

Clinical Profile of Isolated Systolic Hypertension (I.S.H.) In Elderly with Special Reference to Cardio Vascular Complications - A Cross Sectional Study

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Abstract:

Background and Objectives: With the increase in life expectancy and modification of life style, hypertension is emerging as a major health problem in elderly. ISH is the commonest cause of raised blood pressure in the elderly. Hence this study was undertaken.

STUDY SUBJECTS AND METHODS:

Cross sectional study of 75 elderly patients, 60 years & above (Males – 39, Females – 26), with SBP > 140 & DBP ≤ 90, patients attending OPD & in-patients of Government General Hospital, Kurnool, during the period from July 2009 to October 2011. Evaluation of these patients as per prescheduled proforma.

Results & Analysis: Mean age was 71.23±6.47 years, of which 42.7% were symptomatics, 36% of the patients had stage I blood pressure, (SBP140-159), 64% had stage II blood pressure (SPB >160), 41.3% had diabetes and 38.7% had dyslipidaemia as risk factors. Commonest ECG finding was LVH. Common ECHO finding, were increased left ventricular mass (>131 gm/m² in males & >100 gm/m² in females), regional wall motion abnormality in 28% of the patients, reduced ejection fraction in 26.7% of the patients.

Conclusion: ISH is a better predictor than diastolic B.P, if detected early, and treated promptly, in our growing elderly population to prevent cardiovascular morbidity.

Key Words: Isolated systolic hypertension, Left ventricular hypertrophy, Left ventricular mass index, Ejection fraction, Cardiovascular disease, Regional wall motion abnormality.

I. Introduction:

In India awareness of hypertension, its risk factors and complications is very poor. Hence, hypertension goes undiagnosed and untreated for a long time. We see many patients with hypertension diagnosed for the first time in 5th and 6th decade. , hypertension is one of the most important treatable causes of mortality and morbidity in the elderly population.¹

With improvement in health facilities in India the life expectancy at birth is increased to more than 64 years for both male and female. Hence, there is a gross increase in the number of elderly population in India. Isolated systolic hypertension is the commonest cause of raised blood pressure in the older population.² As the age progresses more and more persons will be hypertensive, a disease, which is definitely the most prevalent, remediable risk factor for cardiovascular diseases. The prevalence of isolated systolic hypertension (that is systolic blood pressure more than 140 mm Hg and diastolic blood pressure less than 90 mmHg) is higher in elderly population.² Many of elderly patients are asymptomatic. Sometimes they may present with end organ complications, which are irreversible.

Indeed the JNC – 7 report recommends prompt pharmacological therapy and states that in persons older than 50 years, systolic blood pressure of more than 140 mm Hg is a much more important cardiovascular disease risk factor than diastolic blood pressure.³

Hence the present study is undertaken to study the clinical profile of isolated systolic hypertension (systolic>140 and diastolic ≤ 90 mm Hg in elderly (above the age of 60 years), to find out any other associated risk factors, any end organ complications, specially on cardiac through electrocardiography and echocardiography.

Certainly the great frequency of isolated systolic hypertension and its cardio vascular sequel make further investigation of its etiology, epidemiology and prevention, treatment, compelling research goals in our rapidly growing elderly population.

Isolated systolic hypertension (ISH) is defined as elevated systolic blood pressure(>140mmHg) in conjunction with diastolic blood pressure (≤ 90 mm Hg). Previously systolic pressure of more than 160 mm Hg was

classified as ISH, and pressure between 140 and 160 mm Hg was classified as borderline ISH. In 1993, the definition of ISH was changed to any systolic blood pressure above 140 mm Hg together with diastolic blood pressure below 90 mm Hg. ISH is characterized by an increased pulse pressure, defined as the difference between the systolic and diastolic blood pressures. Etiopathogenesis for ISH is rigidity of aorta primarily because of loss of elasticity of the aorta with progression of age. It increases the total peripheral resistance (TPR). It is the main bulk of ISH, especially in elderly population.⁴ Increased rigidity or decreased elasticity of the large capacitance arteries, increased total peripheral resistance, With the advancement of age, obesity stress, decreased physical activities, altered dietary patterns specially increased sodium and decreased potassium intake are contributory. Decreased blood volume combined with run-off because smaller reservoir provided by rigid large arteries lowers diastolic blood pressure and widens pulse pressure. Ageing impairs baroreceptor function and renal function.⁵

Hypertension is present in more than half of all persons over 60 years of age, regardless of race. The majority of hypertensive patients in this age-group have ISH.⁶ Its prevalence increases with age, from about 5% of persons aged 60 years to almost 25% of those aged 80 years and is higher in elderly women than in elderly men. For many years it was thought that gradual elevation of blood pressure with age was necessary to perfuse vital organs adequately and previously many physicians used to consider the age + 100 = acceptable systolic blood pressure. For example at the age of 70 years 170 mm of systolic blood pressure was acceptable. This concept was proved to be erroneous by the Framingham Study.⁷

The annual incidence of cardiovascular disease was 3 – 4 times greater in those patients between 65 – 74 years old who had blood pressure over 160/95 mm Hg (Kennel, 1974). The study revealed that compared to diastolic blood pressure, systolic pressure is the most potent contributor to cardiovascular complications.⁸

However, in an Indian study it was found that smoking, tobacco chewing, alcohol consumption, and dyslipidemia were important determinants of hypertension and an important factor for cardiovascular complications (Vrinda et al). Elderly hypertensive usually have predominant isolated systolic hypertension. Systolic hypertension in the elderly programme (SHEP) demonstrated 10% prevalence of ISH.⁸ Framingham heart study in the elderly showed that ISH was seen in 57.4% in men and 65% in women.⁷ Its prevalence in one of the Indian study is 56% (Vrinda et al).

The level of systolic pressure correlated best with the development of ventricular hypertrophy. Indeed, isolated systolic hypertension has been associated with an increased incidence of myocardial infarction or ischemia (Gubner, In men and women between 65 and 74 years of age, the presence of left ventricular hypertrophy predicted a 10-fold increase in the risk of congestive cardiac failure as compared with subjects, without evidence of left ventricular hypertrophy.⁹

A systolic blood pressure greater than 180 mm of Hg predicted an increased risk with electrocardiographic signs of myocardial infarction or ischemia (Glagov S)¹⁰ Classifications of ISH for adults (>18 years of age)²¹ ISH : Stage 1 B.P:140 – 159 and ≤ 90 Stage 2: >160 and ≤ 90. Complications of hypertension are Heart disease, Angina / Prior coronary revascularization / prior MI, VH, Heart failure Stroke / TIA Nephropathy Retinopathy Peripheral artery disease. Now it is clearly seen in different studies that hypertension is a great risk factor for elderly males in comparison to younger males.¹¹

II. Methodology:

The present cross-sectional study was undertaken on patients attending the Outpatient Department as well as in-patients Government General Hospital attached to Kurnool Medical College Kurnool, during the period from July 2009 – November 2011.

The study group comprised 75 elderly patients (Male = 49, Female = 26) of the age group of 60 to 89 years. All of these patients had isolated systolic hypertension first time detected. Patients above 60 years, with isolated systolic hypertension (Systolic BP > 140 mmHg and DBP ≤ 90 mm Hg) were included. Below 60 years of age, DBP more than 90 mmHg. Patients with previous history hypertension or hypertensive on medication, Patients with hemoglobin less than 12 gms, chronic kidney disease were excluded in the study. The evaluation comprised of detailed clinical history, thorough physical examination with relevant investigations.

II.2. Statistical software: The Statistical software namely SPSS 11.0 and Systat 8.0 were used for the analysis of the data.

II.3. Results: A cross – sectional study is undertaken to study the clinical profile of isolated systolic hypertension in elderly and to study the development of cardiovascular complications in such patients at the time of detection through ECG and Echo changes mainly in relation to LVMI.

III. Table

1:Age distribution with Sex

Age in years	Female		Male		Total	
60 years	1	3.85	-	-	1	1.33
61 – 65	8	30.77	7	14.29	15	20.00
66 – 70	8	30.77	14	28.57	22	29.33
71 – 75	5	19.23	13	26.53	18	24.00
76 – 80	3	11.54	11	22.45	14	18.67
> 80	1	3.85	4	8.16	5	6.67
Total	26	34.67	49	65.33	75	100.00
Mean ± SD	69.65±6.39		72.06±6.42		71.23±6.47	

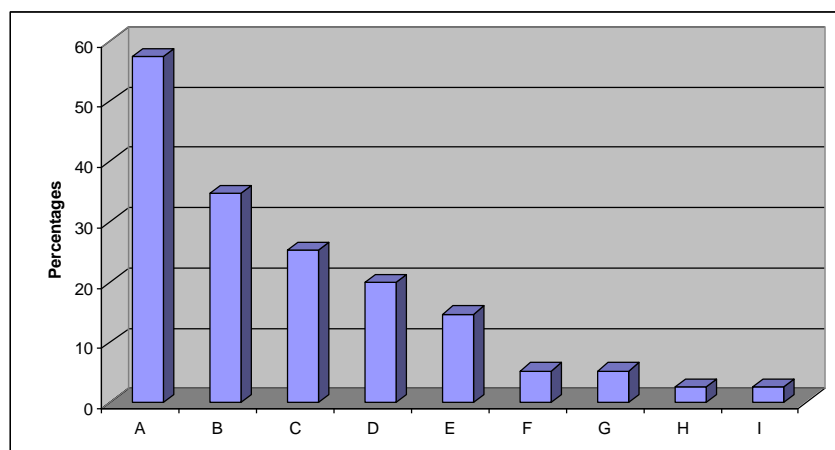
53.33% of the patients are in the age group of 66 – 75 years. Females are presented more in the age group of < 70 years than males with p = 0.063.

Table 2:Correlation of age with stage of blood pressure

Age in years	Stage I (140-159)		Stage II (>160)	
≤ 60 years	1	3.70	-	-
61 – 65	12	44.44	3	6.25
66 – 70	11	40.74	11	22.9
71 – 75	1	3.70	17	35.4
76 – 80	1	3.70	13	27.08
>80	1	3.70	4	8.33
Total	27	36.00	48	64.0
Mean ± SD	66.67±5.56		72.56±4.01	

Table 3 Symptomatology

Symptomatology	Number	%
Asymptomatic	43	57.3
Breathlessness	26	34.7
Swelling of the limbs	19	25.3
Chest pain	15	20.0
Headache	11	14.7
Blurred vision	4	5.3
Giddiness	4	5.3
Palpitation	2	2.7
Motor weakness	2	2.7



57.3% are asymptomatic, 42.7% are symptomatic. Symptomatic patients are more in the stage II BP group with p<0.001.

Table 4 Associated risk factors with ISH

Associated Risk factors (n = 75)	Number	%
BMI (> 25)	23	30.7
Waist / Hip Ratio (Males > 0.9, Females > 0.8)	33	44.0
DM+	31	41.3
Smoke +	20	26.7
Dyslipidemia	29	38.7

Table 5 Electrocardiographic changes regarding LVH

ECG (n = 75)	Number	%
Sokolow – Lyons Positive (≥ 35 mm)	27	36.0
Romhilt – Estees scores (≥ 5 points)	21	28.0

Table 6 Echocardiographic findings in ISH

Echo changes (n=75)	Number	%
Increased LVMI (Males > 131 gm/m ² , females > 100 gm/m ²)	36	48.0
Increased LV Volume (>90 ml/m ²)	12	16.0
Reduced ejection fraction ($<56\%$)	20	26.7
Regional Wall Motion Abnormality	21	28.0

IV. Discussion:

A common misconception among patients and practitioners is that elevated diastolic blood pressure is more important than elevated systolic pressure. In fact one of the key messages of JNC VII is in persons older than 50 years, systolic blood pressure of more than 140 mmHg is a much more cardiovascular risk factor than DBP.³

Comparing the present study with other studies Dwivedi S., et al (2000) found mean age 67.36 ± 6.23 range (60 – 90 years) and male to female ration 1.44:1. In our Study comprised of 75 patients out of which 49 were males and 26 females. Male constituted 65.33%, females constituted 34.67% Mean age was $71.23 \pm 6.47\%$, with male to female ratio 1.91:1. Systolic hypertension in elderly program me (SHEP) trial found mean age 72 years and mean blood pressure 170/77 mmHg.⁸ Michael A. Colander et al found mean age 69.7 years. Thomas Kuruvilla et al found the proportion of hypertensive's suffering from ISH, increases with age in those more than 70 years. 75.6% of men and 82.1% of women with hypertension had ISH. ISH is significantly more in women than in men. In the present study also females are more prone for ISH. In the present study the mean age at stage I blood pressure was found to be 66.67 ± 5.56 years, the mean age at stage II blood pressure was 72.56 ± 4.01 As the age increases the blood pressure also increases significantly, $p < 0.001$. Messerli FH et al, Anery A et al found prevalence of ISH increases with age from about 5% of the persons at 60 years to 25% of those aged 80 years. Rocha E et al found that there has been increase in ISH from 44-57% in the age group from 60-80 years.¹²

In the present study 57.5% of the patient's were asymptomatic. Breathlessness was the major symptom (34.7%) followed by swelling of the limbs, (25.3%) chest pain (20%) headache (14.7%), blurred vision giddiness constituted (5.3%), palpitation motor weakness (2.7%). Stage II blood pressure group constituted more of the symptomatic patients (7.6 times significantly more).

Virinda et al found (32%) were asymptomatic among the symptomatic headache was common presentation (77.9%). However the age group in this study ranged from 60-65 years, whereas in present study it ranges from 60-89 years.¹³

In the present study average weight for females was 58.08 ± 8.74 , average BMI was 25.99 ± 5.06 compared to male (Weight 61.98 ± 9.2 and BMI 23.17 ± 5.09 . Average waist / hip ratio for females was 0.92 ± 0.15 compared to males 0.82 ± 0.16 BMI and waist hip ratio were significantly more in the females. Wilking et al found that age and obesity in women are significant variables in the evolution of ISH. 30.7% of the patients had BMI more than 25 (overweight).¹⁴

44% of the patients had waist by hip ratio more than (0.9) in males and 0.8 in females. 41.3% of the patients had diabetes mellitus. Dwivedi S et al found that 31.41% of the patients had diabetes mellitus. N.C. Hazarika et al found that age, BMI, waist / hip ratio are associated significant risk factors.¹⁴ However smoking is negatively associated.

38.7% of the patients had dyslipidaemia. Among these patients, 28% of the patients had isolated low HDLC (normal HDLC > 50 mg/dl for females & ≥ 40 mg/dl for males). 20% had high isolated triglycerides (>150 mg/dl) remaining patients had combined low HDLC and high triglycerides and LDL > 100 mg/dl. P. Malhotra et al found that prevalence of dyslipidaemia was 46.8%, prevalence of isolated HDLC was 23.7% and high triglycerides 11.8-18.8%.¹⁵ However the study group consisted of hypertensive in all age groups.

In the present study waist / hip ratio was positively related with the increased LVMI, with $p = 0.004$. The patients with DM were 4.06 times more likely to develop increased LVMI, with $p = 0.150$. Dim FC, et al and Froehlich E D et al found above risk factors in association with increased Left Ventricular Mass Index. (16) Out of 75 patients, 30 patients had developed retinal changes. 13.3% for focal arteriolar narrowing, 12% had arteriovenous nipping and about 8% for retinopathy. Patients with stage II blood pressure were found to be 3.06 times more likely to develop abnormal retinal changes.¹⁷

Wrong TY et al in his study found that retinal micro vascular abnormality was 8.3% for retinopathy, 9.6% for focal arteriolar narrowing and 7.7% for arteriovenous nipping. (14) Various ECG findings found in the present study was left ventricular hypertrophy, mainly Sokolow – Lyon positive (≥ 35 mm) in 36%

of the patients and Romhilt – Estees score (≥ 5 points) in 28% of the patients. Vrinda et al found that LVH was commonest ECG manifestations in 36.8% of the patients. Boon D. et al found, prevalence of silent myocardial ischemia in ISH. Hypertension is still leading cause of stroke in the elderly.¹⁸

In the present study echocardiographic changes seen are :

Increased Left Ventricular Mass Index in 48%, among them 16% had LV volume $> 90 \text{ ml/m}^2$. 28% of the patients had regional wall motion abnormalities. 26.7% of the patients had reduced ejection fraction ($< 56\%$) Lindros's M et al found echocardiography evidence of LVH in the general population. It is observed in the present study that 19.4% of the patients in stage I blood pressure were having increased LV mass, 80.6% of the patients in stage II. It is observed that as the stage of blood pressure increases, incidence of increased LV mass also increases significantly with $p=0.044$. It is also observed that female patients were more likely to develop increased LVMI compared to male counter parts with $p=0.028$. LVH is highly reliable and is far better than the existing ECG methods.

Difference in the sensitivity and specificity of the ECG criteria between this study and previous studies could be due to the small sample size, which do not represent the population under study. Also, it could be due to selection bias, with the more pathological extreme of LVH encountered here since ours is a tertiary referral centre. Technical errors like proper placement of the electrodes and reader interpretation should be kept in mind.

Hence, there is a need for computerized examination of the ECG's which will improve the accuracy of diagnosis of ECG criteria in early stages. Also there is a need to develop more sensitive ECG criteria for quick and early diagnosis of LVH. Clinicians should continue to use these ECG criteria (Sokolow-Lyon voltage alone or Romhilt Estees score) that are known to have a more reasonable sensitivity for LVH. These criteria should be used especially in clinical patient population in whom a specificity of 95% is acceptable.

V. Conclusion:

The incidence increases with age advancement. Waist/hip ratios, DM, dyslipidaemia are significant associated risk factors. ISH associated with risk factors has definite effect mainly on cardiac in terms of LV hypertrophy. It is an even better predictor of morbidity and mortality than is diastolic blood pressure. Several large trials have documented a clear benefit to treating ISH. Even small reductions in BP have a substantial impact on patient outcome. Hence, ISH in elderly to be detected early, treated promptly so as to prevent / reduce cardiovascular morbidity and mortality in our growing elderly population.

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References

- [1]. Hypertension Study Group. Prevalence, awareness, treatment and control of hypertension among the elderly in Bangladesh and India: A multicentre study Bull World Health Organ 2001; 79:490-500.
- [2]. Pinto E. Blood pressure and ageing. Postgraduate Medical Journal. 2007;83(976):109-11.
- [3]. Aram V, Chobanian, George L, Bakris, Henry R, Black William C, Cushman, Lee A, Green. The VII report of JNC on prevention, detection, evaluation and treatment of high blood pressure. JAMA, May 2003, 289; 2560 – 72.
- [4]. Fayad A, Yang H. Is Peri-Operative Isolated Systolic Hypertension (ISH) a Cardiac Risk Factor? Current Cardiology Reviews. 2008;4(1):22-33.
- [5]. McCarthy CG, Gouloupoulou S, Wenceslau CF, et al. Toll-like receptors and damage-associated molecular patterns: novel links between inflammation and hypertension. American Journal of Physiology - Heart and Circulatory Physiology. 2014;306(2):H184-H196.
- [6]. Martin A, James, Jayne Tullett, Anthony G, Hemsley, Angela C, Shore. Effects of Aging and Hypertension on the Microcirculation Hypertension. 2006;47:968-974
- [7]. Christopher J O'Donnell, Roberto Elosua Cardiovascular Risk Factors. Insights From Framingham Heart Study Rev Esp Cardiol. 2008;61:299-310. - Vol. 61 Num.03
- [8]. Ravenni R, Jabre JF, Casiglia E, Mazza A. Primary stroke prevention and hypertension Lutale J, Thordarson H, Gulam-Abbas Z, Vetvik K, Gerds E.
- [9]. Prevalence and covariates of electrocardiographic left ventricular hypertrophy in diabetic patients in Tanzania. Cardiovascular Journal of Africa. 2008;19(1):8-14. treatment: which is the first-line strategy? Neurology International. 2011;3(2):e12.
- [10]. Kannel WB. Hypertension: Reflections on Risks and Prognostication. The Medical clinics of Wagener HP, Clay GE, Gipner JF.
- [11]. Classification of Retinal Lesions in the Presence of Vascular Hypertension: Report submitted to the American Ophthalmological Society by the committee on Classification of Hypertensive Disease of the Retina. Transactions of the American Ophthalmological Society. 1947;45:57-73. North America. 2009;93(3):541-Content
- [12]. Xuefeng Liu, Van Minh Hoang, Yali Liu, and Rachel L.W. Brown
- [13]. Untreated Isolated Systolic Hypertension among Middle-Aged and Old Adults in the United States: Trends in the Prevalence by Demographic Factors During 1999–2010 International Journal of Chronic Diseases. Volume 2015 (2015), Article ID 508584, 8 pages
- [14]. Virinda Kulkarni, Bhagwat N, Avi Hakim, Sandhya Kamat, Soneji St. Hypertension in elderly, JAPI, 49: September, 2001.

- [15]. Manmohan Gupta, Rajkumar Patil, Mohd.Iqbal Khan, Sanjeev Kumar Gupta. The Prevalence Of Obesity And Hypertension In Urban Tamilnadu. *Journal of Clinical and Diagnostic Research* [serial online] 2011 June [cited: 2015 Sep 13] ; 5:586-588
- [16]. Lepira FB¹, M'Buyamba-Kabangu JR, Kayembe KP, Nseka MN. Correlates of serum lipids and lipoproteins in Congolese patients with arterial hypertension. *Cardiovasc J S Afr.* 2005 Sep-Oct;16(5):249-55.
- [17]. Increased left ventricular mass is a risk factor for the development of a depressed left ventricular ejection fraction within five years ☆: The Cardiovascular Health Study
- [18]. Mark H Drazner, Eduardo Rame, Emily K Marino, *Journal of the American College of Cardiology* Volume 43, Issue 12, 16 June 2004, Pages 2207–221516.
- [19]. Grosso A, Veglio F, Porta M, Grignolo FM, Wong TY. Hypertensive retinopathy: *The British Journal of Ophthalmology.* 2005 ; 89(12):1646-1654.
- [20]. Malyszko J, Muntner P, Rysz J, Banach M. Blood Pressure Levels and Stroke: J-curve Phenomenon? *Current Hypertension Reports.* 2013; 15(6):575-581.