

An Overview of Hypertensive Crisis Reporting to an Intensive Care Setting

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Abstract

Background: Hypertensive crisis encompasses both hypertensive emergency (HE) and hypertensive urgency (HU). HE occurs when blood pressure (BP) reaches severe levels ($>180/120$ mm Hg) and results in significant organ damage, such as cardiac ischemia, nephropathy, retinopathy, or encephalopathy. On the other hand, HU occurs when BP is severely elevated without organ damage. Given the alarming global and regional statistics, a comprehensive study on hypertensive crises is imperative to develop effective strategies for prevention, early detection, and timely intervention, thus reducing the burden of hypertension-related morbidity and mortality.

Methods: The study was designed as a prospective observational study, conducted over a duration of 1.5 years. The researchers employed a consecutive type of non-probability sampling method to select the study sample. A total of 50 patients who met the inclusion criteria were included in the study after obtaining informed consent. The study focused on hypertensive emergencies, excluding cases related to pregnancy and those arising post-operatively.

Results: The prevalence of hypertensive crisis in our ICU was observed to be 6.4%. Out of the total 50 cases of hypertensive crisis, 82% were cases with hypertensive emergencies while 18% were cases of hypertensive urgencies. Neurological symptoms were the most commonly reported complaints (54%). Among the 41 cases with hypertensive emergencies, the most common observed target organ damage was in the form of intracerebral hemorrhage (ICH) ($n=17$), followed by acute left ventricular failure (LVF) ($n=9$), cerebral infarction ($n=5$), acute myocardial infarction (AMI) ($n=5$), unstable angina ($n=3$), and subarachnoid hemorrhage (SAH) ($n=2$).

Conclusions: The mortality rate among patients with hypertensive crisis is quite high, with one-fourth of the cases failing to survive the condition.

Keywords: Hypertensive Crisis, Hypertensive Emergency, Hypertensive Urgency.

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Introduction

Hypertensive emergency (HE) and hypertensive urgency (HU) are often referred to as hypertensive crisis. A hypertensive emergency is when blood pressure is severely increased, or when it is $>180/120$ mmHg. This seriously damages the organs or causes organ failure, such as cardiac ischemia, nephropathy, retinopathy, or encephalopathy. Hypertensive urgency is the term used to describe when blood pressure is severely increased, that is, when it is $>180/120$ mmHg without endangering any organs.¹ The target organ functions that

are affected by hypertension are required to be considered for the excessive BP lowering risks. In emergencies, it is required that within minutes BP must be lowered with aid of parenteral agents to prevent serious end-organ damage. It takes many hours to drop the BP in cases of hypertensive urgency, and oral medications are utilized for this to prevent harmful BP falls.

Hypertensive emergencies account for more than 15 million deaths per year globally.^{2,3} Three quarters of these deaths occur in lower middle income countries. Lifestyle disorders, raised living standards,

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lack of timely medical intervention, and inadequate awareness are some factors implicated for the rise of hypertension in low and middle income countries like India. Reports have suggested that the prevalence of hypertension is increasing rapidly globally which will be at a projected 1.5 billion next decade. This high prevalence will also lead to an increase in mortality and disability by hypertensive emergencies. In India, the prevalence of hypertension in urban areas is 33.8% and in rural areas 27.6%.⁴ The Global Burden of Disease study has shown an epidemiological shift from communicable diseases to non-communicable diseases reflected in terms of increasing death and Disability Adjusted Life Years (DALYs). The leading non-communicable causes noted were ischemic heart disease and cerebrovascular accidents.⁵

Methods

The study is a prospective observational study. The duration of the study was 1.5 years. A consecutive type of non-probability sampling was followed during the study period for selection of study sample. The study has been approved by the Institutional Ethics board of the medical college. A total of 50 patients fulfilling the eligibility criteria were included in the study after taking informed consent. The inclusion criteria of the study listed patients having blood pressure >180/120 mmHg on presentation with or without severe headaches, visual disturbances, shortness of breath, chest pain, neurological deficits, oliguria, or other signs of end-organ damage. The exclusion criteria of the study applied to patients with hypertensive emergencies of pregnancy and that arising post-operatively. Patients presenting with head injury and having a blood pressure >180/120 mmHg were also excluded from the study. Hypertensive emergencies included all cases with one or more of the following types of acute end-organ damage: hypertensive encephalopathy; Acute ischaemic stroke; hemorrhagic stroke manifesting as spontaneous intracerebral hemorrhage and subarachnoid hemorrhage hypertensive encephalopathy manifesting as headache or confusion or vomiting or nausea or signs of raised intracerebral pressure which abated on lowering blood pressure; acute congestive heart failure; acute coronary syndrome or unstable angina pectoris; hemiparesis or focal neurological deficit; acute aortic dissection; progressive renal insufficiency or significantly reduced urine output as seen in acute hypertensive nephrosclerosis and pheochromocytoma. Hypertensive urgency was defined as elevated blood pressure meeting inclusion criteria, but without evidence of acute end organ dysfunction.

Statistical Analysis

The quantitative data was represented as their mean $\pm$ SD. In this study, we conducted a statistical analysis of categorical and nominal data, which was expressed in percentages. The purpose of the analysis was to explore the relationships, patterns, and trends within the data and draw meaningful insights from it. The data collected for this study consisted of non-numeric variables, and as such, we used appropriate statistical techniques tailored for categorical data analysis. All analysis was carried out by using SPSS software version 21.

Results

Of 781 patients in the ICU, 50 were admitted with the diagnosis of Hypertensive Crisis. The prevalence hypertensive crisis in our ICU

was observed to be 6.4%. The mean age of the study group was 59.2 years with 72% of the cases were between 50-70 years of age group. Male predominance was seen in our study with 82% males to 18% females. Out of the total 50 cases of hypertensive crisis, 82% (n=41) were cases with hypertensive emergencies while 18% (n=9) were of hypertensive urgencies as shown in Table 1.

Table 1. Distribution of study cases as per Type of hypertensive crisis

Type of Hypertensive Crisis	N	%
Urgency	9	18.0%
Emergency	41	82.0%
Total	50	100.0%

Neurological symptoms were the most common presenting complaints (54%) followed by dyspnea (36%) and chest pain (30%). Out of the 27 cases with neurological symptoms, 21 (42%) were of hemiparesis while headache and convulsions were reported in 5 (10%) and 4 (8%) cases respectively. History of hypertension was given by 68% cases of hypertensive crisis. Out of the 34 cases with known hypertension, a history of poor compliance to hypertensive treatment was reported in 8 cases while history of discontinued treatment was seen in 10 cases. History of alcoholism and tobacco use has been shown in table 2.

Table 2. Distribution of study cases as per personal addiction history

Personal History	N	%
Alcohol	29	58.0%
Smoking	13	26.0%
Tobacco Chewer	12	24.0%

Mean systolic and diastolic blood pressures on hospitalization, discharge and during hospital stay have been shown in Figures 1 and 2. Out of the 41 cases with hypertensive emergencies, most common target organ damage observed was in form of ICH (n=17) followed by acute LVF (n=9), cerebral infarct (n=5), AMI (n=5), unstable angina (n=3) and SAH (n=2). Mortality rate in present study among hypertensive crisis cases was 24%.

Discussion

We screened 781 cases coming to our ICU during the study period. The prevalence of hypertensive crisis in our ICU was observed as 6.4%. Shao PJ *et al.* in a similar study screened 8002 patients and found 203 cases in HC.⁶ The hypertensive crisis prevalence was 2.5% in their study. Salagre SB *et al.* in their study reported that hypertensive crisis constitute 18.04% of total ICU admissions.⁷

The present research included nearly fifty cases of HC, 82% were cases with hypertensive emergencies (HE) while 18% were of urgencies (HU). In the study by Shao PJ *et al.*, 138 (68%) had hypertensive urgency and 65 (32%) had hypertensive emergency. Salagre SB *et al.* observed 51.67% patients with hypertensive urgency and 48.33% with hypertensive emergency out of total cohort of hypertensive crisis. S. Salkic *et al.* in their studied 180 patients of hypertensive crisis with HU represented more significantly as compared to the emergency (16.47% vs. 83.53%, $p < 0.01$).⁶⁻⁸ An average age of patients of one group under consideration was 59.2 where 72% of people were in 50-70 of age group. Male predominance was seen with 82% males to

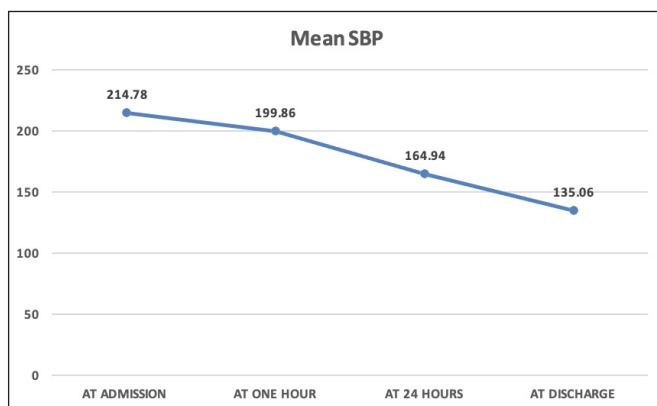


Figure 1. Mean systolic blood pressure readings during hospitalization.

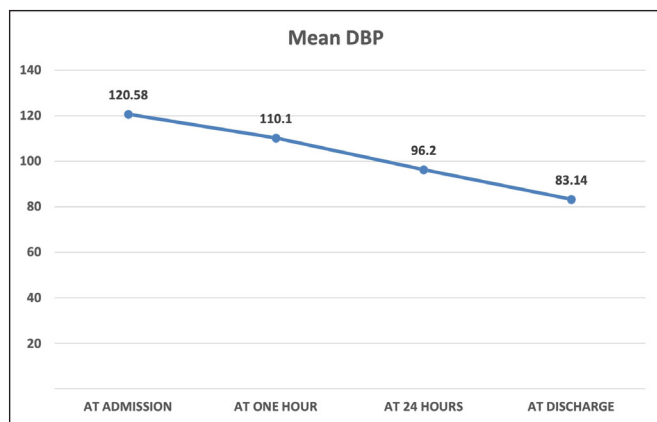


Figure 2. Mean diastolic blood pressure readings during hospitalization.

only 18% females. A similar study done as ours in 2017 found the mean age of patients was 48.34 years and 52.48 years in HU and HE groups respectively.⁷ This is in line with the findings that Indian patients have an earlier onset of hypertension as compared to that in the west.³

Neurological symptoms were the most common presenting complaints. Out of the 27 cases with neurological symptoms, 21 (42%) were of hemiparesis while headache and convulsions were reported in 5 (10%) and 4 (8%) cases respectively. Martin J *et al.* came up with a similar research study about the symptoms or signs present for chest pain in nearly 18% of the patients, dyspnea in nearly 25% and neurological deficits in nearly 48% of the people.⁹ Gulhane S *et al.* with their research observed common symptom present was giddiness in 103 patients (51.5%) followed by headache in 80 patients (40%), breathlessness in 73 patients (36.5%) and hemiparesis in 69 patients (34.5%).¹⁰ Other researchers have also concluded that the most common symptoms were neurological followed by cardiac.^{11,12}

History of hypertension was given by 34 (68%) cases of hypertensive crisis. Out of the 34 cases with known hypertension, 16 patients were on regular medication, history of poor compliance to treatment was reported in 8 cases while history of discontinued treatment was given by 10 cases. Garcia GM *et al.* and Martin J *et al.* observed 65.9% and 83% of the patients for their research all diagnosed previously with the condition of hypertension, respectively.^{9,13} A number of known hypertensives who discontinued their antihypertensive

medications were 12.7% in the study by Cerillo *et al.* 37.5% and 25% in research conducted by Sobrino J *et al.* and Zampaglione B *et al.*, respectively.^{11,14,15} An important research conducted by Garcia GM *et al.* only 17.3% patients were complying with antihypertensive therapy.¹³

Smoking and tobacco chewing were found in 26 and 24%, respectively and 58% were alcoholic in this study. Shao PJ *et al.* in research made an observation considering alcoholism and tobacco addiction in 26.7% cases each.⁶ In a study by Martin J *et al.* smoking and dyslipidaemia are the factors leading to a high risk for hypertensive crisis development.⁹ Such factors of risk add up to diseases linked to coronary artery or premature atherosclerosis conditions among the patients which directly dispose them to the damage of acute organ under target.

The present study research upon patients to evaluate damage in target organs. Most common target organ damage observed was in the form of ICH (n=17) followed by acute LVF (n=9), cerebral infarct (n=5), AMI (n=5), unstable angina (n=3) and SAH (n=2), Figure 3. Another similar research conducted by Martin *et al.* resulted in 8% of acute myocardial infarction, 39% of acute ischemic stroke, 25% left ventricular failure, 17% showing intracerebral hemorrhage as common pathologies in their patients.⁹ Zampaglione B *et al.* made an observation through their research regarding the damage of the target organ in 4.5% of patients suffering from intracerebral hemorrhage, 24% with acute ischemic stroke, 23% patients with left ventricular failure.¹¹ A recent research on target organ damage in HE as observed by Gulhane S *et al.* included Neurologic 79 (39.5%), cardiac 71 (35.5%), renal 36 (18%) and ophthalmic 14 (7%).¹⁰ A similar research conducted by Lanthier *et al.* provided a ranking to the damaged organ in HE using the occurrence frequency as 23% of patients experiencing myocardial ischemia, 23% stroke, 32% people due to heart failure.¹⁶ Giuliano *et al.* noticed 4.9% patients with hypertensive encephalopathy, 5.9% with acute renal failure, 7.9% with acute aortic dissection, 17.9% with myocardial infarction, 22% due to stroke and 30.9% with acute pulmonary edema in their study cohort.¹⁷

The mortality rate in the present study among hypertensive crisis cases was 24%. Such a fatality rate is approximately equal to the one estimated in research conducted by Garcia GM *et al.* Resulting in a fatality rate in hospital to be 25.2%.¹³ Shao PJ *et al.* through their research observed mortality rate of approx. 20% in their study cohort of hypertensive crisis cases.⁶ Salagre SB *et al.* in their study reported that out of a total 120 patients with hypertensive crisis, 19 (15.83%) died.⁷ The cause of mortality in our patients were cerebral herniation in patients of ICH, cardiogenic shock in patients of left ventricular failure, and acute coronary syndrome. 3 patients died due to arrhythmias.

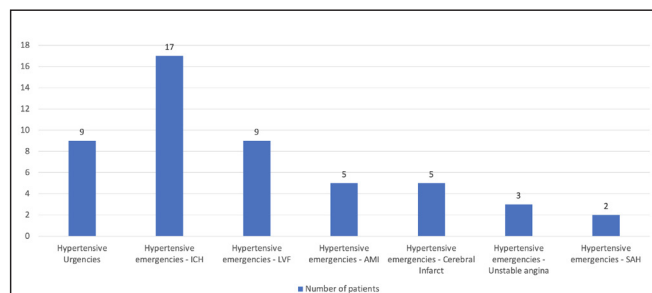


Figure 3. Distribution of cases as per final diagnosis.

Our study has a few limitation. The study had a relatively small sample size of 50 patients, which might limit the generalizability of the findings. A larger sample size would have provided more robust and reliable results. We were additionally not able to establish other risk factors like atherosclerosis in our patients because most patients who have reported to our hospital do not undergo regular periodic health checkups. The study was conducted over a relatively short duration of 1.5 years, which may not capture long-term trends or changes in hypertensive crisis incidence and outcomes. Some data, such as the medical history of poor compliance or discontinued treatment for hypertension, might rely on patients' self-reporting, leading to potential recall bias or missing information.

Conclusion

Most of the people suffering from the condition of hypertensive crisis were 50–60 years of age. The most usual risk factors (modifiable) leading to this were alcohol consumption, smoking, and non-adherence to antihypertensive medication. Our findings emphasize the alarming impact of the hypertensive crisis on mortality, with a distressingly high mortality rate of 24%. This underscores the urgent need for effective preventive measures, early detection, and timely interventions to mitigate the burden of hypertension-related morbidity and mortality. The importance of regular blood pressure monitoring, adherence to antihypertensive treatment, and lifestyle modifications cannot be overstated in reducing the occurrence and severity of hypertensive crises.

Disclosure

Financial support – This study was not funded by any organization.

Conflict of interest – There are no conflict of interest.

Ethical approval – Ethical approval was obtained for the study by the institutional ethics committee board of the hospital.

Consent – written informed consent was taken from all the study participants and their attendants to take part in this study

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