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To study Management of Hypertension via psychological Treatment, Drug Treatment, and Other Therapies to Prevent Hypertension: a systemic Review

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ABSTRACT: - In this paper our explored a systematic review on management of hypertension through drug treatment and others different therapies. Herbal and allopathic system of medicine since over a long time to cure and prevention of hypertension. Allopathic medicine treatment of hypertension various types of ailments. Each category used on their mode of action prational refer and control the hypertension.

Many antihypertensive agent are used for treatment of hypertension like calcium antagonist, angiotensin converting enzyme, beta-blockers, thiazide ,loop diuretics, centrally acting sympatholytic etc. these all category of allopathic medicine caused different side effect like blurred vision, headches, vomiting, nausea etc. herbal drug do not cause side effect.

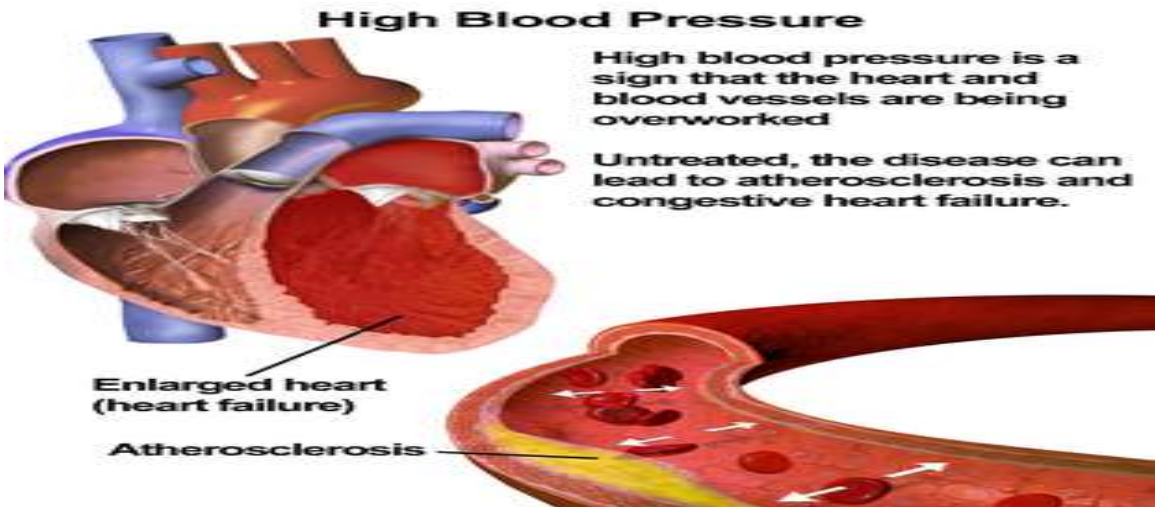
Herbal medicinal plants obtained from their root, stem, wood, bark, seed, fruits and other parts of plant are useful for prevention and cure of hypertension. There are many herbal drug like allium sativum, camellia sinensis, carrot, cinnamon, bindii, coriandrum sativum, onion, theobroma cacoa L., black plum, senna occidentalis, Indian plantago, sesanum indicum etc. which can safely used for treatment of hypertension. Cure of hypertension others therapies included the hypertension diet plan and exercise yoga and meditation.

This review highlights the scientifically proved herbs and allopathic medicine used for treatment of hypertension.

KEY WORDS: - Hypertension, Blood Pressure, Allopathic Medication, Herbal Medication, DASH Diet

INTRODUCTION:

Hypertension is the most common preventable risk factor for cardiovascular disease (CVD; including coronary heart disease, heart failure, stroke, myocardial infarction, atrial fibrillation and peripheral artery disease), chronic kidney disease (CKD) and cognitive impairment, and is the leading single contributor to all-cause death and disability worldwide. [1]



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High blood pressure is a common condition that affects the body artiries. Blood pressure is measured in millimeters of mercury (mm Hg).

Normal blood pressure- blood pressure is 120/80 mm Hg or lower.

Elevated blood pressure- The top number ranges from 120 to 129 mm Hg and the bottom number is below, not above 80 mm Hg.

Stage 1 hypertension- the top number ranges from 130 to 139 mm Hg or the bottom number is between 80 and 89 mm Hg.

Stage 2 hypertension- The top number is 140 mm Hg or higher or the bottom number is 90 mm Hg or higher.[2]

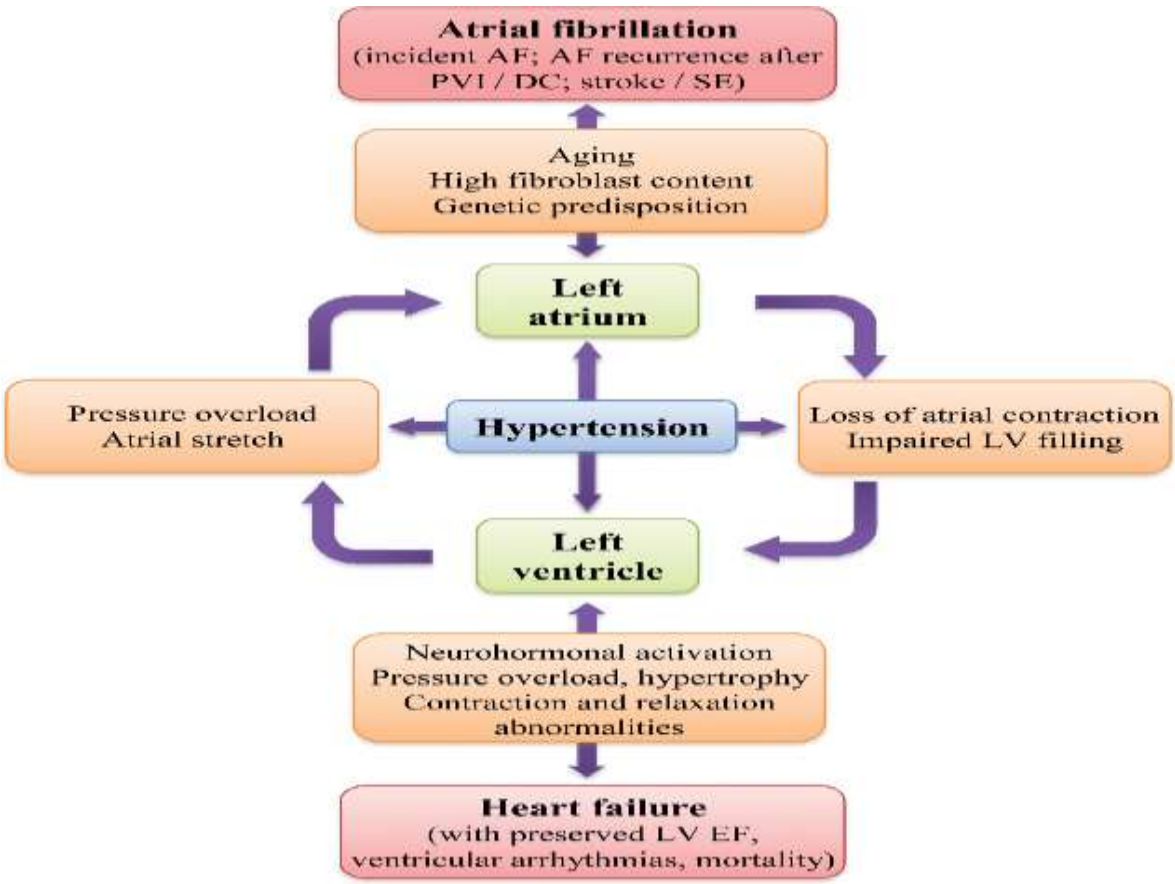
High blood pressure can be categorized two types;

- Primary (also called essential) high blood pressure- causes of these most common type of high blood pressure include aging and unhealthy habits like not getting enough exercise.
- Secondary high blood pressure – causes of this type of high blood pressure include different medical problems (for example kidney or hormonal problems) or sometimes a medication our taking.[4]

Symptoms Of Hypertension – When symptoms do occure, they can include early morning headaches

- Nose bleedind
- Irregular heart rhythms
- Vision Changes
- Buzzing in the ears
- Fatigue
- Nausea , vomiting , confusion
- Anxiety, Chest pain etc.[5]

Pathophysiology of Hypertension :



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Treatment of Hypertension by Allopathic Medications [6]

	Drug name	Category	Dose	Mode of action	Side effect	Remark
1	Captopril	ACE inhibitor	25-50mg	Blocking a substance in the body that causes blood vessels to tighten.	Dizziness,cough, etc.	Contraindicated in pragnancy.
2	Enalapril	ACE inhibitor	2.5-20mg	Angiotension-1 is converted to angiotensin-2	Headache,dry cough .	Enalapril is used alone or together with other medicines to treat high blood pressure (hypertension).
3	Lisinopril	ACE inhibitor	5-80mg	Inhibits ACE activity, thereby reducing plasma angiotensin II and aldosterone and increasing plasma renin activity.	Low BP, Blurred vision , weakness	Check serum creatinine before inhibition and repeat 2 weeks after instillation.
4	Peridopril	ACE inhibitor	2-8mg	ACE is a peptidyl dipeptidase that catalyzes conversion of the inactive decapeptide, angiotensin I, to the vasoconstrictor, angiotensin II.	Mild skin rash	ACE should be stopped if rise in creatinine >30% from baseline.
5	Ramipril	ACE inhibitor	2.5-10mg	Ramipril inhibits angiotensin-converting enzyme and decreases angiotensin II formation.	Muscles Cramps	42% of reviewers reported a positive experience, while 35% reported a negative experience.
6	Quinapril	ACE inhibitor	2.5-40mg	Quinapril is deesterified to the principal metabolite, quinaprilat, which is an inhibitor of ACE activity in human.	Headache , weakness	lowers blood pressure and increases the supply of blood and oxygen to the heart

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7	Fosinopril	ACE inhibitor		Fosinopril is an ester prodrug that hydrolyzes in the liver to fosinoprilat, the active metabolite form.	Vomiting,dizziness	MONOPRIL (fosinopril sodium) (fosinopril sodium tablets) is indicated for the treatment of hypertension.
8	Losartan	Angiotensin receptor Antagonist	50-100mg	They act by antagonist the AT1 as well as combined AT1 and AT2 receptors	• Feeling sick (nausea) , • Being sick (vomiting) • Diarrhoea., • Pain in your joints or muscles.	Contraindicated in pragnancy and bileateral renal artery stenosis
9	Condesartan	Angiotensin receptor Antagonist	8-16mg	Candesartan blocks the vasoconstrictor and aldosterone-secreting effects of angiotensin II by selectively blocking the binding of angiotensin II to the AT1 receptor in many tissues, such as vascular smooth muscle and the adrenal gland.	Chest pain and discomfort,Joint pain,irregular heart beat.	Candesartan is generally safe to take for a long time.
10	Valsartan	Angiotensin receptor Antagonist	80-160mg	Valsartan belongs to the angiotensin II receptor blocker (ARB) family of drugs, which selectively bind to angiotensin receptor 1 (AT1) and prevent angiotensin II from binding and exerting its hypertensive effects.	Bloody Urine,increased thirst,etc.	Bedtime administration of valsartan is considered to normalize circadian rhythm and protect the kidneys and heart in CKD patients.

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11	Talmisartan	Angiotensin receptor Antagonist	20-80mg	Telmisartan is an angiotensin II receptor blocker (ARB). It works by blocking a substance in the body that causes blood vessels to tighten	Change in vision,dizziness ,large hives.	Telmisartan is rapidly absorbed from the gastrointestinal tract.
12	Verapamil	Calcium Channel Blocker	80-240mg	Verapamil inhibits the calcium ion (and possibly sodium ion) influx through slow channels into conductile and contractile myocardial cells and vascular smooth muscle cells.	Chest Pain,Blue lips and fingernails etc.	May reduce reduce heart rate and use with beta blockers.
13	Diltiazem	Calcium Channel Blocker	30-60mg	diltiazem inhibits the inflow of calcium ions into the cardiac muscle during depolarization.	Headaches.feeling tired,stomach pain etc.	atrial arrhythmia, hypertension, paroxysmal supraventricular tachycardia, and chronic stable angina.
14	Nifedipine	Calcium Channel Blocker	10-30mg	Nifedipine inhibits the entry of calcium ions by blocking these voltage-dependent L-type calcium channels in vascular smooth muscle and myocardial cells.	Flushing,constipation,Oedema	nifedipine are safe for use in pregnancy.
15	Amlodipine	Calcium Channel Blocker	5-10mg	Amlodipine is a dihydropyridine calcium antagonist (calcium ion antagonist or slow-channel blocker) that inhibits the transmembrane	Headches,fatigue, palpitation,swelling.	It works by relaxing blood vessels so blood can flow more easily.

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				influx of calcium ions into vascular smooth muscle and cardiac muscle.		
16	Felidipine	Calcium Channel Blocker	2.5-10mg	Inhibiting the influx of calcium ions through voltage-gated L-type calcium channels.	Swelling of body,feling dizzy,unusual weight gain or loss.	Felodipine decr eases total renal vascular resistance and causes a transient increase in RBF in patients with normal RBF.
17	Clonidine	Centrally acting sympatholyt ic		Clonidine has an alpha-antagonist effect in the posterior hypothalamus and medulla.	Anxiety,burning, dryness,decrease d urine output	Clonidine was first used as a nasal decongestant and was found serendipitously to have blood pressure lowering effects
18	Methyldop a	Centrally acting sympatholyt ic		Alpha-methyldopa is converted to methyl norepinephrine centrally to decrease the adrenergic outflow by alpha-2 agonistic action from the central nervous system, leading to reduced total peripheral resistance and decreased systemic blood pressure.	Vommiting,diarr hea,gas,dry mouth	The addition of atenolol alone or methyldopa alone or of atenolol and methyldopa in combination is effective in the treatment of moderate hypertension.
19	Atenolol	B-blockers	50-100mg	Reduction in heart rate and blood pressure and decreases myocardial contractility.	Feeling Tired,Cold,Nause a.Vomiting,Diarr hea	Contraindicated in patient with COAD severe peripheral vascular disease and heart block.

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20	Metoprolol	B-blockers	50-200mg	Metoprolol is a cardioselective beta-1-adrenergic receptor inhibitor that competitively blocks beta1-receptors with minimal or no effects on beta-2 receptors at oral doses of less than 100 mg in adults.	Dizziness,Lightheadedness,Stomach pain	metoprolol is considered a safe and effective solution for social phobia and performance anxiety

Treatment of Hypertension by Herbal medicines :

Sr.No.	Plant name	Family/common name	Chemical constituents	Plant part	Uses
1	Allium Sativum 	Alliaceae	Garlic,alliin, ajoenes.mucilage,albumin, volatile and fatty oils.	Bulb	Antiviral,antibacterial
2	Carumcopticum L.(Ajwain) 	Apiaceae	Thymol(25.64%),carvacrol(14.36%),p-cymene(10.24%).	Seed	Abdominal tumors,abdominal pain
3	Camellia sinensis 	Theaceae	Catechin,caffeine,theaflavin.	Leaves and leaf buds	Anti-cancer,anti-microbial
4	Rauwolfia serpentine 	Apocynaceae	Reserpine, Serpentine,Ajmalicine	Roots	Hypertension
5	Zingiber officinale	Zingiberaceae	Gingerol, Zingiberene,	Roots	Hyperurecemia,hypercholestremia,bacteri

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			Shogaol,, trans-6-shogaol.		al infection
6	Carrot 	Umbelliferum	Ascorbic acid,tocopherol	Roots	Hypertension,skin ,diseases
7	Cinnamon 	Lauraceae	Cinnamaldyhyde,Cinnamate,Cinnamic acid	Bark	Antioxidant,antiinflammatory,antidiabetic
8	Bindii 	Caltrops	Starch,dietaryfiber,essential amino acids and minerals.		Antioxidant,antiinflammatory
9	Coriandrum Sativum 	Umbellifers	Linalol(40.9-79.9%),neryl acetate(2.3-14.2%),Alpha-pinene(1.2-7.1)	Leaves and Fruit	Antioxidan
10	Onion 	Amaryllidaceae	Quercetin,Allicin,Streptozotocin	Bulb	Atherosclerosis,Angina
11	Theobroma cacao L. 	Malvaceae	Carbohydrates (85%),Fat (14%),Protein(20%),Water(3%)	Seeds	Antioxidant,antimalarial,apetite
12	Black Plum(Syzygium cumini) 	Myrtle	3.40 g protein, 0.66 g fat, 13.73 g total sugars, and 2.50 g crude fiber	Fruits	Sore throat,bronchitis,asthma,thrust
13	Senna occidentalis(coffee weed)	Legumes	Alkaloids,flavonoids,tannis,emodin	Roots	Antiviral,antifungal,antibacterial

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14	Indian Plantago 	Plantaginaceae	flavonoids, alkaloids, terpenoids, phenolic acid derivatives, iridoid glycosides, fatty acids, polysaccharides and vitamins	Leaves	Antiviral,antifungal,antibacterial
15	Sesanum indicum 	Pedaliaceae	Sesamolin,Sesamol,Sesamin		Hypertension,antiviral

ALLIUM SATIVUM (GARLIC):

. This herb is recognized for its antibacterial, antioxidant, anti-inflammatory, anti-cancer, and hypocholerestemic effect.[7] higher concentrations of aged garlic extract (10 mL/day, containing 14.7 mg S-allylcysteine) for patients on warfarin therapy found no increase in the incidence of hemorrhage compared with placebo.[8]

CARUMCOPTICUM L. (Ajwain):

The calcium channel blocking effect, Ajwain has a role in heart rate and blood pressure.[9] Negative inotropic and chronotropic effects due to administration of 1–10 mg/kg thymol in mice were shown which lead to decrease in blood pressure. It was suggested that this effect of thymol could be due to calcium channel blocking property.[10]

CAMELLIA SINENSIS (TEA):

A large number of researchers have confirmed that green tea possesses chemical ingredients that are closely related to human health. Tea polyphenols, caffeine, theanine, tea polysaccharides, and other components which are extracted and separated from green tea have pharmacological activities such as anti-cancer, anti-oxidation.[11, 12]

RAUWOLFIA SARPENTINA:

Understanding Essential Hypertension is a Vata dominant Tridoshaj disease. Dushya Rasa and Rakta whole blood) Dhatu's are play important role in pathogenesis of hypertension.[13]

Rasa- Tikta, Guna- Ruksha, Vipaka- Katu, Virya- Ushna, KarmaKapha Vata Shamaka, Prabhava– Nidrajanaka (induces sleep). Parts used- Root. Sarpagandha has calming effect over mind and brain. It induces sleep. It also relieves excited state of mind, hence useful in hypertension. It decreases blood pressure.[14]

For hypertension– 250mg – 2 gram in divided dose per day. Manasa Bhavas like Chinta, Krodha, Bhaya, etc., play an important role in the pathogenesis, progression, and prognosis of diseases, and also have effects on the response to treatment – hypertension.[15]

ZINGIBER OFFICINALE (GINGER):

Shunthi (Zingiber offincinale) is one of the medicinal plants mentioned as 'Hridya' by Acharya Charak and Sushruta. Shunthi by its medicinal properties improves functions of heart and maintain elasticity of walls of blood vessels, so it is useful to maintain and cure hypertension. [16] Chemical constituents, active principles and ayurvedic medicinal properties of Shunthi in terms of Rasa, Veerya, Vipaka, Guna and Karma are reviewed.[16]

An in vivo study by Ghayur et al. (2005) used 70% methanol extract on rats and showed that Z. officinale Roscoe extracts at a dose of 0.3-3 mg/kg reduces arterial blood pressure in anesthetized rats.[17]

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DAUCUS CARROTA:

Carrots contain 86 percent moisture, 0.9 percent protein, 0.2 percent fat, 10.6 percent carbohydrate, 1.2 percent crude fibre, 1.1 percent total ash, 80 mg of calcium per 100 grams, 2.2 mg of iron per 100 grams, and 53 mg of phosphorus per 100 grams. However, the values reported by Holland et al. (1991) for the majority of these parameters are different.[18]

Ethanolic extract of Daucus carota at the dose of 10–100 mg/kg caused a dose-dependent fall in systolic and diastolic arterial blood pressure in normotensive anesthetized rats.[19]

DC-2 and DC-3 acting through blockade of calcium channels, the effect which may be responsible for the blood pressure lowering effect of the compounds observed In the in vivo studies.[20]

CINNAMON:

Cinnamomum (cinnamon) is a genus of the Lauraceae family, many of whose members are used as spices.[21] The ability of cinnamaldehyde in vasodilatory function may be because it impedes both Ca^{2+} influx and Ca^{2+} release.[22] Generally, major chemicals reported to be present in cinnamon include coumarin, cinnamic acid, eugenol, and cinnamaldehyde that contribute to its pharmacological properties (e.g. anti-inflammatory, anti-oxidant, anti-diabetic, and anti-obesity).[23]

TRIBULUS TERRESTIS (BINDII) :

Tribulus terrestris is a medicinal plant used for treating HTN. Bindii causes a decrease in BP in spontaneously hypertensive (SHR) rats. Its methanolic and aqueous extracts (0.3–15 mg/ml) have been shown to have vasodilatory properties.[24] Gokshura (Tribulus terrestris Linn) is having the properties of best diuretic and vatahara (C.Su 25/40), by virtue of these properties Gokshura may antagonize the etipathogenesis of hypertension by reducing the intra vascular volume, thus prevents further accumulation of fluid and ultimately influence the other blood pressure controlling mechanisms like renal, cardiac, endocrine and central nervous system and work hriday vasodilators.[25]

CORIANDRUM SATIVUM (CORIANDER):

The fruit extracts of C. sativum reduces the effects of hypertension in animal model, rabbit, by relaxing the valves of aorta.[26,27] Phytochemicals present in C. sativum, such as flavonoids, phenolic acids, phytosterols, and terpenes, have significant potential in cardiovascular health and have demonstrated an angiotensin-converting enzyme (ACE)-inhibiting potency, cardioprotective, antihyperlipidemic, and cardiometabolic disorder-inhibiting properties.[28,29]

The aqueous-methanolic extract of coriander fruits was also found to exhibit diuretic effect in conscious rats (Jabeen et al., 2009)

ALLIUM CEPA L. (ONION):

Onion has been shown to be anti-hypertensive in many in vivo animal studies. In L-NAME (NG-nitro-L-arginine methyl ester)-induced hypertensive rats and stroke-prone spontaneously hypertensive rats (SHRSP), dried onion was able to reduce blood pressure when it was added into diet at 5% .[30] Mechanisms of action by which these onion bioactive compounds exert their hypolipidemic and hypocholesterolemic activities include: inhibition hepatic lipid/cholesterol biosynthesis by inactivating thiol enzymes (eg. HMGCoA), which promote it, or by reducing the level of NADPH in tissue, thus they may not be available for cholesterol synthesis.[31, 32, 33]

THEOBROMA COCOA L.:

Theobroma cacao L. is a small but economically important tree. It is an evergreen, 4–8 m tall, of the Sterculiaceae family, native to the tropical region of the Americas.

Each seed contains a significant amount of fat (40–50% as cocoa butter) and polyphenols which make up about 10% of the whole bean's dry weight (epicatechin: concentrations among freshly harvested beans of verified genetic origin ranged from 21.89 to 43.27 mg/g of dry defatted samples).[34,35]

SYZYGIUM CUMIN (BLACK PLUM):

S. cumini has also been reported to promote hypotensive and antihypertensive effects. Chronic administration of hydroalcoholic extract of S. cumini leaf (100 and 250 mg/kg/day, 20 weeks) reduced blood pressure in normotensive rats, an effect further corroborated by decreased reactivity of vascular smooth muscle observed upon incubation of its chloroform (0.25 and 0.5 mg/mL) and aqueous fractions (0.1, 0.25, and 0.5 mg/mL. [36]

Diet Plan for Hypertension:

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DASH Diet - The DASH (dietary approaches to stop hypertension) pattern, which emphasizes a diet rich in fruits, vegetables, and low-fat dairy products and reduced saturated and total fat, has been tested in multiple randomized controlled trials in specific populations including obese ty hypertensives.[37]

Diet Chart : [38]

Days	Breakfast	Lunch	Dinner
Monday	**Banana Yogurt pots.** Nutritions:- Calories- 236 Protein-14g Carbs-32g Fat-7g	**Cannellini Bean Salad** Nutritions:- Calories- 302 Protein-20g Carbs-54g Fat-0g	**Quick Moussaka** Nutritions:- Calories- 577 Protein-27g Carbs-46g Fat-27g
Tuesday	**Tomato and watermelon Salad**. Nutritions:- Calories- 177 Protein-5g Carbs-13g Fat-13g	**Edgy Veggie Wraps**. Nutritions:- Calories- 310 Protein-11g Carbs-39g Fat-11g	**Spicy Tomato Baked Eggs.** Nutritions:- Calories- 417 Protein-19g Carbs-45g Fat-17g
Wednusday	**Bluberry Oats Bowl**. Nutritions:- Calories- 235 Protein-13g Carbs-38g Fat-4g	**Carrot,Orange,Avocado Salad.** Nutritions:- Calories- 177 Protein-5g Carbs-13g Fat-13g	**Salmon With Potatoes and Corn Salad.** Nutritions:- Calories- 479 Protein-43g Carbs-27g Fat-21g
Thursday	**Banana Yogurt Pots.** Nutritions:- Calories-240 Protein-11g Carbs-22g Fat-12g	**Mixed Bean Salad**. Nutritions:- Calories- 240 Protein-11g Carbs-22g Fat-12g	**Spiced Carrot and Lentil Soup.** Nutritions:- Calories- 238 Protein-11g Carbs-34g Fat-7g
Friday	**Tomato and Watermelon Salad.** Nutritions:- Calories- 452 Protein-6g Carbs-37g Fat-25g	**Panzanella Salad.** Nutritions:- Calories- 452 Protein-6g Carbs-37g Fat-25g	**Med Chicken Quinoa and greek Salad.** Nutritions:- Calories- 473 Protein-36g Carbs-57g Fat-25g
Saturday	**Blueberry Oats Bowl.** Nutritions:- Calories-473 Protein-11g Carbs-56g	**Quinoa and Stir Fried Veg.** Nutritions:- Calories-473 Protein-11g Carbs-56g	**Grilled Vegetables with Bean mash.** Nutritions:- Calories-374 Protein-19g Carbs-33g

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	Fat-25g	Fat-25g	Fat-16g
Sunday	**Banana Yogurt Pots.** Nutritions:- Calories-408 Protein-15g Carbs-63g Fat-11g	**Moroccan Chickpea Soup.** Nutritions:- Calories-408 Protein-15g Carbs-63g Fat-11g	**Spicy Mediterranean beat salad.** Nutritions:- Calories-548 Protein-23g Carbs-58g Fat-20g

Yoga Pranayam and Meditation:[39]

(1) Setu Bandhasana (Bridge pose)
(2) Vajrasana (Diamond pose)
(3) Balasana (Child pose)
(4) Viparita Karani (legs up in the air)
(5) Adho Mukha Svanasana (Downword Dog Pose)
(6) Baddha Konasana (Butterfly Pose)
(7) Janu Sirsasana (Head to knee Pose)
(8) Halasana (Plow Pose)
(9) Bhujangasana (Cobra pose)
(10)Shavasana (Corpse Pose)

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