

End Organ Damage in Hypertensive Geriatric Age Group: A Cross Sectional Study

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Abstract

Objective: Hypertension (HTN) is one of the most common risk factor for causing cardiovascular (CVS) and cerebrovascular diseases (CVD). A developing country like India, faces the double burden of communicable and non-communicable diseases; of the which, the HTN is the most treatable cause of mortality and morbidity, thus preventing the loss of functional capacity and decline in the quality of life.

Aim: To study the prevalence of end organ damage in the hypertensive geriatric age group.

Method: The present study was a cross sectional study, conducted in 150 elderly patients admitted in MGM Hospital, Navi Mumbai, India with the diagnosis of either stage I or II HTN from 2011 to 2013.

Results: Data analysis of the present study showed that 68% of elderly population aged between 60 to 69 years were suffering from HTN. Compared to males, females had a higher rate of target organ damage. This study observed that amongst all the patients with total end organ damage, 54.6 % had CVS complications, 15.7 % had hypertensive retinopathy, 25.9 % and 18.51 had raised creatinine and protein levels in urine respectively. 19.4 % had cerebrovascular accident (CVA) complications. Among the Cardiovascular related complications Coronary artery disease (CAD) was found in 21 patients, out of them 7 had Congestive cardiac Failure (CCF). Left Ventricular Hypertrophy (LVH) was the most common complication and was seen in 38 patients. 13.8 % patients had Regional Wall Motion Abnormality (RWMA).

Conclusion: The present study observed that Isolated Systolic Hypertension (ISH) was most commonly seen in geriatric age group amongst all the types of HTN. This study concluded that the most common risk factors leading to HTN in the elderly are sedentary life style and dyslipidemia while the most common end organ damage was observed to be Left Ventricular Hypertrophy (LVH) followed by renal dysfunction.

Keywords: Biomass Hypertension, Isolated Systolic Hypertension, Dyslipidemia.

Introduction

High blood pressure is one of the most common risk factors for developing both the cardiovascular (CVS) and cerebrovascular diseases (CVD). During the period of epidemiological transition, developing countries might face the double burden of communicable and non-communicable diseases. Of the non-communicable causes, hypertension (HTN) is amongst the treatable causes, which is responsible to contribute high mortality and morbidity throughout the world. A recent study found that, systolic blood pressure (SBP) continues to rise until 70-80 years of age while diastolic blood pressure shows the increased trend up to 50-60 years for a normal person [1].

High blood pressure amongst the elderly age group confers a three to four fold rise in developing CVS disorders, as compared to the younger age group. Previous study suggested that HTN affects more than half of the people who are aged 65 or older, and the prevalence of hypertension and its related complication continues to rise with age [2]. Hypertension often leads to complications involving the systems like that of cardiovascular, nervous system kidneys, retina etc. Several trials have demonstrated significant rise of blood pressure leading to target organ damage. The aim of the study is to find out the frequency of end organ damage amongst the hypertensive geriatric patients.

Methods & Materials

The present study was a cross sectional study conducted amongst the 150 elderly patients whose age was above 60 years at MGM Hospital, Kamothe, Navi Mumbai, India.

Target Organ Damage Definition

End organ damage usually refers to the damage occurring in major organs fed by the circulatory system (heart, kidneys, brain, eyes) which can sustain damage due to uncontrolled HTN, hypotension, or hypovolemia.

The present study used the following reference points to conclude the presence of the end organ damage:

For heart: Hypertrophy of the heart muscle on electrocardiogram (but may also be seen on chest X-ray) suggesting left ventricular hypertrophy (LVH) or by echocardiography of less efficient function (left ventricular failure) [3].

For Kidneys: The presence of leakage of protein into the urine (albuminuria or proteinuria), or reduced renal function [3].

Inclusion & Exclusion Criteria

The participants were selected based on the inclusion criteria from 2011 to 2013. Geriatric patients who were hypertensive as per the criteria of Joint National Committee 7 (JNC-7) were included [4]. The patients were later classified according to the target organ complication/s. All other patients below the age of 60 years were excluded.

Data Collection

Clinical evaluation was done by using a structured questionnaire which was prepared following the

medical condition. Other information collected was as follows: past or present history of angina pectoris, myocardial infarction, transient ischemic attacks, cerebrovascular disease, hypertensive encephalopathy, renal failure and left ventricular failure based on history or medical records. This was followed by a complete physical examination and necessary investigations like Electrocardiogram, Echocardiographic correlations and end organ complications of cardiovascular, cerebrovascular and renal system. Descriptive statistics were used to present the study findings. The participants were further classified in stage I or stage II as per the JNC-7 criteria. Stage I included the patients having a blood pressure between 140-159 mmHg. Stage II included patients having a blood pressure above 160 mmHg. IBM SPSS software (Version 20.0) was used for analysing the data.

Ethics

The study proposal was approved by the MGM Medical College's Ethics Review Committee.

Results

150 elderly patients having stage I or stage II hypertension were studied. 49% patients had systolic blood pressure (SBP) between 140-159 mmHg (Stage I) and 51% patients had SBP > 160 mmHg (Stage II).

Out of total patients, 56 (37%) were females and 94 (62%) were males. 74 patients had stage I HTN while 76 had stage II HTN. Amongst all the patients, 108 (72%) patients developed target organ damage (table 1).

The mean age in our patients was 67.06 years (SD 6.35). The means SBP and DBP were 161.53 and 84.97 respectively (table 2).

Table 1. Distribution according to gender and stage of HTN

Category	Frequency	Percentage
Gender		
Females	56	37.3
Males	94	62.7
Hypertension Stage		
Stage 1	74	49.3
Stage 2	76	50.7
Target organ damage		
Present	108	72.0
Absent	42	28.0

Table 2. Descriptive statistics for patient's characteristics

Category	Mean	Standard Deviation (SD)
Age (Years)	67.06	6.35
Height (cm)	161.24	11.85
Weight (kg)	62.58	10.15
BMI	24.36	5.04
W/H Ratio	0.91	0.18
SBP	161.53	12.73
DBP	84.97	4.47

*BMI: Body Mass Index; W/H: Weight by height; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure.

We found a significant correlation between SBP (Stage I and II) and end organ complications. 68% of patients with Stage I Isolated Systolic Hypertension (ISH) suffered the target organ damage. 78% of patients with Stage II ISH suffered target organ damage. Hence earlier diagnosis and treatment of ISH would reduce the target organ

damage. Most common clinical presentation was headache (35%), and dyslipidemia (31%) among the study participants. 24% were smokers and 24% alcoholics. 34% patients were taking extra salt diet while 66% denied. We also found a significant correlation ($p < 0.01$) between lipid profile and stage I and stage II HTN (table 3).

Table 3. Descriptive statistics for Lipid Profile

Category	Stage I HTN	Stage II HTN
Total Cholesterol	155 ± 15	194 ± 39
Triglycerides	125 ± 22	163 ± 60
High Density Lipoproteins	54 ± 4	39 ± 6
Low Density Lipoproteins	76 ± 11	121 ± 41
Very low density lipoproteins	25 ± 4	32 ± 12
p-value	<0.01	< 0.01

This study found that amongst all the patients with total end organ damage, 54.6% had CVS complications and 15.7% had hypertensive retinopathy. 25.9 % and 18.51 had raised creatinine and protein levels in the urine respectively. 19.4 % had cerebrovascular accident (CVA) complications. Amongst the CVS related complications, Coronary artery disease (CAD) was found in 21 patients, out of them seven had

Congestive cardiac Failure (CCF). Left Ventricular Hypertrophy (LVH) was the most common complication which was seen in 38 patients. 13.88 % patients had Regional Wall Motion Abnormality (RWMA) (table 4).

Target organ damage was seen relatively more in females as compared to males suggesting a female predisposition (figure 1).

Table 4. Types of total end organ damage (n=108)		
Total end organ damage	Number/108	Response (%)
LVH, CAD	59	54.62
RWMA	15	13.88
Hypertensive Retinopathy	17	15.74
Raised Serum Creatinine (>1.2 mg/dL)	28	25.92
Proteinuria	20	18.51
Neurodeficit/CVA	21	19.44

*(LVH: Left Ventricular Hypertrophy; CAD: Coronary artery disease; RWMA: Regional Wall Motion Abnormality. **Please note** : A patient may have a single or multiple organ damages.)

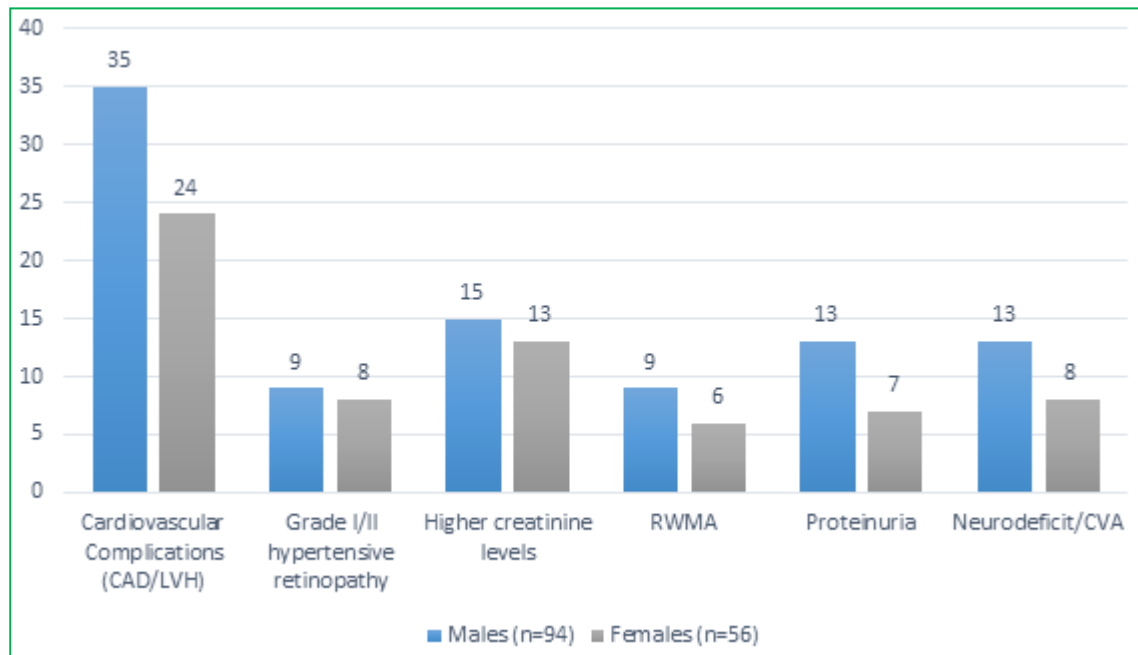


Figure 1. Target organ damage found slightly more in males compared with females

Discussion

Hypertension is estimated to be a leading cause of current global disease burden and is prevalent in many developing countries, as compared to that of the developed world. The present literature also suggest the role of low levels of vitamin D, high sugar and fats levels causing HTN [5-7]. Furthermore, it has been proved that HTN could be strongly age dependent which was also observed in Framingham Heart Study [8]. In the present study, there was no significant association between rise in SBP and increase in age.

However, there was a positive significant association between end organ complications and increase in SBP and age, thus supporting the results of the previous study [9].

In the present study of 150 patients, there were 94 males and 56 females. Other study found similar male to female ratio, which correlates with our study [10]. In the present study, the most common symptom presentation was headache (35%). We further observed that 13 (8%) patients had a family history of hypertension which other study too had showed as an important determinant of HTN [11].

In the present study, 47 (31%) patients had dyslipidaemia. Another study found presence of

dyslipidaemia in 55.9% of their patients [9]. The difference in the numbers may occur due to diagnostic variabilities. Cardiovascular complications (LVH/CAD) in our study were seen in 59 patients. This observation was consistent with one of the previous study [9]. 100 (66%) patients had high SBP (140 mm Hg and above) with normal diastolic blood pressure, out of which 63 (out of those 100 patients {63%}) had at least one target organ damage. The remaining 50 patients had high DBP with normal SBP, of which 39 patients had one or more target organ damage. Oates et al., in their study observed that more than 40% of the subjects had coronary heart disease, approximately 18% had cerebrovascular disease and almost 10% had chronic renal failure in this study [12].

The previous study reported that high frequency of ISH was present among the elderly hypertensive patients [13]. In one of the studies, 87% patients who developed ISH were in the age of 60 years or above were considered as a category for studying ISH in elderly [9], suggesting age can be an important factor to consider [13-15].

In our study, CAD was diagnosed in 21 patients out of 108 patients (19.44 %) who developed target organ damage. 12 patients out of those 21, had classical angina supporting other studies which observed 32.3% and 22.82% as an incidence of ischemic heart disease [9, 17]. In our study LVH was found in 38 patients out of 108 target organ damaged patients (35.18 %), while in a study done by Kulkarni et al., [9] observed LVH in 36.8% patients. However, LVH was found in 47% patients in an another study [16], while other studies have shown higher LV mass index [15, 18, 19].

In the present study, 15.74 % patients had developed hypertensive retinopathy which was less as compared to an another study which observed hypertensive retinopathy in 50.5% of their total participants [9].

Limitation of the study

The patients were exposed to drugs or medications; which we did not consider in this study. It was a cross sectional and mono-centric study. The study also did not differentiate between the mono or multi target organ damage. More longitudinal studies involving multiple centres can help us to find the exact causation of HTN.

Conclusion

The ISH is the commonest type of hypertension observed in non-obese elderly age group particularly from urban area which may occur due to common risk factors such as hypertension, smoking, non-healthy food intake, sedentary lifestyle and dyslipidemia. Most common end organ damage in elderly age group is left ventricular hypertrophy followed by renal dysfunction (in the form of proteinuria and raised serum creatinine levels). Target organ involvement increases with age. Hence, care should be taken to maintain the blood pressure levels in order to prevent the complications for the geriatric group.

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