Clinical characteristics of patients with hypertensive emergencies and urgencies presenting to the emergency department of a tertiary care centre

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Abstract

Background: Hypertension is the leading health-related risk factor in India, contributing significantly to disease burden and mortality. Approximately 1–3% of patients experience a hypertensive crisis during their lifetime. Hypertensive emergencies are potentially life-threatening and pose challenges for emergency physicians, often presenting with diverse clinical symptoms and variable end-organ involvement.

Aim: This research aimed to study the clinical presentation of patients with hypertensive crisis coming to emergency department and to assess the common predisposing factors associated with the hypertensive crisis.

Materials & Methods This descriptive cross-sectional study was conducted at East Point Hospital. It included all patients aged over 18 years who presented to the emergency department with blood pressure readings exceeding 180/120 mmHg.

Results: Hypertensive urgencies accounted for 73% of cases. Hypertensive crises were more common in males, individuals with prior hypertension, and those with BMI >25. Medication non-compliance was frequent in both groups. Giddiness was the leading symptom in urgencies, while altered mental status was most common in emergencies. Acute hemorrhagic stroke was the predominant end-organ damage, with higher ICU admissions in hypertensive emergencies.

Conclusion Hypertension is a leading modifiable risk factor for cerebrovascular and cardiovascular diseases in India. Early diagnosis, effective treatment, and improved awareness can reduce preventable acute events and ICU admissions.

Keywords: Hypertensive crisis, Hypertensive emergency, Hypertensive urgency

Introduction

Hypertension poses the greatest health risk in India, accounting for the largest share of disease burden and mortality.[1,2]. Approximately 1.6 million deaths in India each year are attributed to ischemic heart disease and stroke[3], with hypertension being a significant contributing factor (57% of stroke deaths and 24% of coronary heart disease deaths)[4]. India has a high prevalence of hypertension, affecting nearly 30% of the population (29.8%, 95% CI: 26.7-33.0). Urban areas have a higher prevalence (33.8%) compared to rural areas (27.6%, p=0.05)[4].

The burden of hypertension is expected to escalate, reaching 1.56 billion cases by 2025[5]. A significant concern is that 1-3% of patients will experience a hypertensive crisis, primarily due to inadequate or lack of medical treatment [6].

Hypertensive emergencies are life-threatening and present diverse symptoms, challenging emergency physicians. Despite global variation, data from Indian emergency departments remain scarce. This study aims to identify common presentations, risk factors, and end-organ involvement to bridge this gap.

This study is novel in its focus on emergency department presentations of hypertensive emergencies and urgencies within a tertiary care setting, particularly in a region with limited prior data. By distinguishing between emergencies and urgencies and providing detailed clinical, demographic and management-related insights, it adds valuable evidence. Unlike many

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previous studies that focus on inpatient populations or combine hypertensive crises into a single category, this study uniquely evaluates and compares the clinical profiles of hypertensive emergencies and urgencies in an emergency department setting in Bangalore. It highlights regional trends; modifiable risk factors and provides valuable insights for both acute management and public health intervention, areas that are underrepresented in current Indian literature.

Materials and Methods

This descriptive cross-sectional study was conducted in the emergency medicine department at East point college of medical sciences and research centre over six months after obtaining the institutional ethical committee clearance. The study population consisted of patients presenting to the emergency department with hypertensive crisis. Inclusion criteria were age ≥ 18 years and systolic blood pressure ≥ 180 mmHg or diastolic blood pressure ≥ 120 mmHg. Patients with chronic renal failure, pregnancy, valvular heart disease, or secondary hypertension were excluded.

Eligible participants received a thorough explanation of the study's purpose and procedures, and written informed consent was obtained. For patients unable to provide consent, it was obtained from their accompanying guardian.

A comprehensive assessment was conducted for each patient, including complete medical history, physical examination, routine blood and urine chemical analysis. Blood pressure measurements were taken using a mercury sphygmomanometer with the patient in the recumbent position, adhering to standard techniques. Hypertensive emergencies were identified based on the presence of acute or ongoing end-organ damage, including: hypertensive encephalopathy, stroke (cerebral infarction, intracerebral, subarachnoid haemorrhage), acute pulmonary oedema, congestive heart failure, left ventricular failure, or aortic dissection, acute myocardial infarction or unstable angina, progressive renal insufficiency. Diagnostic tests, such as blood and urine chemistry, eye fundus examination, ECG, roentgenogram, computed tomography, and ultrasound imaging, were used to confirm these conditions. CT imaging was performed for patients presenting with neurological symptoms. In the absence of end-organ damage, all other hypertensive crises were classified as hypertensive urgencies.

Hypertensive crisis is separated into 2 broad categories of urgency and emergency. According to the Joint National Commission (JNC), on prevention, detection, evaluation and treatment of high blood pressure, hypertensive crisis is defined as a systolic blood pressure of 180 mm Hg or higher and a diastolic pressure 120 mm Hg or higher, with or without end-organ damage respectively [7].

Sample size was 200 cases and was calculated based on proportion of patients with hypertensive crisis visiting emergency department at EPCMSRC= 8%.

Using the formula

$N = Z^2_{1-a/2}P(1-P)/ d^2$

$(1.96)^2$*0.08*0.96/0.05*0.05

=117 patients

All the data collected were compiled and entered into a Microsoft excel 2016. Categorization of data was done and was analysed using SPSS software v.22.0. Descriptive statistics- qualitative variables was summarised as frequency and percentages. Quantitative data was summarised as mean and standard deviation. Chi-square tests were employed to analyse the data, examining the significance of associations between categorical variables.

Results

A total of 200 patients were enrolled in the study, with 54 patients (27%) diagnosed with hypertensive emergency and 146 patients (73%) diagnosed with hypertensive urgency.

Table 1: Patient Profile

Variables		Overall (n=200)	Emergency (n=54)	Urgency (n=146)	P Value
Gender	Male	115 (57.5%)	41 (75.9%)	74 (50.7%)	0.001*
	Female	85 (42.5%)	13 (24.1%)	72 (49.3%)	
Age (years)	Median (IQR)	52 (45-62)	52 (45-64)	52 (46-61)	0.525
BMI	Normal	50 (25%)	11 (20.4%)	39 (26.7%)	0.001*
	Over	105 (52.5%)	39 (72.2%)	66 (45.2%)	
	Obese	45 (22.5%)	4 (7.4 %)	41 (28.1%)	

**Statistically significant*

Chi-square Test

In terms of gender, we had total of 115 male patients and 85 female patients who presented with hypertensive crisis. The study found a significant gender disparity between the two groups, with males comprising 75.9% of the hypertensive emergency group, compared to 50.7% of the hypertensive urgency group. The median age was similar between the two groups and most of the cases were between the age of 40-60 yrs. (Table 1)

Regarding obesity, 73% (150 patients) had a BMI >25. A breakdown of the groups revealed that in the hypertensive emergency group, 72.2% (39 patients) were overweight and 7.4% (4 patients) were obese.

In the hypertensive urgency group, 45.2% (66 patients) were overweight and 28.1% (41 patients) were obese. Statistical analysis showed a significant difference in BMI distribution between the two groups (p-value = 0.001). (Table 1)

Table 2: Risk factors

Variables		Total (n=200)	Emergency (n=54)	Urgency (n=146)	P VALUE
Systolic blood pressure	Median (IQR)	190 (182-200)	190 (184-210)	190 (182-200)	0.065
Diastolic blood pressure	Median (IQR)	100 (90-120)	120 (94-123)	99 (86-112)	<0.001*
History of Hypertension	Yes	139 (69.5%)	45 (83.3%)	94 (64.4%)	0.010*
	No	61 (30.5%)	9 (16.7%)	52 (35.6%)	
Medication Compliance	Yes	88 (44%)	31 (57.4%)	57 (39%)	0.020*
	No	112 (56%)	23 (42.6%)	89 (61%)	
History of Diabetics	Yes	61 (30.5%)	28 (51.9%)	33 (22.6%)	<0.001*
	No	139 (69.5%)	26 (48.1%)	113 (77.4%)	
Smoking History	Yes	145 (72.5%)	37 (68.5%)	108 (74%)	0.443
	No	55 (27.5%)	17 (31.5%)	38 (26%)	
Alcohol History	Yes	144 (72%)	32 (59.3%)	112 (76.7%)	0.015*
	No	56 (28%)	22 (40.7%)	34 (23.3%)	
Hypothyroidism	Yes	25 (12.5%)	9 (16.7%)	16 (11%)	0.279
	No	175 (87.5%)	45 (83.3%)	130 (89%)	

**Statistically significant*

Chi-square Test

Mann-Whitney U Test

The overall median systolic blood pressure was 190 mmHg, with an interquartile range (IQR) of 182-200 mmHg. Notably, no statistically significant difference was observed in median systolic blood pressure between the hypertensive emergency and urgency groups (p = 0.065).

In contrast, the median diastolic blood pressure was substantially higher in the hypertensive emergency group (120 mmHg, IQR: 94-123 mmHg) compared to the hypertensive urgency group (99 mmHg, IQR: 86-112 mmHg), with a highly significant difference (p < 0.001). (Table2)

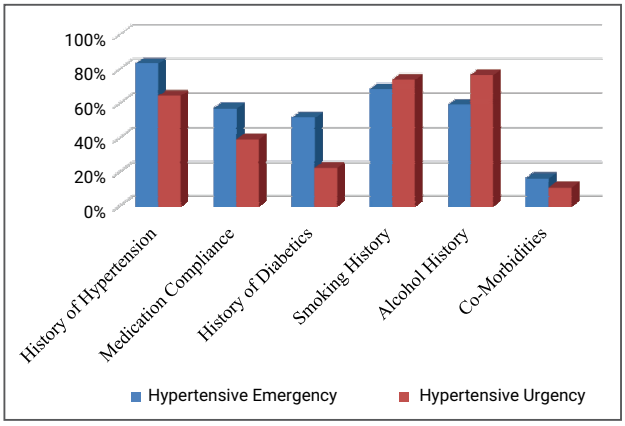

Figure 1: Risk factors

In terms of risk factors (Figure1), a history of hypertension was present in 139 patients who presented with hypertensive crisis. Out of which, 45 (83.3%) patients belonged to the emergency group while 94 patients (64.4%) to the urgency group, with a significant p-value of 0.010.

112 (56%) patients were not compliant with medication, 23 (42.6%) belonged to the emergency group, 89 (61%) to the urgency group, with a significant p-value of 0.020.

A history of diabetes was present in only 61(30.5%) patients in total with 28 (51.9%) patients belonging to the emergency group and 33 (22.6%) patients belonging to the urgency group, with a significant p-value of <0.001.

Of the total, 72.5% patients had a history of smoking. Of this 74% belonged to the urgency group and 68.5% to emergency group. This was not statistically significant.

A history of alcohol consumption was more prevalent in the hypertensive urgency group (76.7%) compared to the hypertensive emergency group (59.3%), with a statistically significant difference (p = 0.015). In contrast, the presence of other co-morbidities loke hypothyroidism did not differ significantly between the two groups (p = 0.279).

Table 3: Medication & disposition

Variables		Total (n=200)	Emergency (n=54)	Urgency (n=146)	P VALUE
Intravenous drug administration		62 (31%)	32 (59.3%)	30 (20.5%)	
Admission	Ward	98 (49%)	11 (20.4%)	87 (59.6%)	<0.001*
	ICU	50 (25%)	40 (74%)	10 (6.8%)	
	Discharge	52 (26%)	3 (5.6%)	49 (33.6%)	

**Statistically significant*

Chi-square Test

32 patients (59.3%) in the emergency group received IV anti-hypertensive medication. 30 patients (59.3%) in the urgency group received IV anti-hypertensive medication and 116 patients (40.7%) received oral anti-hypertensive medication. IV medications used were labetalol or nitroglycerine. Commonly used oral medications were amlodipine or cilnidipine. A total of 148 (74%) patients required admission: 98(49%) patients were admitted to the ward and 50 (25%) to ICU. In the emergency group 40 were admitted to ICU, 11 were admitted to wards and 3 were discharged against medical advice. In the urgency group, 87patients were admitted to wards, 10 patients to ICU and 49 patients were discharged. (Table 3)

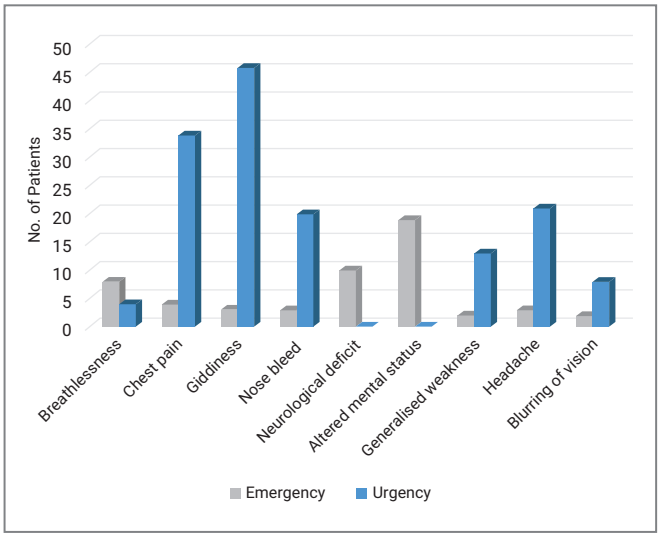

Figure 2: Clinical symptoms

The primary presenting complaints differed between the two groups. In the hypertensive emergency group, the most common symptoms were: altered mental status (35.2%), neurological deficit (18.5%) and breathlessness (14.8%). In contrast, the hypertensive urgency group most frequently presented with giddiness (31.5%), chest pain (23.3%) and headache (14.4%). (Figure 2)

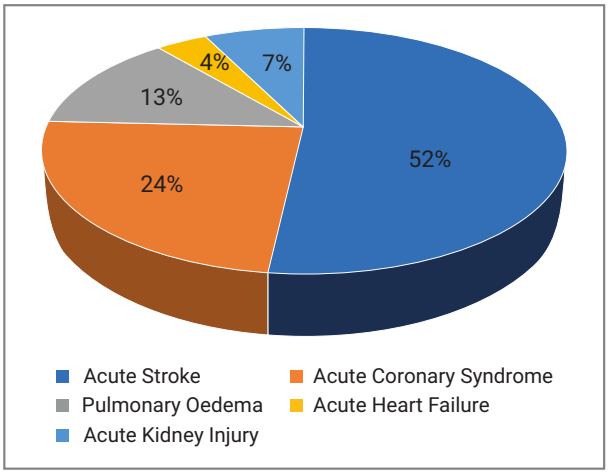

Figure 3: End organ damage

Among the target organ damage, 28 (51.9%) patients had acute stroke, 13 (24.1%) patients had acute coronary syndrome, 7 (12.9%) patients had acute pulmonary oedema, 4 (7.4%) patients had acute kidney injury and 2 (3.7%) patients had acute heart failure. (Figure 3). Among patients with acute stroke, 20 (64.2%) were diagnosed with hemorrhagic stroke, while 8 (28.5%) had ischemic stroke.

Discussion

Hypertensive crisis is a common condition which presents with varied presentations to the emergency department. Prompt recognition and timely

initiation of treatment are crucial in reducing end-organ damage. This study aimed to investigate the clinical characteristics of patients presenting with hypertensive crisis. In this study, out of the 200 patients who presented with hypertensive crisis, 27% of them belonged to the emergency group with end organ damage, whereas 73% were diagnosed as hypertensive urgencies. Our findings are consistent with previous studies[8-10], including the one by Manoj Kumar et al, which also reported a higher prevalence of hypertensive urgencies

Our study found a higher proportion of male patients (57.5%) affected by hypertensive crises compared to female patients (42.5%). This trend is consistent with previous studies, including those by Zampogline et al[11], Varun et al[12], and Martin et al[13], which also reported a higher prevalence of hypertensive emergencies among males. The observed gender disparity may be attributed to a combination of biological and behavioural factors. Research suggests that biological factors, such as sex hormones and chromosomal differences, may confer protective effects against hypertension in women, as noted in a study by Vitale et al[14].

In terms of risk factors, a history of hypertension was present in 139 patients who presented with hypertensive crisis. Out of this, 45 (83.3%) patients belonged to the emergency group and 94 patients (64.4%) to the urgency group. Martin et al[13] reported a high prevalence of prior hypertension among patients in their study, which aligns with our observations.

Medication non-compliance was a common issue, affecting 112 patients in our study. Among the non-compliant patients, 23 (42.6%) presented with hypertensive emergencies, whereas 89 (61%) had hypertensive urgencies. Several studies have highlighted the importance of adequate blood pressure control in preventing hypertensive crises. Tisdale et al[15] identified poor outpatient blood pressure control as an independent predictor of subsequent hypertensive crises. Furthermore, Kartz et al[16] reported that non-adherence to medication was a significant issue, with 26% of patients presenting with hypertensive emergencies having a history of chronic or current non-adherence. Similarly, Saguner et al[17] found that non-adherence to medication was the most critical factor contributing to hypertensive crises. Most of our patients are from rural background with low socioeconomic status and hence non-adherence maybe a major contributing factor. Socioeconomic status plays a pivotal role in shaping health outcomes and treatment adherence. Disparities in healthcare access, financial resources, and insurance coverage disproportionately affect individuals from lower socioeconomic backgrounds, exacerbating health inequities[18].

A history of diabetes was present in only 30% of patients in total and 28 belonged to emergency and 33 belonged to urgency group. This is possibly because the patients with concomitant diabetes are adherent to medication. Comparative studies, such as the one conducted by Polanska et al[19], have revealed that patients with hypertension tend to have lower adherence to treatment compared to diabetic patients. This may be attributed to the asymptomatic nature of hypertension, leading patients to adopt a more relaxed approach to treatment, underestimating the potential long-term consequences[20]. As a result, patients with uncontrolled hypertension are more likely to present with hypertensive crises.

The primary risk factors contributing to hypertension include smoking, excessive alcohol consumption, obesity, and high salt intake[21]. Majority of our patients were overweight with BMI >25. Of the total, 72.5% patients had history of smoking. 74% belonged to urgency group and 68.5% to the emergency group. This was not statistically significant. Our study revealed a significant association between alcohol consumption and hypertensive crises. A history of alcohol intake was reported by 59.3% of patients in the emergency group and 76.7% of patients in the urgency group (p=0.015). In contrast, Goswami et al[22] found no significant differences in smoking and alcohol consumption habits between patients with hypertensive emergencies (HTN-E) and hypertensive urgencies (HTN-U), with p-values of 0.5173 and 0.5475, respectively.

Hypertensive emergencies exhibited a spectrum of clinical symptoms, influenced by the specific organ systems involved. The most frequently observed signs were altered mental status, neurological deficits, and breathlessness. In comparison, patients experiencing hypertensive urgency commonly reported giddiness, chest pain, and headaches. Our findings are consistent with previous studies, which reported a wide range of clinical presentations in patients with hypertensive emergencies. For instance, Vala et al[23] found that nearly half of patients presented with altered sensorium and neurological deficits.

Our study revealed that acute stroke followed by acute coronary syndrome were the most common forms of target organ damage in patients with hypertensive emergencies. Notably, haemorrhagic stroke was more prevalent than ischemic stroke, consistent with the findings of Vala et al[23], which reported cerebrovascular accident (CVA) as the top emergency department diagnosis (51.57%), with haemorrhagic stroke being

more common. In the studies conducted in East and Southeast Asian populations, stroke was the most common organ-related involvement in hypertensive emergencies, affecting approximately 40% of patients presenting to the emergency department[24-25]. Unlike our findings, studies from Thailand[24] and Korea[25] reported a predominance of ischemic strokes, with the latter study noting that ischemic strokes occurred at a ratio of 2:1 compared to haemorrhagic strokes. Varun et al[12] reported acute myocardial infarction (38%) as the most common causes of hypertensive emergencies followed by intracerebral haemorrhage (23%). This observation highlights the importance of considering demographic and population-specific factors in the clinical presentation and management of hypertensive emergencies.

Our analysis revealed similar mean systolic blood pressure levels in both the groups. However, a significant difference was observed in diastolic blood pressure between the two groups, with mean diastolic blood pressure at presentation being substantially higher in patients with hypertensive emergencies (120 mmHg) compared to those with hypertensive urgencies (99 mmHg). This finding is consistent with the study by Manoj Kumar et al[8], which also reported higher mean systolic and diastolic blood pressure levels in the emergency group versus the urgency group. Our results also align with those of Zampaglione et al[11] and Salagre SB et al[26]. Collectively, these studies suggest that higher systolic and diastolic blood pressure levels at presentation are associated with an increased risk of end-organ damage

Effective management of hypertensive emergencies requires the immediate administration of intravenous medications that rapidly lower blood pressure, thereby protecting target organs and preventing further complications. 32 patients (59.3%) in the emergency group received IV anti-hypertensive medication. 30 patients (59.3%) in the urgency group received IV anti-hypertensive medication and 116 patients (40.7%) received oral anti-hypertensive medication.

The recommended approach for managing hypertensive urgency is to use oral medications to gradually lower blood pressure over a period of 24 to 48 hours[7]. However, our study revealed that 30 patients in the urgency group received intravenous (IV) medications, a practice that may be driven by a lack of clear guidelines and a desire to rapidly reduce blood pressure numbers, rather than following evidence-based protocols. Research suggests that patients with hypertensive urgency, even those exhibiting symptoms, have a less than 1% risk of experiencing major adverse cardiac events (MACE) within six months[27]. Furthermore, the use of IV therapy for hypertensive urgency is not without risks, highlighting the need for a more judicious approach to treatment

A study conducted by Allgaier et al[27] compared the efficacy of intravenous and oral medications in lowering blood pressure and found that both routes of administration achieved similar blood pressure control and outcomes. Notably, the study concluded that oral medications are the preferred treatment option for hypertensive crisis without organ damage.

Conclusions

Hypertension is a key modifiable risk factor for cerebrovascular and cardiovascular diseases in India. In our study, 73% of hypertensive crisis cases were classified as urgencies. Acute hemorrhagic stroke was the most common end-organ complication. Medication non-adherence emerged as a widespread concern.

Recommendations

Lack of awareness about hypertension, its complications, and the importance of medication adherence is particularly pronounced in rural areas, emphasizing the need for targeted education and awareness initiatives. Prompt identification, appropriate management, and enhanced awareness of hypertension play a critical role in lowering the incidence of acute presentations and ICU admissions, thereby helping to ease its overall burden on public health.

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