



## Geriatric Hypertension and its Dietary Recommendation

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### Abstract

*In the elderly, isolated systolic hypertension is commonly noted. It is defined as systolic blood pressure greater than or equal to 140 mm Hg and diastolic BP less than 90 mm Hg. Its prevalence 30 percent more than women and 20 percent more in man over the age of 65 years. The overall prevalence rate of hypertension in Indian subcontinent is 6.5. The prevalence of elderly hypertension is increasing worldwide, it is perhaps due to both (a) increasing longevity, and (b) increasing obesity from more traditional dietary intake among and less physical activity among geriatrics. It was estimated that elderly have a 90% life time risk for developing hypertension and approx. five crores of Indian population suffering with hypertension. The impact of ageing and the accompanying increased prevalence of hypertension on both stroke and ischemic Heart Disease (IHD) mortality has been clearly portrayed in a meta-analysis of data from over an million adults in 61 prospective studies by the prospective studies collaboration. The importance of diet for prevention and control hypertension was first incorporated in JNC-7 and it was linchpin of the life style. In this paper researchers attempt to put forward a review of different dietary recommendation for prevention and control of geriatrics hypertension that to be beneficial for patients of elderly hypertension prevention and control for nutritionist and practitioners.*

**Keywords:** Elderly, isolated hypertension, ageing, ischemic heart disease (IHD), JNC-7.

### Introduction

Brings a considerably burden on society, government, hospitals, home etc.

In the elders, hypertension should not be seen in isolation. Disease in the elderly are characterized by multiplicity chronicity (persist long and do not go away), duplicity (presentations of disease are often marked).

The increasing part of elderly population (60 years and above)

Table-1

Years	Total	Male	Female
1901	5.06%	6.45	6.66
2001	7.70%	7.55	7.86
2050	23-80% Projected	-	-

Demographic transition from high mortality and high fertility to low mortality and low fertility resulted in steep rise in elderly population. India has the second largest elderly population next only to China in the world. As expected 78 % of elderly live in rural area comprising 7.22% of population whereas 22% of elderly live in urban area comprising 5.37% of population. It is also expected that a 55.57% live with their spouses, 33.43% with their children, 6% with relative and friends and rest 4-5% live alone. The prevalence of hypertension is increasing

worldwide because of both i. Increasing Longevity ii. Increasing obesity from more fast food intake and less physical activity. As noted in the JNC-7 report, there is no doubt that the unhealthy life style of people in most developed societies contribute to our high incidence of hypertension, diabetes and cardio-vascular disease<sup>1</sup>. Individuals who are normotensive at 55 years of age have a 90 % life time risk for developing hypertension<sup>1</sup>. The striking impact of ageing was seen among participants in the framinghem heart study. Among those who remained normotensive at either age 55 or 65 years (providing 2 cohorts) over a 20 years follow-up, hypertension developed in almost 90% of those who were now aged 75 or 85 years<sup>2</sup>. In India, it was estimated that approximately five crores of Indian population suffering with hypertension. The impact of ageing and the accompanying increased prevalence of hypertension on both stroke and Ischemic Heart Disease (IHD) mortality has been clearly portrayed in a meta-analysis of data from over one million adults in 61 prospective studies by the prospective studies collaboration<sup>3</sup>. Hypertension also depends on quality of life<sup>4</sup>.

**Definitions:** Hypertension is defined as systolic BP greater than or equal to 140 mm Hg. OR Diastolic BP greater than or equal to 90 mm Hg.

(Joint National Committee on prevention, detection, evaluation and treatment of High Blood Pressure)

**Isolated Systolic Hypertension (ISH):** Age after 50 years ISH with systolic hypertension BP less than 90 mm Hg (NHANES III data). Franklin et.al. A 65% of all cases of uncontrolled hypertension seen in the entire population and in 80% of patients older than 50 years ISH as a systolic BP of 160 mm Hg or greater. Franklin et. al.; ISH approximately use 140 mm Hg or higher for older patients of ages 50 years and above. In elderly, isolated systolic hypertension is commonly noted: Defined as systolic BP greater than or equal to 140 mm Hg and Diastolic BP less than 90 mm Hg. 65 years or more than 65 years. It occur more than 30% (woman)-65 years or more and more than 20% (man) in than 65 years.

**Finding of Hypertension study group<sup>5</sup>:** The overall prevalence in the Indian sub-continent is 65%.The prevalence were similar in both sex. In women with high BP have a significantly higher body mass index (BMI) than man. A higher BMI presence of diabetic. A higher educational status strongly correlated with the prevalence of hypertension.HTN higher with higher educational level. Sedentary life style also correlated with hypertension. Significantly higher in the urban population than their rural counterparts. Sub group analysis demonstrated that woman, were more aware of their hypertension than man and more likely to be treated than man. Awareness was higher in the urban residents than rural residents. Elderly hypertensions in rural Kerala demonstrated a greater awareness and were more likely to be treated than those from Dhaka. Levels of awareness about and treatment of hypertension did not differ among any of the urban areas. Hypertension control depends mainly on awareness for treatment.

**Symptoms:** In most elderly patients, primary hypertension is a symptomatic, epistaxis may be a presenting feature in many, or they present with symptoms or signs suggestive of end-organ dysfunction. Cardiac dysfunction is indicated by symptoms of coronary artery disease, heart failure, and arrhythmias, especially arterial fibrillation. Symptoms of angina pectoris may result from increased myocardial oxygen damage due to left ventricular hypertrophy and increased after load rather than due to coronary artery disease, stroke, intermittent claudications due to peripheral arterial disease, aortic aneurys, aortic dissection, features of hypertension retinopathy, renal insufficiency or failure may develop severe hypertension or any abrupt rise in BP may cause headache, blurred vision or dizziness.

**Diagnosis:** Diagnostic evaluations should be done to document elevated BP, evaluate for end-organ damage, detect other cardiovascular risk factors, and secondary causes when appropriate. All elderly people should be screened for hypertension at every healthcare visit and atleast annually. Before conforming the diagnosis, a high reading should be documented or at least two separate occasions with atleast two separate measurements on each occasion. Average change in blood pressure associated with commonly occurring activities, relative to blood pressure while relaxing in table-6.

**Concomitant disease and risk factors:** Cardiovascular risk factors, depression, chronic obstructive pulmonary disease, Impotency, Urinary symptoms, Arthritis, Anxiety, Insomnia and cognitive dysfunction.

**Risks Associated with Hypertension:** Ischemia, Infarction, Intermittent claudication.

**Mechanism of Anti Hypertensive Effect:** Weight loss likely lowers BP through multiple effects, includes the following: Improvement in insulin sensitivity; Decrease in Sympathetic Nervous System activity; Decrease in renin-angiotensive-aldosterone activity; Decrease in plasma leptin levels; Reduction in inflammatory cytokines; Reversal of endothelial dysfunction; Reduction in arterial stiffness.

**Types and Causes of Hypertension: Systolic and Diastolic Hypertension: Primary, Essential, or idiopathic identifiable causes:**

i. Renal: Renal parenchymal disease: Acute glomerulonephritis, chronic nephritis, polycystic disease, diabetic neuropathy, hydronephrosis. Renovascular disease, renal artery stenosis, other cause of renal ischemia, renal producing tumors, renoprival, primary sodium retention; Liddle's syndrome, Gordon's syndrome. ii. Endocrine: acromegaly, hypothyroidism, hyperthyroidism, hypercalcemia (hyperparathyroidism), adrenal disorders, cortical disorders (Cushing syndrome, primary aldosteronism, congenital adrenal hyperplasia), medullary tumors; pheochromocytoma, iii. Extra-adrenal chromaffin tumors, iv. 11/13-hydroxysteroid dehydrogenase deficiency or inhibition (licorice), v. Exogenous hormones (estrogen, glucocorticoids, mineralocorticoids, sympathomimetics, erythropoietin), vi. Foods containing tyramine with monoamine oxidase inhibitors, vii. coarctation of the aorta and aortites. viii. Pregnancy-induced, ix. Neurological disorders (Increased intracranial pressure, Sleep apnea, quadriplegia, acute porphyria, familial dysautonomia, Lead poisoning, Guillain-Barre Syndrome), x. Acute stress (psychogenic hyperventilation, hypoglycemia, burns, alcohol withdrawal, sickle cell crisis, after resuscitation, perioperative), xi. Increased intravascular volume (polycythemia), xii. Alcohol, xiii. Nicotine, ivx. Cyclosporin, tacrolimus, xv. Other agents.

**Systolic Hypertension:** Increased cardiac output, Aortic valvular output, Aortic valvular insufficiency, Arteriovenous fistula, patent ductus, Thyrotoxicosis, Paget's disease of bone, Beriberi, Arterial rigidity.

## Leptin Hormone and Hypertension

Obesity is typically associated with greater risk of hypertension and strong correlation exist between blood pressure and circulating leptin level over a whole range of blood pressure. Notably, the positive association between leptin and hypertension is by no means consistently reported and factors such as age, sex and race may be contributing factors. Leptin administration in healthy individuals does not exert a significant acute effect on blood pressure. Few studies have focused on

hypertension in animal models but both obese db/ab mice and Zucker rats show a propensity to develop hypertension.

**Table-2**  
**Hypertension Induced by Chemical Agents**

Mechanism	Examples
<b>Expansion of fluid volume</b>	
Increased sodium intake	Antacids, processed food.
Mineralocorticoid effects	Licorice, cortisone, anabolic steroids
Stimulation of rennin - angiotensin	Estrogen(oral contraceptives)
Inhibition of prostaglandins	NSAIDS
<b>Stimulation of Sympathetic nervous activity</b>	
Sympathomimetic agents	Caffeine, Cocaine, Ephedrine (Bent et.al.2003), Methylphenidate (Ritalin), Methylenedioxymethamphetamine, (MDMA ecstasy), Modafinil, Nicotine, Phencyclidine(Sernulan), Phenylpropanolamine
Interductions with monoamine Oxidase	Food with high inhibitors
Anesthetics	Ketamine (Broughton)
Ergot alkaloids	Ergotamine
Dopamine receptor agonist	Bromocriptine
Antidopaminergic	Metaclopramide
Sandostatin analogue	Sandostatin LAR
<b>Interference with Antihypertensive drug</b>	
Inhibition of prostaglandin Synthesis	NSAIDs
Inhibition of neuronal uptake	Trigelicantidepressantsibutramin
<b>Paradoxical response to antihypertensive drugs</b>	
Withdrawal, followed by atichols	clonidine
Unopposed adrenergic vasoconstriction	B-blockers
Intrinsic Sympathomimetic Pindol Activity Blockers	Combination $\alpha$ and $\beta$ propranolol plus clonidine
<b>Unknown Mechanism</b>	
Heavy Metal Poisoning	PolyChlorinated biphenyl
Insecticides	Parathion
Insect bites	Spider, Scorpion
Diagnostic Agents	Indigo Carmine, Pentagastrin, Thyrotropin-releasing hormone
Therapeutic agents	Bevacizumals, Cyclosporine Clozapine, Disulfiram, Erythropoetin, Herbal remedies, Indinavir, Lithium
Alcohol	Alcohol

## Dietary Recommendations of Geriatric Hypertension

Diet is the linchpin of life style. Despite the advocacy of hundreds of diet, and with billions of dollars spent on the search for the ultimate weight loss programme, the “Ideal Diet” for prevention of cardiovascular disease remains uncertain. However those who consume less red meat, refined grains and sweets and eat mere fruits and vegetables, fish and whole grains have fewer stroke. When extra olive oil and wine are added i.e. the Mediterranean diet, the life expectancy is prolonged.

**Dash Eating Plan:** The importance of diet for prevention and control hypertension was first incorporated in JNC-7 for following importance: i. Diet control especially reduction in salt intake 2-8 mm Hg BP/10 Kg. wt. reduced. Reduction in weight by two obese SBP 5-20 mmHg/10 kg. wt. reduced. Stopping Alcohol.

Life style modification for prevention and treatment of hypertension (including dietary approach); Maintain normal body weight for adults (18.5-24.9 kg/m<sup>2</sup>). Reduce dietary sodium intake to no more than 100 mmol. Per day (approx 6 gm sodium chloride or 2.4 gm of sodium per day). Engage in regular aerobic physical activity such as brisk walking, at least 30 minutes per day of the week. Limit alcohol consumption to no more than 1 Oz (30 ml) of ethanol (eg. 24 Oz. (720 ml.) of beer, 10 Oz ( 300 ml. ) of wine, or 2 Oz (60 ml.) of 100 – proof whisky per day in most men and to no more than 0.5 Oz (15 ml.) ethanol per day in women and lighter weight persons. Maintain adequate intake of dietary potassium [ $>90$  mmol (3500 mg) per day]. Consume a diet that is rich in fruits and vegetables and in low fat dairy products with a reduced content of saturated and total fat [Dietary approach to stop hypertension. (DASH) eating plan].

**British Nutrition Foundations C. Gopalan Criteria: (Annexure– 6 ):** Proper nutrition should be decreased to risk of heart disease. Advice to restrict fat intakes, particularly saturated fat (animal fat) for hypertension and cardiovascular health, remains true for elderly people who are fit and well. Above the age of 75 years, fat restrictions are less likely to be beneficial. Fat restriction is definitely not appropriate for those who are frail, have suffered weight loss, or have a small appetite. Infact, in these situations additional fat may be used to increase the calories in meals and snacks to aid weight gain.

**Polymeal Dietary Guidelines:** The polymeal offers a 75 percent or greater reductions of CVD when the published reductions of CVD risk provided by each of its individual components are added up: Wine, 150 ml/day-32% ; Fish, 114g four times/week-14%; Dark chocolate, 100 gm/day – 21%; Fruits and vegetables, 400 gm/day-21%; Garlic, 2.7 gm/day-25%; Almond, 68 gm/day-12%; Combined effect-76%<sup>6</sup>. The polymeal criteria are largely met described tongue-in-cheek by its proposes or a more rational, safer and probably tastier strategy to reduce cardiovascular disease by more than 75%, the

Polymeal, a more natural, safer and probably tastier strategy to reduce cardiovascular disease by more than 75% ; In subsequent letters to the British medical Journal editors, claims were made that such a diet, particularly the chocolate, could relieve impotence and depression.

Could this be the next Atkins Diet (Low carbohydrate diet for reducing weight) as the British Medical Journal editors predict “Finding happiness in a frugal, active life style can spare us a future of pills and This looks rather difficult, but recall how Atkins diet (Low Carbohydrate Diet ) took over the world, who can tell what will replace Atkins now that it is going out of style since it turns out to be no better than any other diet.

**Nutritional Factors that Affect Blood Pressure:** i. Sugar :- (Refined Sweetness damaging to hypertensives; sugar stresses the glands and organs, depletes many valuable nutrients needed to lower blood pressure and raises insulin levels which in turn may raise blood pressure), ii. Celery : lowers blood pressure by relaxing smooth muscles that live the blood vessel wall; amount needed is four celery stalks per day. iii. Fish oils dose 2 gm of EPA per day. (Uncontrolled HTN→ X, Undercontrol Patients EPA with Calcium, Magnesium, and potassium, foods such as garlic/onions EPA alone → X), iv. Vitamin C: lower diastolic blood pressure. dose – 1 gm, v. Calcium and Magnesium :- dose – 1,000 mg of Ca and 400-600 mg of magnesium per day are most found helpful. vi. Potassium: Low Level raises blood pressure. Pot Supplements lowers BP. vii. Chromium Picolinate :- dose – 200 and 600 micrograms (Control Sugar Cravings, lower insulin levels, increase weight loss, increase lean tissue growth), viii. Taurine: is an amino acid that lowers blood pressure remarkably. Dose: 1-3 gms. per day: Taurine help insulin be more effectively taken by body cells. This may be a mechanism by which it may help lower blood pressure. ix. Coenzyme 10 :- dose 50-75 mg - Promote weight loss – reduce BP, x. Eat less salt. xi. Cadmium (a toxic metal in cigarette paper, cadmium raises BP, associated with aggressive behavior that may help raise BP, A hair analysis can show whether cadmium levels are dangerously high. xi. Antioxidants are substances that neutralized free radicals or their action. xii. Consumption of fruits and vegetables is weakly associated with reduced risk of coronary heart disease in cohort studies. xiii. Consumption of fruits and vegetables is associated with decrease in blood pressure. ivx. Garlic having an antioxidantally sulphide this lowering B.P. xv. Eliminated Foods (Intoxicants, Salted food and salts, Margerine and fried food, Trans Fat, Refined white floor and super market oils, Stimulatents such as ephida (mahuang) and kola nuts).

### Conclusion

A life style modification including dietary intervention as prescribed by JNC-7, JNC-8 along with polymeal therapy and atkin diet; low salt diet, restriction of intoxicants, no doubt beneficial for controlling geriatric hypertension. The best uses of indigenious anti-oxidant ingredients having garlic, almonds,

walnuts, basil leaves etc was most beneficial for controlling geriatric hypertension. The major ingredients margerine, trans fat, fried food, salty foods, red meat, desi ghee, and high fat dairy products should be restricted to the patients of geriatric hypertension. Habitual drinker can be taken 25 ml to 50 ml of wine and red wine was found much more beneficial to control blood pressure among elderly patients. The cooking media should be rice branoil or mustard oil (pure) was found beneficial to these patients. The 130-150 gm cereal, 50 gm pulses and 25-30 gm oils and fat including juicy fruits specially citrus fruits and vegetables of low sodium and potassium should be beneficial for these patients. The RDA a RDI energy should be 25 kCal to 30 kCal per kg body weight per day including 55% carbohydrates, 30 percent fat and 1.0 gm per kg body weight per day protein are recommended to those geriatric hypertension patients. Other life style components included worship, yoga, exercises, stress management techniques. Techniques of slowing down of age related of mental decline, and prevention of neurodegenerative disorder are most beneficial to those patients.

**Table-3**  
**Mortality of Elderly in India**

Disease	Percent
Hypertension	39.5%
Cataract	35.3%
COPD	20%
IHD	19%
NIDDM	15.2%
BPH(in males)	16%
Dyspepsia	11%
IBS	9.2%
Depression	8.5%

Source: Banerjee Sameered: Geriatric Health in India pp. 3

**Table-4**  
**Comparative Classification of Hypertension JNC-6 and JNC-7**

SBP/DBP	JNC-6	JNC-7
<120/80	Optimal	Normal
120-129/80-84	Normal	Prehypertension
130-139/85-89	Borderline	
>=140/90	Hypertension	Hypertension
140-159/90-99	Stage I HTM	Stage I HTN
160-179/100-109	Stage II HTN	Stage II HTN
>= 180/110	Stage III HTN	Stage II HTN

Source: Arch. INt. Med.; 1997 JAMA; 2003

**Table-5**  
**The Trends of Awareness, Treatment and Control of JNC-7 Hypertension, 1976-2000 of ages 18 to 74 Years**

	1976-80	1988-1991	1991-1994	1990-2000
Awareness	51%	73%	68%	70%
Treatment	31%	55%	54%	59%
Control	10%	29%	27%	34%

(Source: Hypertension, 2003)

**Table-6**

Activities	Systolic BP mmHg.	Diastolic BP mmHg.
Meeting	+20.2	+15.0
Work	+14.0	+13.0
Transportation	+14.0	+9.2
Walking	+12	+5.5
Dressing	+11.2	+9.5
Chaves	+10.2	+6.7
Telephone	+9.5	+7.2
Eating	+8.8	+9.6
Talking	+6.7	+6.7
Desk Work	+1.9	+5.3
Reading	+1.6	+2.2
Business (at home)	+1.6	+3.2
Television	+0.3	+1.1
Relaxing	00	00
Sleeping	-10.0	-7.6

**Table-7  
 Dash Eating Plan**

Food Group	Daily Servings	One serving is equal to
Cereal and its products	7-8	1-slice bread ½-Cup dry cereal ½-Cup cooked rice
Vegetables	4-5	Paste or cereal 1-Cup raw leafy vegetables ½-Cup cooked vegetables
Fruits	4-5	150-180 ml. veg juice 1 ¼ cup dried fruits 150-180 ml. fruit juice 1 medium fruit
Low fat or non fat dairy milk	2-3	½ cup fresh, or canned fruits 240 ml. milk, 1 cup yogurt 40-50 gm. Cheese
Meat, poultry, fish	2 or less	80-90 gm. Cooked meat, fish, Poultry
Nuts	1-2	40 gm. Or 1/3 cup or 2 TSP seeds 1 ½ cup cooked legume

**Table- 8**

Food group	Number of Serving/day	Serving Size
Fluids	8	8 Ounce glass
Breads, fourt fried cereals rice		1-Slice of Bread 1-Ounce dry cereal ½-Cup Cooked cereal, rice
Vegetables	6 or more	1-Cup leafy or raw ½-Cup cooked 6-Ounce rice
Fruits	2 or more	1-peace fruit 6-Ounce juice
Fat free or low fat dairy milk	3	8-Ounce milk 1-Cup Yogurt
Less meat, poultry, fish, legumes, eggs and milk	2	2-Ounce meat 2-eggs ½-Cup nuts
Fats and Oils	6	1-Cup oils
Sweets		Occasionally

Source: Nutritional Guidelines for the elderly; British Nutrition Foundation, 2004, Gopalan; Nutritional statue of the elderly in Urban Slums of Delhi; J of Nutrition Foundation of India, Jan. 2004)

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