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Clinical study of hypertensive emergencies in young patients in tertiary health care centreSanjay V. Patne¹, Kailas N. Chintale², S. Tungikar³, Pravin Dhadse⁴, Sandip R. Dukare⁵¹Assistant professor, Department of Medicine, JIU, Indian Institute of Medical Sciences & Research, Tq. Badnapur, Dist. Jalna., Maharashtra State, India.²Assistant professor, Department of Medicine, S. R. T. R. Medical College, Ambajogai, Dist. Beed. Maharashtra, India.³Associate professor, Department of Medicine, JIU, Indian Institute Of Medical Sciences & Research, Tq. Badnapur, Dist. Jalna., Maharashtra State, India.⁴Junior Resident, Department of Medicine, JIU, Indian Institute of Medical Sciences & Research, Tq. Badnapur, Dist. Jalna. Maharashtra State, India⁵Assistant professor, Department of Pathology, JIU, Indian Institute of Medical Sciences & Research, Tq. Badnapur, Dist. Jalna., Maharashtra State, India**ABSTRACT**

Background: The incidence and prevalence of hypertensive emergency have been little addressed in the literature. However, over the last decade increasing numbers of young patients with different forms of hypertensive crisis have been observed in emergency departments. We performed this study to ascertain the clinical and epidemiological characteristics of patients aged ≤ 40 years admitted with a diagnosis of hypertensive emergency. Hypertension is one of the leading causes of the global burden of disease. Approximately 7.6 million deaths and 92 million disability-adjusted life years worldwide were attributed to high blood pressure in 2010. Hypertension doubles the risk of cardiovascular disease, including coronary heart disease, congestive heart failure, ischemia and hemorrhagic stroke, renal failure, and peripheral arterial disease. **Material & Methods:** This Observational study was done on rural patients with hypertensive emergencies admitted to Intensive Cardiac Care Unit, in the Department of General Medicine in Government tertiary rural health Care Hospital of JIU, Badnapur, Jalna, from January 2014 to June 2015 (50 patients). On admission, detailed history was taken and complete clinical examination was done. Patients with an elevated systolic blood pressure of ≥ 180 mmHg or diastolic blood pressure of ≥ 120 mmHg, with history suggestive of acute target organ damage or with laboratory evidence of target organ damage were included in the study. The data obtained was analyzed by descriptive statistics by means of percentage, proportions and depicted via bar charts, pie charts. **Results:** Males had higher chances of developing a hypertensive emergency as compared to females, 66% of the patients were males. Male to female ratio was 2.57:1. The commonest presenting symptoms were neurological deficit (50%), dyspnoea (30%), followed by chest pain (24%). Majority of the patients were known hypertensives (70%). Higher levels of blood pressure at presentation were associated with an adverse outcome. Laboratory abnormalities noticed in these patients included hyponatremia and hyperkalemia. Acute intracerebral hemorrhage was the commonest mode of target organ damage, and in hospital mortality of 20% was observed. The incidence of coronary artery disease in men increased in an almost linear mode as age is increased. Hemiparesis accounted for the largest group of patients with neurological deficit. This evidence confirms that hypertensive emergencies were higher in patients with previously known hypertension. This also shows that patients with hypertension are at a higher risk of developing a hypertensive emergency, more so if they do not adhere to the antihypertensive therapy. Diabetes mellitus and dyslipidemia were the other risk factors; Patients with diabetes mellitus and dyslipidemia were 24% and 32% respectively in the present study. The mean reduction in blood pressure in one hour after admission to the hospital was 19 mmHg of systolic blood pressure and 14 mmHg of diastolic blood pressure. Blood pressure levels at the time of admission were higher in group of patients expired compared to those who were discharged from the hospital. The higher levels of blood pressure would have added to more severe target organ damage in these patients, with an adverse outcome. This indicates worse prognosis with a higher levels of blood pressure at presentation. The outcome of this study showed an in-hospital mortality of 20% among these patients. **Conclusion:** Known hypertensives are at a higher risk of presenting with acute target organ damage associated with hypertensive emergency. Commonest mode of presentation was neurological deficit (50%). Acute intracerebral hemorrhage was the commonest target organ damage noted. This indicates worse prognosis with a higher levels of blood pressure at presentation.

Keywords: Arterial Hypertension, Hypertensive emergencies, hypertensive end organ damage, in young patients, Diabetes, dyslipidemia.

Introduction

The incidence and prevalence of hypertensive emergency have been little addressed in the literature.

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However, over the last decade increasing numbers of young patients with different forms of hypertensive crisis have been observed in emergency departments.

We performed this study to ascertain the clinical and epidemiological characteristics of patients aged ≤ 40 years admitted with a diagnosis of hypertensive emergency. [1]. Hypertension is one of the leading causes of the global burden of disease. Approximately 7.6 million deaths and 92

million disability-adjusted life years worldwide were attributed to high blood pressure in 2010. Hypertension doubles the risk of cardiovascular disease, including coronary heart disease, congestive heart failure, ischemia and hemorrhagic stroke, renal failure, and peripheral arterial disease. [2]. Target organ damage resulting from hypertension includes those affecting the brain, heart, kidneys and the eyes. A number of cardiovascular, pulmonary and neurological symptoms are found to be associated with patients in hypertensive emergency with target organ involvement. Focal neurological deficits, dyspnoea, chest pain, headache, loss of vision, are considered as the commonest symptoms with which patients in hypertension related acute target organ damage present. The physician should perform an extensive evaluation in a patient who presents with any of these symptoms and with an elevated blood pressure to exclude a hypertensive emergency [3]. Hypertension in the young has usually been attributed to some underlying cause, frequently renal. This view stems from the studies of Platt (1948), who found secondary hypertension in 75% of 64 hypertensive patients under the age of 40 [4]. More recently, however, Breckenridge *et al.* (1967), using modern diagnostic techniques, were unable to confirm this finding. It is therefore of interest to compare our experience, using similar methods, in an unselected group of young hypertensive patients. With increasingly sedentary lifestyle, smoking and changing dietary pattern, the prevalence of hypertension in the young generation is increasing [5]. Hypertension affects individuals of all classes and across all age groups. The prevalence of hypertension increases with advancing age to the point where more than half of people of 60-69 years of age and approximately three-fourths of those 70 years of age and older are affected. The age related rise in SBP is primarily responsible for an increase incidence and prevalence of hypertension with increasing age. The relationship between blood pressure and risk of cardiovascular disease events is continuous, consistent and independent of other risk factors [6]. The syndrome of hypertensive emergency was first described by Volhard and Fahr in 1914 and was characterized by severe accelerated hypertension, accompanied by evidence of renal disease and by signs of vascular injury to the heart, brain, retina and kidney, and by a rapidly fatal course ending in heart attack, renal failure, or stroke. Hypertension affects approximately one billion individuals worldwide as per the observations made by the Joint National Committee on prevention, detection, evaluation and treatment of high blood pressure (JNC VII) report in 2003. Higher than optimal blood pressure is the number one attributable risk for death throughout the world and approximately 7.1 million deaths per year are attributed to uncontrolled hypertension [7]. As population age the prevalence of hypertension will increase even further unless and effective preventive measures are implemented. It was recognized as early as beginning of nineteenth century, more than half a century before blood pressure measuring devices were discovered, that many patients with renal disease had diffuse vascular disease and cardiac hypertrophy. It has been estimated that approximately 1% of patients with hypertension will develop a hypertensive crisis at some point during their lives. Before the advent of antihypertensive

therapy, this complication occurred in up to 7% of the hypertensive population [8]. The first large study of the natural history of malignant hypertension was published in 1939 before the widespread use of antihypertensive agents. In that seminal report by Keith and colleagues, untreated malignant hypertension had a 1-year mortality of 79% and a median survival of 10.5 months. Data from Framingham heart study suggests that individuals who are normotensive at 55 yrs have 90% lifetime risk for developing hypertension [9]. Although improved management of chronic hypertension has decreased the lifetime incidence of hypertensive crisis to less than 1%, patients presenting with severe hypertension represent up to 25% of all patients presenting to emergency department [10]. Hypertensive emergency can be an end result of chronic hypertension, noncompliance to drugs, or new presentation of unrecognized essential hypertension. A hypertensive emergency is characterized by rapid deterioration of target-organ and poses an immediate threat to life. These conditions were invariably fatal before the advent of antihypertensive drugs [11]. Hypertension is a major contributor to cardiovascular morbidity and mortality in India and worldwide. In India, one of every five has hypertension and 50% people above 50 yrs have hypertension. Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease death in India. Epidemiological studies show that hypertension is present in 25% urban and 10% of rural subjects in India. It is estimated that there are up to 31.5 million have hypertension in rural population [12]. At one end of the age spectrum is isolated systolic hypertension in young adults (typically 17 to 25 years of age). The key hemodynamic abnormalities are increased cardiac output and a stiff aorta, both presumably reflecting an overactive sympathetic nervous system. The prevalence is estimated to be as high as 25% in young men but only 2% in young women. These figures may be too high because brachial artery BP overestimates central aortic pressure by approximately 20mmHg in young adults from peripheral pulse wave amplification. However in the largest study to date, central aortic pressure, were 20mmHg higher than normal in young adults with isolated systolic hypertension. A hyperdynamic circulation in youth may precede diastolic hypertension in middle age [13]. In India, the awareness of hypertension, its risk factors and complications is very poor. Scanty information is available regarding the prevalence of hypertension and its complications in younger Indians. Despite its high prevalence in the population, hypertension in women has received less attention than hypertension in men. This clinical study of hypertensive emergencies is done in order to recognize this condition as early as possible, so as to reduce burden associated with it in terms of morbidity and mortality of our society [14-17].

Material and Methods

This study was done on rural patients with hypertensive emergencies admitted to Intensive Cardiac Care Unit in Rural tertiary health care hospital from January 2014 to June 2015 (50 patients). On admission, detailed history was taken and complete clinical examination was done. Patients with an

elevated systolic blood pressure of ≥ 180 mmHg or diastolic blood pressure of ≥ 120 mmHg, with history suggestive of acute target organ damage or with laboratory evidence of target organ damage were included in the study.

Study design: The study design for our project was a hospital based cross sectional study.

Type of study: Observational study

Study setting: We selected Patients diagnosed to have hypertensive emergencies in young admitted in rural tertiary Health Care Centre in the department of medicine.

Study duration: The duration of our study was from January 2014 to June 2015.

Sample size: The sample size was restricted to 50 cases.

Statistical methods: The data obtained was analysed by descriptive statistics by means of percentage, proportions and depicted via bar charts, pie charts.

Selection of Subjects: Inclusion Criteria:

1. Systolic blood pressure of 180mmHg and above or diastolic blood pressure of 120mmHg and above.
2. Evidence of end organ damage, either clinically or laboratory findings.

Exclusion Criteria:

1. Patients less than 18 yrs and above 40 yrs of age
2. Patients with valvular heart disease, pregnancy induced hypertension

Diagnostic Criteria: The diagnosis of hypertensive emergency will be established by the following

1. Systolic blood pressure ≥ 180 mmHg or diastolic blood pressure ≥ 120 mmHg.
2. Acute target organ damage.

Ethics: The sample of 50 cases was considered to be sufficient for this study, which adhered to the principles of the Declaration of Helsinki, and was approved by independent ethical committees of our college. We obtained written informed consent in all cases to participate in the study.

Data collection procedure: All patients who fulfilled the inclusion and exclusion criteria were included in this study. The consent was taken from the patients or attendants who were included in the study, for performing the necessary investigations or procedures. A Proforma was prepared which included detailed history, clinical examination and requisite investigations available in our hospital. History includes all symptoms pertaining to hypertensive emergencies in young in detail with emphasis on all the risk factors attributable to the hypertensive emergencies in young. A detailed clinical examination was done and neurological deficits were identified. Relevant investigations like hemoglobin, total white cell count, erythrocyte sedimentation rate, routine urine analysis, blood glucose, blood urea, serum creatinine, serum electrolytes, serum lipid profile, Chest X-ray, CT scan head, electrocardiography, funduscopy, urine albumin were done for all patients, Bleeding time, Clotting time, echocardiogram, Color renal Doppler were done in the required patients. The results were analyzed to assess the etiology, risk factors, and the pattern of clinical and radiological profile.

Clinical examination for checking blood pressure:

Hypertension: ➤The American guidelines state that blood pressure below 120/80 mm of Hg is normal, 120 to 139/80 to 89 mm of Hg is pre hypertension, and readings above

prehypertension level are abnormal. Isolated systolic hypertension is defined as an elevated B.P of >140 mm Hg with a normal (<80 mm of Hg) diastolic pressure. [18].

➤The European and British guidelines have classified a B.P of less than 120/80 mm of Hg as optimal. 120 to 129/80 to 84 mm is normal. 130 to 139/85 to 89 mm of Hg is high normal, and anything above that is classified as hypertension and is divided into three stages [19].

Stage -1: Systolic 140 to 159 mm Hg and/or diastolic 90 to 99 mm of Hg.

Stage -2: Systolic 160 to 179 mm Hg and/or diastolic 100 to 109 mm Hg.

Stage -3: Systolic 180 mm Hg or higher and/or diastolic 110 mm of Hg or higher.

Analysis: This cross sectional study was accomplished from January 2014 to June 2015 in tertiary rural health care hospital, Ambajogai. A proper questionnaire was used to collect data from all the cases and which was recorded in the form of tables and graphs. The data were analyzed using SPSS program version 16 software. Chi square test was used as a test, the significance and p value less than 0.05 was considered as significant. Odds ratio and relative risk were calculated, summarized and tabulated accordingly.

Acute Target Organ Damage May Include:

1. **Hypertensive encephalopathy:** A clinical characteristic of hypertensive encephalopathy includes a mean arterial pressure of about 180mmHg. Neurological examination might reveal a patient who is disoriented or with varying severity of altered sensorium, presence of focal neurological signs, generalized or focal seizures, retinopathy including papilloedema, asymmetric reflexes and nystagmus.
2. **Intracerebral haemorrhage:** Intracerebral haemorrhage is more than twice as common as subarachnoid haemorrhage (SAH) and is much more likely to result in death or major disability than cerebral infarction or SAH. Advancing age and hypertension are the most important risk factor for ICH
3. **Subarachnoid haemorrhage:** Patients with subarachnoid haemorrhage usually present with severe headache, altered sensorium and neurological deficits.
4. **Atherothrombotic brain infarction with severe hypertension:** Study by martin et al reported that most cases of hypertensive emergencies corresponded to cerebrovascular lesions (58%) among which 67% were cases of ischemic stroke.
5. **Cardiac conditions in hypertensive emergencies:** Cardiac conditions include acute left ventricular failure, acute myocardial infarction, unstable angina and acute aortic dissection.

Renal hypertensive emergencies: Renal conditions leading to hypertensive emergencies include glomerulonephritis leading to acute renal failure. In renovascular hypertension secondary to unilateral or bilateral renal artery stenosis patients usually present with oliguria, azotemia and uremia.

Results

Sex Distribution: Among the fifty subjects in the present study, 33(66%) were males and 17(34%) were females.

Age Distribution: The mean age in patient was 32 years. The age varied from 18 to 40 years in males and 18 to 40 years in females. The mean age for male and female was 32 and 34 years respectively.

Presenting Symptoms: In the present study the presenting symptoms in these patients were neurological deficits including convulsions, visual deficits, and cardiac symptoms like chest pain and dyspnoea. The commonest presenting complaints were neurological deficits in 24 patients (48%) followed by dyspnoea in 12(24%) and chest pain in 10 patients (20%).

Neurological Deficits: Among patients with neurological deficit, 18 patients (75%) had hemiparesis, 4 patients (16.6%) had convulsions and 2 patients (8.3%) had visual disturbance.

12 patients out of 24 patients who had neurological deficits were in altered sensorium.

Hypertensive Status: Among the fifty patients studied 31 patients (62%) were previously known hypertensives.

Compliance to Antihypertensive Drugs: Out of the known hypertensive, 24 (77.41%) were still continuing their antihypertensive medications while 7 patients (22.58%) had discontinued medications

Diabetes and Dyslipidemia: Of the 50 patients studied 12 patients (24%) had diabetes mellitus and 16 patients (32%) had Dyslipidemia.

Blood Pressure Measurements: Blood pressure systolic and diastolic measurements at the time of presentation, after one hour, at 24 hours and at the time of discharge are given below.

Systolic Blood Pressure

Table 1: Systolic Blood pressure measurements

Systolic blood pressure mmHg	Number of patients	Mean (SBP in mmHg)	Standard Deviation
At admission	50	216	24.74
At one hour	50	197	22.20
At 24 hours	50	163	22.01
At discharge	40	136	10.81

Diastolic Blood Pressure

Table 2: Diastolic Blood pressure measurements

Diastolic blood pressure mmHg	Number of patients	Mean(DBP in mmHg)	Standard Deviation
AT ADMISSION	50	125	18.41
AT ONE HOUR	50	111	22.29
AT 24HOURS	50	96	10.99
AT DISCHARGE	40	85	5.08

Variations in Systolic Blood Pressure: Mean variation in systolic blood pressure at one hour, 24 hours and at the time of discharge are given in the table below.

Table 3: Variations in systolic blood pressure

Systolic blood pressure mmHg	Mean(SBP in mmHg)	Standard deviation	T value	P value
SBP 0 hours to 1hour	19	20.65	6.47	0.001 VHS
SBP 0 hours to 24hours	53	27.24	13.70	0.001 VHS
SBP 0 hours to Discharge	76	24.70	19.33	0.001 VHS

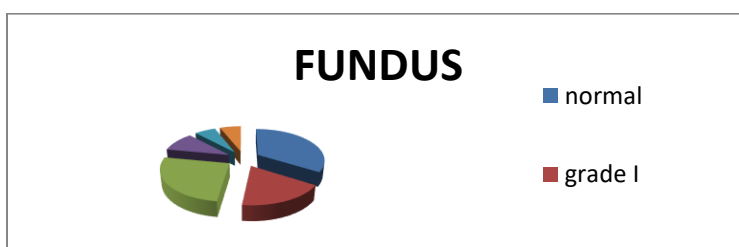
Table 4: Variations in diastolic blood pressure

Mean variation in diastolic blood pressure at one hour, 24 hours and at the time of discharge are given in the table below.

Diastolic blood pressure mmhg	Mean(DBP in mmhg)	Standard deviation	T value	P value
DBP 0 hours to 1 hour	14	19.23	5.24	0.001 VHS
DBP 0 hours to 24 hours	30	18.51	11.32	0.001 VHS
DBP 0 hours to Discharge	37	16.61	13.91	0.001 VHS

The mean blood pressure readings in patients who were discharged from the hospital were systolic blood pressure of 212mmHg and diastolic blood pressure of 121mmHg. Similar readings in patients who expired were systolic blood pressure of 224mmHg and diastolic blood pressure of 138 mmHg respectively. This is represented in table no. 4 above.

Fundoscopy Examination: Fundoscopic examination was done in every patient and the results are as given below. Fundoscopic evaluation was normal in 15 patients (30%), 10 had grade I changes (20%), 12 had grade II changes (24%), 7 patients had grade III changes (14%), 2 patients had evidence of papilloedema (4%). Fundus could not be visualized in 4 patients (8%)

**Fig 1: Fundoscopic Examination**

Acute Left Ventricular Failure: Out of 50 patients, 12(24%) patients had acute left ventricular failure

Chest Radiograph: Chest radiography was suggestive of cardiomegaly in 18 patients and 3 patients had signs of pulmonary oedema. Chest radiography was normal in 29 patients.

ECG Changes: Out of 50 patients 23 patients (46%) had ST segment or T wave abnormalities, 12(24%) had ECG with voltage criteria suggestive of LVH and 8 patients had both the changes.

Echocardiography: Echocardiography done in 22 patients with evidence of cardiac dysfunction. Showed left ventricular dysfunction in 11(50%), regional wall motion abnormality in 8 patients (36 %), left ventricular hypertrophy in 6 (27%) patients and normal echocardiographic study in 5 patients (22 %).

Renal Function Tests: Serum urea was abnormal with levels above 40mg/dl in 14(28%) of patients. Serum creatinine level were above 1.4mg.dl in 8(16%) of patients. Serum urea and creatinine were elevated in

6 patients (12%) and 7 patients out of 17 patients had elevated serum urea levels alone.

Renal Sonogram: Patients with laboratory evidence of renal dysfunction were subjected to renal sonogram. Out of 14 patients 7 patients had grade I changes, 2 patients had grade II changes.

Electrolyte Abnormalities: Hyponatremia with serum sodium levels less than 135 meq/l were seen in 14patients (28%) while 7 patients (14%) had hypokalemia with serum potassium levels less than 3.5 meq/l and 5 (10%) had hyperkalemia with potassium levels more than 5.0 meq/l.

Microalbuminuria: Microalbuminuria was seen in 16 patients (32%)

Computed Tomography: Neurological evaluation in symptomatic patients with computed tomography scan of brain revealed acute intracerebral haemorrhage in 13 patients, acute cerebral infarct in 6 patients, Subarachnoid haemorrhage was seen in 3 patients and normal study of the brain in 2 patients.

Target Organ Damage: Neurological target organ damage included acute intracerebral haemorrhage in 13 patients (26%), subarachnoid haemorrhage in 3 patients (6%), acute ischemic stroke in 6 patients (12%), hypertensive encephalopathy in 3 patient (6%), cardiac target organ damage were acute left ventricular failure

in 12 patients (24%), acute myocardial infarction in 3 patients (6%), unstable angina in 6 patients (12%), and malignant hypertension in 4 patients (8%)

Outcome: Out of 50 patients with hypertensive emergencies, 10 patients died before discharge. In hospital mortality was 20%.

Table 5: Characteristics of those discharged and expired

Outcome	Discharge (N= 40)	Expired (N =10)
Male	24	9
Female	16	1
Mean Age	34	36
Mean Bp	212/121mmhg	224/138mmhg
Presenting Symptoms		
Neurological Deficits	14	9
Chest Pain	10	1
Dyspnoea	13	-
Comorbidities		
Diabetes	9	3
Dyslipidemia	12	4

Discussion

In the present clinical study of hypertensive emergencies done at tertiary health care centre. The number of males presenting with hypertensive emergencies were more than the number of females. 66% of the patients were males. Martin *et al* [26]. In their study on hypertensive crises observed that 55% of patients were male among patients with hypertensive emergencies. The proportions of males in hypertensive emergencies were also higher in the study by Zampaglione *et al.* [10]. This is probably related target organ damage. This possibility is revealed in the Framingham study [21] which showed that the incidence of coronary arterial disease in men increased in an almost linear mode as age is increased. Analysing the presenting symptoms, the largest group of patients in the present study, presented with a neurological deficit (48%), followed by dyspnoea (24%) and chest pain (20%). This was similar to the study by Martin *et al*[26], who in their study found presenting symptoms of neurological deficits, dyspnoea and chest pain in 48%, 25%, and 18% of their patients. Zampaglione *et al*[10]. In their study had more patients presenting with chest pain (27%), followed by dyspnoea (22%) and neurological deficits (21%). Neurological deficits in the present study varied from hemiparesis (75%), convulsion (16.6%), and visual deficits (8.3%). Hemiparesis accounted for the largest group of patients with neurological deficit [30]. Majority of patients in

the present study were previously known hypertensives (62%). Garcia GM [1] noticed a large number of patients, (65.9%), in their study to be previously diagnosed hypertensive [1]. Zampaglione *et al* [10]. Reports a larger number, with (92%) of known hypertensives among their patients. This evidence confirms that hypertensive emergencies were higher in patients with previously known hypertension. This also shows that patients with hypertension are at a higher risk of developing a hypertensive emergency, more so if they do not adhere to the antihypertensive therapy [12]. In the present study 23% among the known hypertensive ignored their hypertensive status and discontinued antihypertensive medications which would have put them at a higher risk for acute target organ damage and hypertensive emergency[8]. Diabetes mellitus and dyslipidemia were the other risk factors present in the present group of patients 9]. Patients with diabetes mellitus and dyslipidemia were 24% and 32% respectively in the present study. The number of patients with diabetes mellitus was 26% in the study done by Martin *et al* [26]. These risk factors would have added to premature atherosclerosis and coronary artery disease in these patients predisposing them to acute target organ damage. Prevalence of arterial hypertension in diabetic patients is greater when compared with that in non-diabetic patients (40-50% and 24%, respectively) [33]. Metabolic

abnormalities (hyperglycemia, hyperinsulinemia, and dyslipidemias) may play a role in the pathogenesis and complications of arterial hypertension, as seen in the present study [25]. Higher recorded systolic blood pressure was 280 mmHg with mean systolic blood pressure of 216 ± 18 mmHg. Martin *et al* [26]. In their study reports a mean systolic blood pressure of 193 ± 26 mmHg in their patients and a mean diastolic blood pressure of 129 ± 12 mmHg. The mean reduction in blood pressure in one hour after admission to the hospital was 19 mmHg of systolic blood pressure and 14 mmHg of diastolic blood pressure [33]. Blood pressure levels at the time of admission were higher in group of patients expired compared to those who were discharged from the hospital. The higher levels of blood pressure would have added to more severe target organ damage in these patients, with an adverse outcome [33]. This indicates worse prognosis with higher levels of blood pressure at presentation [33]. Evaluation of fundus revealed changes ranging from hypertensive retinopathy to papilloedema on 70 percent of patients [10]. Papilloedema was seen in 4% of patients which is evidence of target organ damage in these patients. Renal dysfunction in the form of raised serum urea and creatinine were seen in 28% and 16% of patients respectively [8]. Renal ultrasonographic changes amounting to hypertensive target organ damage was seen in 9 patients [5]. Hyponatremia was observed in 28% of patients. 14% of the patients had hypokalemia compared to 10% with hyperkalemia reflecting secondary aldosteronism from increased rennin secretion induced by intra renal ischemia [35]. Microalbuminuria was seen in 33% of the patients which puts these patients at higher risk for hypertension related renal disease compared to the patients without proteinuria [34]. Computed tomography of the brain showed intracerebral haemorrhage as the commonest cause for the neurological target organ damage followed by cerebral infarct and subarachnoid haemorrhage. Voltage criteria of left ventricular hypertrophy on ECG was seen in 12 patients (24%). Out of 22 patients who underwent echocardiography 6 patients (27%) had left ventricular hypertrophy. A study done by Lip GY [33]. *et al* on complications of survival of 315 patients with malignant phase hypertension found low median survival time in patients with proteinuria and high serum urea and serum creatinine levels at presentation and if left ventricular hypertrophy was detected on electrocardiogram [39]. These findings in a patient in hypertensive emergency situation may help in prognosticating these patients. Evaluation for target organ damage in patients in the present study showed acute intracerebral haemorrhage in 30% was the most

common target organ damage, followed by including acute left ventricular failure in 28% and unstable angina in 14%. Study by Martin *et al* [26]. shows intracerebral haemorrhage (17%), left ventricular failure (25%), acute ischemic stroke (39%) and acute myocardial infarction in (8%) their patients. Zampaglione *et al* [10]. In their study observed target organ damage in the form of left ventricular failure (23%), Acute ischemic stroke (24%) and intracerebral haemorrhage (4.5%) in their patients. The outcome of the study showed an in-hospital mortality of 24% among these patients. In those who expired, males (18%) were more than female (2%), mean age was 36 yrs, which was higher than those discharged 32 yrs, most of these presented with neurological deficits (91%) and most of them had diabetes and Dyslipidemia [33].

Conclusion

- Majority of patients presenting with hypertensive emergencies belonged to the 20-35 years of age group.
- Males have higher chances of developing hypertensive emergencies and greater mortality compared to females.
- Known hypertensives are at higher risk of presenting with acute end organ damage associated with hypertensive emergencies.
- Patients of diabetes & Dyslipidemia increase the chances of developing hypertensive emergencies.
- Commonest mode of presentation is with neurological deficit.
- High levels of blood pressure at the time of presentation points towards adverse outcome.
- Hyponatremia & Hypokalemia were common in patients with hypertensive emergencies.
- Acute intracerebral hemorrhage was the most common form of end organ damage in present study.
- The hospital mortality among the patients with hypertensive emergencies were 24%.

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List of abbreviations used

LVH	Left ventricular hypertrophy
LVF	Left Ventricular Failure
ICH	Intracerebral haemorrhage
SAH	Subarachnoid haemorrhage
BP	Blood pressure
SBP	Systolic blood pressure
DBP	Diastolic blood pressure
CT	Computed tomography
JNC VII	Joint National committee vii

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