. Knapp, C. R. Nelson	To determine the antihypertensive Drug Therapy of Ambulatory Patients by US Office-Based Physicians	Estimated number and percent of hypertension visits in which at least 1 antihypertensive drug. was mentioned were, respectively. There was no significant trend for these percentages	2000
2	D. S. loao ,D. Nefrologia, F.D. Medicina	Hypertension in the elderly	Hypertension, namely ISH is recognized as an important entity in the elderly which requires consistent treatment	2001
3	G. A. Mansoor	Herbs and Alternative Therapies in the Hypertension Clinic	Vigilance is needed in monitoring the use of herbals, supplements, and other nontraditional medications in the hypertensive population	2001
4	A.P. Dadhich, D.K. Badyal, H. Lata	To perform the Animal models of hypertension and effect of drugs	Hypertension model has been studied on both the conventional and genetic models on hypertension	2003

5	D.D. Zeeuwa, F M. Haaijer-Ruskampa, F W. Beltmanb, J P. Grevinga,, M C. J. M. Sturkenboomc, Willem Jan van der Veenb	To dertermine antihypertensive agents does comorbidity explain trends in prescribing of newer	The average number of comorbidities increased from 0.4 in the lowest age group to 1.4 in the highest age group.	2004
6	A.Movahed, F. A Ghanem	Antihypertensive Drugs during Pregnancy and Lactation	During pregnancy the drug therapy has been studied on lower arterial pressure in pregnancy should be used mainly for maternal safety due to lack of data to support an improvement in fetal outcome. Drug therapy is usually indicated if arterial pressures exceeds 150 to 160 mmHg systolic or 100 to 110 mmHg diastolic or in the presence of target organ damage.	2007
7	A. A. Kroon, A.G.H. Kessels, C. Dirksen, D. E. Grobbee, Dani lle E.M. Brunenberg, F. W. Beltman, G.V. Montfrans,	To study and survey the Self-Measurement of Blood Pressure at Home Reduces the Need for Antihypertensive Drugs	459 patients met the inclusion criteria and were considered eligible for the study	2007
8	A. Khoynezhad, P. Gupta	To study the Hypertensive Emergency in Aortic Dissection and Thoracic Aortic Aneurysm	Hypertensive emergency with aortic dissection and symptomatic aortic aneurysm is associated with major morbidity and	2009

			mortality.	
9	Dr. Talhatu K. Hamzat,PhD Mr. Adeolu O. Ajala,MSc	To determine Interaction between anti-hypertensive and non-steroidal anti inflammatory drugs: implications in management of osteoarthritis and opinion on a compromise therapy	Physiotherapy has been found the relatiponship between and other non-pharmacological therapies of OA(Osteoarthritis;) are recommended. Pain relief is a key goal in the management of osteoarthritis and NSAIDs, more often than not, are prescribed..	2009
10	J. Thompson, Nadia Ladak	To study the Drugs acting on the heart: antihypertensive drugs	Antihypertensive drugs are used commonly in anaesthesia and intensive care medicine. Patients might require antihypertensive drugs before surgery for the treatment of essential hypertension	2009
11	D. P Akash, S .Ashok P.	Adverse Effects Associated with the Use of Antihypertensive Drugs: An Overview	During the discussion on Anti-hypertensive drugs which is associated with the management of hypertension. Their use has been limited by their propensity to cause cardiac adverse effects.	2010

12	K. Asterios G. A, Vasilios,, P. D. Efstathios,T Konstantinos., D. G Thomas	Effect of Antihypertensive Drug-Associated Diabetes on Cardiovascular Risk	During the survey of antihypertensive drugs (i.e. diuretics and β-blockers) appear to increase the risk for T2DM(type 2 diabetes mellitus), whereas "newer" agents have either a neutral effect (scalcium channel blockers) or decrease the risk (ACE inhibitors and angiotensin receptor blockers).	2010
13	A.Manish ,A. N. S.,N.D,S. Vikas.	Herbal remedies for treatment of hypertension	Treatment on herbal formulation including diet, exercise, and stress management, may contribute significantly to lowering of blood pressure.	2010
14	E Marie, G.Eva-Lotta, L.Michae,S.PhD; Maria,,	Persistent Use of Secondary Preventive Drugs Declines Rapidly During the First 2 Years After Stroke	The mean age was 75.2 years (SD, 11.7). There were more men than women (51.5% vs 48.5%), and 23.6% of the patients had a previous stroke. Cerebral hemorrhage contributed to 9.5% of the stroke events; 86.5% were ischemic strokes and 4.0% were undefined strokes	2010
15	K. V. Raghu.,M. G.	To study the	It contain about 34 (	2011

	P,M.P.K,P.B. Guru,R. V. Raghu	adverse drug reactions due to antihypertensive drugs in a tertiary care teaching hospital	Adverse drug reactions)ADRs were observed in 250 hypertensive patients (106 male and 144 female) during the four month of study with a mean age of 51.52±12.1; mean BMI of 41.52±13.9 kg/m2	
16	A.M Shamsher,B S.Parminder.,C Lakshita,H.Asif,,M. Moloy S. Nadeem	To determine the Pharmacological and Pharmaceutical Profile of Valsartan: A Review	During pharmacology action of Valsartan it show the effect during tolerated once daily Antihypertensive agent in patients with mild to moderate hypertension. In addition, the drug may reduce BP when used as monotherapy in patients with severe hypertension or when used adjunctively in patients with resistant hypertension.	2011
17	D.K,RAnitha.,L.T.,M.V.	Coping With Hypertension Using Safer Herbal Medicine – A Therapeutic Review	Hypertension or elevated blood pressure is an initiator and promoter of cardiovascular disease and end organ damage. Primary or essential hypertension is an	2011

			elevated blood pressure due to an unknown or unidentifiable pathology.Secondary hypertension may be caused by underlying pathology or certain medication	
18	K.A.,R. B. B .kumar	Biopharmaceutics Classification System: A Regulatory Approach	According to solubility and permibility of hypertensive drugs was classified.	2011
19	A.Md Sabir,B.Parminder S.,H.Asif,M.Moloy	A Review on Candesartan: Pharmacological and Pharmaceutical Profile	Candesartan WAS a potent, long-acting, non-peptide tetrazole derivative, angiotensin II receptor antagonist having high selectivity for the AT1 subtype (angiotensin I).	2011
20	B,V Gawade.S.A , Fegade	Rauwolfia (Reserpine) As a Potential Antihypertensive Agent: A Review	Reserpine was a pure crystalline single alkaloid; it cannot produce undesirable effects from unknown alkaloid in the whole root So it WASinteresting to know that in smaller doses it gives more potent hypotensive action and for prolonged duration.	2012
21	B. Jáuregui-Garrido,I.	Interactions	The aim of this	2012

	Jáuregui-Lobera	between antihypertensive drugs and food	study was to conduct a review of available data about interactions between antihypertensive drugs and food	
22	A.Sharma,M.R. Rathod	To determine and understanding the pharmacological action on Hypertension using Ayurveda	Relation with causes and symptoms of the disease in *Ayurveda* hypertension can be considered as *Shonita Dusti*.	2012
23	A. Chandra,A. Yadav,A. Sonje,D. A. Jain	To determine the Formulation and evaluation of immediate release tablet of Antihypertensive drug to bcs system	It has been studied the formulation and evaluation to show the effect of lubricants on dissolution profile of antihypertensive drugs.	2012
24	A Kaskoos.raad,AJaved ,J.H.Khitam ,A.J.Shahlah	Journal of pharmacognosy and phytochemistry	The antioxidant activity of methanolic extract of *C. maxima* leaves was determined.	2013
25	L.Williams, RN, A.H.P.	To study the Hypertension on Lifestyle Management**:**	Hypertentionhad treated by ayurveda system	2013
26	l.m.Pathak, P. Kothiya	Antihypertensive Drugs Interaction with Herbal Medicine.	It show the interaction with herbal medicine which may lead to bioavailability and pharmacokinetic parameter of drugs. Pharmacodynamic interactions may produce synergestic or antagonistic effect.	2013

27	A.Abdulkarem,F Sarhan,Shamssain,S.Shanableh	To study the Quality Of Life of Hypertensive Patients on Different Types of Antihypertensive Medications	During hypertension complete data has been sets, which where it included in this study	2014
28	N. suliska, e.ysukandar	The effectivity of captopril, losartan,and amlodipineon hypertension in rat model of gentamicin-induced renal failure	Serum creatinine was increased in all groups after an induction for 5 days. Renal index control positive, captopril, losartan, and amlodipine group showed significant differences when compared to the negative control group.	2014
29	YK Seedat, BL Rayner, Yosuf Veriava	South African hypertension practice guideline	Reduction in risk of stroke, cardiac failure, chronic kidney disease and coronary artery disease	2014
30	S.Bharath,S.Krishnamurthy,V Madhavan.	To determine the solubility enhancement of bcs class ii antihypertensive drug using solid self emulsification technique.	Solubility enhancement has been studied by the use Self emulsifying drug delivery systems (S-SEDDS) technique in improving the dissolution profile.	2014
31	Johan pandian j, manimekalai .k velvizhy r.	Pattern of antihypertensive drug utilization in a tertiary care hospital	Totally 230 patients were diagnosed with hypertension. For each patient the age, gender,	2015
32	Нетренко О. В.	Chronotherapy of hypertension:	Review devoted to chronotherapy of	2015

		literature review	hypertension	
33	Trilestari, Arief Nurrochmad, Ismiyati, Agustin Wijayanti, Agung Endro Nugroho.	Antihypertensive activity of ethanolic extract of *Andrographis paniculata* herbs in wistar rats with a non-invasive method.	The high cost of treatment and the side effects of drugs are causes of the lack of public awareness in dealing with hypertension.	2015
34	Eltom Elhassan H, Randhawa Mohammad A, Alenazi Khalifa A, Alenazi Yzan T, Alenazi Ahmed B	Research & Reviews: Journal of Hospital and Clinical Pharmacy	Study the overall participant knowledge and awareness about medical treatment, drug compliance, and the disease was ranging from 60-86%.	2015
35	P. Singh, A.Mishra, P. Singh, S. Goswami, A.Singh, K D. Tiwari	Hypertension and herbal plant for its treatment: a review	Hypertention are treated with herbal drugs.	2015

PHARMACOLOGICAL ACTION OG SYNTHETIC DRUGS

Pharmacology action of given drug which can targeted a drug administered inside the body to show a pharmacokinetic and pharmacological action of drug which show a therapeutic efficiency at a moderated dose in a given different time interval to show a adverse reaction also. **Table No 4.1**

S. NO	DRUG	CATEGORY	DOSE	MODE OF ACTION	USE	ADVERS EFFECTS
1	Atenolol	AntiHypertension	12.5, 25, 50 mg tabs	B-blockers	Hypertension,Angina	Fatigue,sleepdisturbance,insomnia
2	Propranolol	AntiHypertension	Oral—10 mg BD to 160 mg QID	B-blockers	Hypertension ,Angina pectoris, Cardiac arrhythmias, Myocardial infarction (MI), Congestive heart failure, Dissecting aortic aneurysm, Pheochromocyto	g.i.t. upset, lack of drive, nightmares, forgetfulness, rarely hallucinations. Male patients more frequently complain of sexual distress.

					ma	
3	metprolol	AntiHypertension	12.5–50 mg OD–BD.	b-blockers	Hypertension ,Angina pectoris, Cardiac arrhythmias, Myocardial infarction (MI), Congestive heart failure, Dissecting aortic aneurysm, Pheochromocytoma	Milder
4	labetalol	AntiHypertension	50 mg tab, 20 mg 4 ml amp	a+b adrenergic blockers	Hypertension,	Postural hypotension
5	Carvedilol	AntiHypertension	6.25 mg BD initially, titrate to max. of 25 mg BD.	b1 + b2 + a1 adrenoceptor blocker	Hypertension,CHF	Edema
6	furosemide	Diuretics	20–80 mg OD .in morning sufficiency,upto 200 mg 6 hourly has been given by i.m./i.v. route. In pulmonary edema 40–80 mg i.v	Inhibits Na+- K+-$2Cl^-$ cotransport	Edemia ,Acute pulmonary edema,cerebral edema,Hypertension,Hypercalcaemia of malignancy	Pulmonary edema,renal hepatic insufficiency.
7	Chlorthalidone	Diuretics	50-100mg OD	inhibitor of Na+-Cl^- symport	Edema,hypertension,Diabetes insipidus,Hypercalciuria	Postural hypotension

8	Indapamide	Diuretics	2.5 mg)/day	Na^+ Channel inhibitor ,k^+ inducers	Diuretics	Minor g.i. symptoms, fatigue.Hypokalaemia is infrequent
9	Amiloride	Diuretics	5-10 mg OD-BD	Block entry of Li^+ through Na^+ channel	Mild antihypertensive, diurectis	Nausea, diarrhoea and headache.
10	Captopril	AntiHypertension	25-150MG	Increases plasma kinin level	Hypertension	Hypotension, Cough ,Hyperkalaemia,Rashes, urticaria, Dysgeusia: Foetopathic, Granulocytopenia and proteinuria,Headache, dizziness, nausea and bowel upset
11	Enalapril	AntiHypertension	5–20 mg OD or BD.	ACE inhibitor	Hypertension,CHF,Myocardial infarction(MI)	Headache, dizziness, nausea
12	Ramipril	AntiHypertension	5, 10, 20 mg tab.BD	ACE inhibitor	Hypertension,CHF,Myocardial infarction(MI)	Headache, dizziness, nausea
13	Fosinopril	AntiHypertension	Initially 10 mg (elderly 5 mg) OD; maximum 40 mg/day.	ACE inhibitor	Hypertension,CHF,Myocardial infarction(MI)	Rashes, urticaria, Dysgeusia: Headache, dizziness, nausea
14	Losartan	AntiHypertension	50 mg OD, rarely BD; in liver disease or volume depleted patients 25 mg OD; 12.5–25 mg	ACE Inhibitors, AT_1 receptor block	hypertension	hypotension and hyperkalemia
15	Candesart	AntiHyp	8 mg OD	ACE	hypertension	hypotension and

	an	ertensio n	(max 8 mg BD), liver/kidn ey impairme nt 4 mg OD.	Inhibitors, AT_1 receptor block		hyperkalemia
16	Irbesartan	AntiHyp ertensio n	150–300 mg OD.	Selective antagonists of AT2 receptor	hypertension	hypotension and hyperkalemia
17	valsartan	AntiHyp ertensio n	80–160 mg OD 1 hour before meal (initial dose in liver disease 40 mg)	Inhibits ca^{2+} channel	hypertension	hypotension and hyperkalemia
18	Telmisart an	AntiHyp ertensio n	20–80 mg OD.	AT_1 receptor block	Hypertension,CH F,Myocardial infraction,Diabeti c nephropathy	Liver disease
19	Aliskiren	AntiHyp ertensio n	150–300 mg OD;	Direct rennin inhibitor	Antihypertensive	dyspepsia, abdominal pain, loose motions, headache and dizziness. Acute hypotension, hyperkalaemia, cough, angioedema and rashes
20	Verapami l	AntiHyp ertensio n	40-160mgT DS,5mgb y slow i.v injection	Inhibits ca^{2+} channel	Hypertension,card iac arrhythmias	Nausea,constipation,Bradyc ardia,flushing,headache,ank le edema
21	Dilitiaze m	AntiHyp ertensio n	30-60mgTD S-QID Oral	Inhibits ca^{2+} channel	Hypertension,card iac arrhythmias	Milder,
22	Nifedipin e	AntiHyp ertensio n	5-20mg BD-TDS oral	Inhibits ca^{2+} channel	Antihypertensive	Palpitation,flushing,ankle edema,hypotension,headach e,drowsiness,nausea

23	Felodipine	AntiHypertension	5-10mgOD, max.10mg BD	Inhibits ca^{2+} channel	Antihypertensive	drowsiness,nausea
24	Amlodipine	AntiHypertension	5-10mgOD	Inhibits ca^{2+}channel	Antihypertensive	Ankle edema, Palpitation,flushing,headache,postural dizziness
25	Nitrendipine	AntiHypertension	5-20mg OD	Inhibits cAMPphosphodiesterase	Antihypertensive	Atherosclerosis
26	Lacidipine	AntiHypertension	4mg OD	Inhibits ca^{2+} channel	Antihypertensive	Ankle edema, Palpitation,flushing,headache,postural dizziness
27	Prazosin	AntiHypertension	1–4 mg BD or TDS	selective a_1 blockers	Hypertension, Pheochromocytoma, Benign hypertrophy of prostate, Secondary shock, Congestive heart failure (CHF), Peripheral vascular diseases	Postural hypotension
28	Terazosin	AntiHypertension	2.5 mg BD-QID or 10 mg as extended release (ER) tablet	selective a_1 blockers	Hypertension, Pheochromocytoma, Benign hypertrophy of prostate, Secondary shock, Congestive heart failure (CHF), Peripheral vascular diseases	Postural hypotension
29	Doxazosin	AntiHypertension	1 mg OD initially, increase upto 8 mg BD	selective a_1 blockers	Hypertension, Pheochromocytoma, Benign hypertrophy of prostate, Secondary shock,Congestive heart failure (CHF), Peripheral	Postural hypotension

					vascular diseases	
30	Imidapril	AntiHypertension	Initially 5 mg OD taken 1 hour before food; usual maintenance dose 10 mg OD	ACE inhibitor	Hypertension, Pheochromocytoma, Benign hypertrophy of prostate	Type-2 Diabetes
31	Benazepril	AntiHypertension	10 mg initially, max 20–40 mg/day	ACE inhibitor	Hypertension, Pheochromocytoma, Benign hypertrophy of prostate	Diabetes
32	Clonidine	AntiHypertension	100 µg OD or BD, max. 300 µg TDS, orally or i.m	Activates Imidazoline receptors, decreased sympathetic outflow and fall in BP.	Antihypertensive	Sedation, mental depression, disturbed sleep; dryness of mouth, nose and eyes (secretion is decreased by central action), constipation (antisecretory effect on the intestines). • Impotence, salt and water retention, bradycardia. • Postural hypotension
33	Methyldopa	AntiHypertension	0.25–0.5 g BD–QID oral	Reduce nar-adrenaline synthesis	Antihypertensive excepts hypertension during preganacy	Sedation, lethargy and reduced mental capacity , Cognitive impairment may develop. Dryness of mouth, nasal stuffiness, headache, fluid retention, weight gain, impotence, Postural hypotension is generally mild.
34	Hydralazine	vasodialator	25–50 mg OD–TDS	Interference with Ca2+ release, opening of certain	antihypertensives during pregnancy, especially preeclampsi	Facial flushing, conjunctival injection, throbbing headache, dizziness, palpitation, nasal stuffiness, fluid

				K+ channels and/or NO generation may be involved		retention, edema, CHF.
35	Minoxidil	vasodialator	5% gel; apply twice a day	Increase Na+ reabsorption	Antihypertension Alopecia.	Local irritation, itching and burning sensation are frequent. Dermatological reaction and systemic
36	Nicorandil	Antianginal	5-20 mg BD	K+ channel opener	Emergencies hypertensive	palpitation,nervousness, vomiting, perspiration, pain in abdomen, weakness,disorientation, andlactic acidosis
37	Sodium nitroprusside	vasodialator	50 mg in 5 ml inj.	Plasma rennin is increased	Antihypertension	palpitation,nervousness, vomiting, perspiration, pain in abdomen, weakness,disorientation, and lactic acidosis
38	Hydrochlorothiazide	Diuretics	12.5-100mg/day	Inhibitor of Na^+-Cl^- symport	Hypertension,edema ,hypercalciuria	Weakness
39	Spironolactone	Diuretics	25–50 mg BD–QID; max 400 mg/day	Na^+ Channel inhibitor ,k^+ inducers	Edema, Hypertension, CHF	Drowsiness, ataxia, mental confusion, epigastric distress and loose motions
40	Lisonopril	AntiHypertension	5-40 mg per day	ACE inhibitors	Hypertension,	Hypotension, Cough ,Hyperkalaemia,Rashes, urticaria, Dysgeusia: Foetopathic, Granulocytopenia proteinuria,Headache, dizziness, nausea and bowel upset

HERBALS SOURSE OF ANTIHYPERTENSIVE DRUGS

Herbal drugs are obtained from the natural source of crude drug which is interacted with body to show a pharmacology action of the pure drug with a systematic circulation if the body to show a first pass metabolism.

Table No 5.1

S. NO	NATURAL DRUG	MECHANISM OF ACTION	DOSE	USE	PARTS OF PLAN	REFERENCES

					TS	
1	Arjuna bark	Inhibition of HMG-CoA redutase	500 mg every eight hourS	Bark—used as a cardioprotective and cardiotonic in angina and poor coronary circulation; as a diuretic in cirrhosis of liver and externally in skin diseases, herpes and leukoderma	Bark	30
2	Ashwagandha	Improved function of the central nervous system(CNS). Circulating levels of monoamine oxidase (MAO) and GABA levels have decreased, while levels of 5Qhydroxytrytophan and glutamic acid decreased.1	500mg–3g/per day	Root-used as antiinflammatory drug for swellings, tumours, scrofula and rheumatism; and as a sedative and hypnotic in anxiety neurosis. Leaf—anti-inflammatory, hepatoprotective, Antibacterial. Fruits and seeds—diuretic	Whole plant	31
3	Bhingaraj	inhibited the higher levels of histamine due to chronic inflammation upto 58.67 percent.	1 capsule (or tablet) once or twice a day.	Rheumatism,hair fall, fever, hepatitis, edema possessing potent antihepatotoxic properties	Leaves	32
4	Musanga cecropioides Umbrella	Vasorelaxant	Used with caution due to its	Hypotensive,antidiarrheal	Bark	

	tree,cork wood		high atropine content			
5	Punarnava (Hogweed	Blocking calcium channel ,relaxes smooth muscles	Fresh juice 5to10ml, powder 1-3 gm	Diuretic, bitter, cooling, astringent to bowels, useful in leucorrhoea, inflammations, asthma	Whole plant	33
6	Garlic	inhibition of platelet activity and increased levels of antioxidant enzymes.	3 to 6 mg per day	Antihypertension, cancer prevention and anti-inflammation, hyperlipidemia.	Bulbils	34,35,36
6	Licorice	Hypokalemia, metabolic alkalosis inhibits 11-b-hydroxysteroid dehydrogenase	0.2 mg/kg/day	AntiHypertension		37
8	Yohimbine	presynaptic a2-adrenergic blocking, monoamine oxidase inhibitor	low (10 mg) and higher doses (22 mg).	antihypertension	Bark	38,39
9	Ma Huang (Herba Ephedra	sympathomimetic activity	1.5 to 10 grams in decoction. The maximum dosage of Ma Huang is 20 to 25	In bronchospasm, asthma, and bronchitis and in allergic Rhinitis	Stem	

			grams			
10	Olive leaf	interfering with the immune system's interactions with the pancreas	500mg/ kg of olive leaf over 14 day	Sore throat, kidney problems and backache. Leaf infusions are lotion to treat eye infections or a gargle to relieve sore throat, internally as a remedy for colic or urinary tract infections; powdered leaf is used as styptic.	Leaf	
11	Raisins	Metabolic distruption	0.32 to 065oz/kg	Antioxidant,hypolipidemic,uterine relaxent	Leaf	
12	Satawari	Increasing secretion ,reducing H+ion back diffusion	200-400 mg/kg	Used as a galactagogue and for disorders of female genitourinary tract; as a styptic and ulcer-healing agent; as an intestinal disinfectant and astringent in diarrhoea; as a nervine tonic, and in sexual debility for permatogenesis	tuberous dried root	
13	Alpinia	CNS stimulate	500mg /kg	diuretic and antiulcerogenic	Whole plant	40,41
14	Hibiscus	Lowering blood pressure	100mg	Aromatic and mild laxative action	calyxes	
15	Ginkgo	Inhibits B amyloid deposition	120 to 240 mg /day	Asthma, sputum and cough, leucorrhoea	fruit , leaves	
16	Dang Gui / Dong Quai/ Chinese Angelica (*Angelica sinesis)*	Nitric acid is synthesized with nitric oxide synthase (vasodialation)	30 g	Modulated immune system,chronic constipation,menstrual disorders,hypertensive	dried root	42
17	Ginseng (*Panax Ginseng*	Stimulates deoxyribonucleic acid ,protein, lipid synthesis	200-400 mg per day	resistance to environmental stress and as a general enhancer of well-being	root	43
18	Forskolin	activated membrane-	250mg BD	hypotensive and antispasmodic	Root	

	(*Coleus forskohlii*)	bound adenylatecyclase and cytoplasmic cAMP-dependent protein kinase.				
19	Indian Snakeroot (*Rauwolfia serpentine*	depression of central nervous system	2-12 Drops TD	hypertension	Root	44,45,46,47,48
20	Ginger	Inhibits the activation of tumor necrosis factor a and cyclooxygenase -2 expression	250 mg QD	Flavour, as a condiment, aromatic, carminative	rhizomes	49
21	Grapes (*Vitis vinifera*	Might improve endothelium-dependent vasodilation	150-300 mg /day	antioxidant, hypotensive, hypolipidemic and vasodilator	Seed	
22	Agathosma betulina (Buchu).	Block calcium channel	600mg/kg body weight	diuretic and antiinflammatory agent	Fruits	50
23	Annona muricata (: Prickly Custard apple).	decreasing the peripheral vascular resistance	10mg/kg	Antimicrobial activity insecticidal	Fruits	51
24	Apium graveolens (Celery).	Reduce systolic and diastolic BP	orally three times each day	Hypertension	Seeds	52,53

25	Aristolochia manshuriensis (: Guan Mu Tong).	Inhibiting phosphatidylcholine biosynthesis	0.2g/kg	diuretic and antiphlogistic for the treatment of edema and rheumatic pain, hypotensive	Root	54
26	Avena sativa (Dietary Fiber, Green Oat)	reduce both systolic and diastolic BP.	5 to 10 drop TD	cardiovascular disease	Root	55,56
27	Blond psyllium (Indian plantago)	Increases in voume by tenfoldor more	15 g daily	cardiovascular disease, constipation,mild diarrhea	Seed	55
28	Camellia sinensis(Tea)	decreased risk of developing Hypertension,promoting detoxification of xenobiotic compounds	50,300,2000mg/kg	Hypertension, cardiovascular disease	Leaf	57
29	Capparis cartilaginea(Lasaf)	BP and slight bradycardia in anesthetized rats,stimulate the b-adrenergic receptor	15mg as a single dose	.Cardiac stimulant ,low bllod presseure	Leaf	58
30	Carum copticum (Ajwain)	Inhibits the COX-1 amd COX-2 and 5-lipoxygenas	(130 mg/kg)	Gastrointestinal disorders ,reflux,cramps,abdominal tumors,abdominal pain,helicobacter pylori ,ete infection ,carminative,antiseptic,antiplatelet-	Seed	59

		e		aggregatory,etc		
31	Cassia absus (Chaksu).	Decrease antiacetylcholine effect	(130 mg/kg	Anthelmintic,carminative,diuretics,haematinic,thermogenic,expectorant,stimulant	Seed,leavs,roots	60
32	Cassia occidentalis (Coffee weed).	inhibiting Ca^{2+}	1-2 tablespoom of dried seed powders, drink two cups BD	Acne,anemia ,kidney failure,asthma,cough,diarrhea,edema,fever,tuberculosis,urinary tract infection symptoms,muscle spasm ,swelling	Whole plnts	61
33	Castanospermum australe (Black bean).	fall in systolic as well as diastolic BP	1100 mg/kg	Inflammation,heart disease ,weight gain ,diabetes,cancers,western diet	Seed	62
34	Crinum glaucum (River Lily, Swamp Lily).	decrease in both systolic and diastolic pressures	4.2 ug/1.5 ul	Asthma,antispasmodic,hypnotic sedative	Leaves	63
35	Cuscuta reflexa (Giant dodder).	decrease in systolic and diastolic BP	10 to 20 ml of juice	Asthma, Diarrhea, indigestion,cough,eye diseases	Whole plants	64
36	Daucus carota (Carrot).	K^+ induced	(1–10 mg/kg, 10–200 µg/ml	BPlowering effect	aerial parts	65,66
37	Desmodium styracifolium : Osbeck).	increased coronary circulation, lowered arterial BP, slowed HR, and decreased the oxygen consumption of the	200mg BD	hypotensive actions	dry leaves and stem	

		heart.				
38	Gossypium barbadense (Pima cotton)	K^+ indused	0.01-10mg/ml	treat hypertension and delayed/irregular menstruation,Anti-inflammatory ,diuretics	yellow flowers and has black seeds	67
39	Glycine max (Soybean)	very modest reduction in BP,	15 ml TD	hypotensive	Seeds	68
40	Yarrow	Relax smooth muscles	4.5 g/day	Antihyperlipidemic diaphoretic and antipyretic, intestinal colic , diuretic and urinary antiseptic for urinary retention or cystitis, vulnerary and topical anti-inflammatory	Dried arial parts with flower	

6.1. CONCLUSION:

Hypertension is an important preventable cause of death and the treatment of this disease is a key strategy for the prevention of cardiovascular diseases. Descriptions of patients' Health Related Quality of Life (HRQL) among different diagnosis groups could be used by clinicians to assist individualized patient care. Our results showed an adverse impact of hypertension on participants' well-being and functioning. This could be useful in clinical practice, particularly in early diagnosis and treatment of hypertension, at which point improving self-management and consequently HRQL is still possible. Also it can be useful in the prevention of complications associated with hypertension such as: cerebrovascular disease and chronic kidney disease, which lead to further reduction in HRQL.

6.2.RECOMMENDATIONS:

Based on the present study, the Health Related Quality of Life (HRQL) of patients having hypertension can be improved by healthy life style and using suitable medications. There are several recommendations that can be offered to improve the HRQL among these patients; increase awareness on health promotion and hypertension among population, especially those people with low income and education levels, regular checkup, which can help in early diagnosis of any health problem and maintaining the HRQL of the individual in high level, following the guidelines in the priority of choosing the medications used in treatment of patients with hypertension. Also, increasing the sample size in patient group to get more clear information about each class of medications used and their effects on quality of life of patients

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