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# A STUDY OF HYPERTENSIVE EMERGENCIES AND ITS OUTCOME

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**ABSTRACT**

**Introduction:** Hypertension prevalence is increasing. 1%–3% of hypertensive patients experience hypertensive emergencies. Hypertensive emergencies are critical as it is associated with acute organ damage like stroke, acute heart failure, acute coronary syndromes, and acute aortic dissection. **Aim of the study:** In our study we aim to study the clinical presentations, organ systems affected and outcomes of patients admitted with hypertensive emergency. **Methods:** This is a retrospective observational study of patients admitted to Acute Medical Care Unit with hypertensive emergency. Inclusion criteria are patients above age 18 years presenting with hypertensive emergency. Pregnant women with pregnancy induced hypertension were excluded from the study. **Results:** Majority of the patients are males ie 64%. The males to females ratio is 1.77. Average age is 56.46 years.
The most common symptom at presentation is dyspnoea in 56%, followed by chest pain in 30%. Neurological symptoms are hemiplegia in 34%. Among the subjects, 88% are known patients of hypertension. But, 68% of them are noncompliant with drug therapy. The most common ECG change noted is ST-T changes in 72%, on Echocardiography is LVH in 38%. **Discussion:** The most common presentation is Congestive Heart Failure in 30%, followed by ACS (Acute Coronary Syndrome) in 26%, CVA with Haemorrhagic stroke in 26%, CVA with ischaemic stroke in 12%.13 (26%) patients of this study expired, which included 11 patients of CVA haemorrhagic stroke and 2 patients of CHF. It is 50% mortality in elderly more than 70 years age.
Keywords: Left Ventricular Hypertrophy, Cerebrovascular Accident; Subarachnoid Haemorrhage ; Congestive Heart Failure; Chronic Kidney Disease; Acute Kidney Injury.

## INTRODUCTION:

Hypertension is the most important risk factor for death and disability in India (1). Its prevalence is 24% in men and 21% among women, as per the report of National Family Health Survey (NFHS-5/ 2019-20). It is an increase of 4-5% from 2015–16 data (2). Among those treated, nearly half did not have their blood pressure under control (3). Globally, 1%–3% of hypertensive patients experience hypertensive emergencies (4), which can be fatal.

Severe hypertension can be either a hypertensive emergency or a hypertensive urgency.

Hypertensive crisis was defined by systolic blood pressure (SBP) ≥ 180 mmHg and/or diastolic blood pressure (DBP) ≥ 120 mmHg (5). A hypertensive emergency is associated with acute end-organ damage whereas without acute end-organ damage is referred as a hypertensive urgency (6). Hypertensive emergencies are more critical as it is associated with acute organ damage like stroke, acute heart failure, acute coronary syndromes, and acute aortic dissection.

## AIM OF THE STUDY

In our study we aim to study the clinical presentations, organ systems affected and outcomes of patients admitted with hypertensive emergency.

## METHODS:

This is a retrospective observational study of patients admitted to Acute Medical Care Unit with hypertensive emergency.

Inclusion criteria are patients above age 18 years presenting with hypertensive emergency (Defined as elevated blood pressure ≥180 mm systolic blood pressure and ≥120 diastolic pressure at admission with evidence of end organ damage either clinically or biochemically ).

Pregnant women with pregnancy induced hypertension were excluded from the study.

The details of patients presenting complaints, duration, co morbidities, addictions, duration of hypertension and compliance to drug therapy are all noted. The investigations performed like ECG, echocardiography, CT Brain (in patients presenting with neurological symptoms), blood tests like Complete blood picture, Blood Glucose, blood urea, serum creatinine, serum electrolytes, urine for albuminuria were noted. The patients follow up monitoring as per hospital protocol and outcome are also noted from case records.

Data analysis: The collected data was organized into a Microsoft excel sheet and (SPSS) v26 software version was utilized for statistical analyses. Descriptive statistics was represented with percentages, Mean with SD. Chi-square test was applied to find significance, P value <0.05 was considered as statistically significant.

## RESULTS

### 1. Age and Gender Distribution

| Age In Years | Males (%) | Females (%) | Total (%) |
|---|---|---|---|
| 30-39 | 4- (8%) | 1-(2%) | 5-(10%) |
| 40-49 | 5-(10%) | 4-(8%) | 9-(18%) |
| 50-59 | 10-(20%) | 6-(12%) | 16-(32%) |
| 60-69 | 9-(18%) | 5-(10%) | 14-(28%) |
| >70 | 4-(8%) | 2-(4%) | 6- (12%) |
| Total | 32-(64%) | 18-(36%) | 50-(100%) |

Majority of the patients are males ie 64%. The males to females ratio is 1.77. Average age is 56.46 years. 60% of the subjects are in the age group of 50 to 70 years, youngest being 32 years and the oldest is 75 years.

**2. Presenting Symptoms:**

| Symptom | Males | Females | Total | % |
|---|---|---|---|---|
| Dyspnea | 18 | 10 | 28 | 56 |
| Chest Pain | 6 | 9 | 15 | 30 |
| Dyspnea + Chest Pain | 5 | 5 | 10 | 20 |
| Convulsions | 8 | 3 | 11 | 22 |
| Hemiplegia | 10 | 7 | 17 | 34 |
| Altered Sensorium | 8 | 4 | 12 | 24 |

The most common symptom at presentation is dyspnoea in 56%, followed by chest pain in 30%. Neurological symptoms are hemiplegia in 34%, convulsions in 22% and altered sensorium in24%.

**3. Hypertension**

| | Males | Females | Total | % |
|---|---|---|---|---|
| Known HTN | 27 | 17 | 44 | 88% |
| Denovo HTN | 5 | 1 | 6 | 12% |
| Treatment Compliant (N=44) | 9 | 5 | 14 | 28% |
| Treatment Non-Compliant(N=44) | 18 | 12 | 30 | 68% |
| | | | | |
| **Duration of HTN** | **Males** | **Females** | **Total** | **%** |
| < 5years | 7 | 4 | 11 | 22 |
| 5-10 years | 18 | 8 | 26 | 52 |
| >10 years | 3 | 4 | 7 | 14 |
| TOTAL | 28 | 16 | 44 | 88 |

Among the subjects, 88% are known patients of hypertension. But, 68% of them are noncompliant with drug therapy. 52% of subjects had hypertension for 5 to 10 years duration.

**Substance Abuse**

| Substance | Number | % |
|---|---|---|
| Alcohol | 23 | 46 |
| Tobacco | 19 | 38 |
| Both | 15 | 30 |
| | | |
| **Substance** | **Non compliant to HTN treatment** | **% Noncompliant (N=30)** |

| | | |
|---|---|---|
| Alcohol | 14 | 46% |
| Tobacco | 11 | 36% |
| Both | 8 | 26% |

46% of subjects consume alcohol, 38% use tobacco and 30% consume both alcohol and tobacco. Among alcoholics, the noncompliance to anti hypertension drug therapy is 46%.

**Blood Pressure recordings**

| | **At admission (Mean±SD)** | **After 6 hours (Mean± SD)** | **At 24 hours (Mean±SD)** |
|---|---|---|---|
| **SBP** | 205±16 | 157±23 | 139±36 |
| **DBP** | 118±6 | 97±5 | 82±21 |
| **MAP** | 147±7 | 136±15 | 119±31 |
| | | | |

SBP- Systolic Blood Pressure; DBP-Diastolic BP; MAP- Mean Arterial Pressure

The mean blood pressure at admission is 205±16/118±6 and mean arterial pressure is 147±7. After 6 hours of admission, mean blood pressure is 157±23/97±5 and mean arterial pressure is 136±15. After 24 hours of admission, mean blood pressure is 139±36/ 82±21 and mean arterial pressure is 119±31.

**ECG CHANGES , 2D ECHO CT BRAIN,**

| **ECG** | **Number** | **% (N=50)** |
|---|---|---|
| Normal | 5 | 10 |
| LVH | 15 | 30 |
| ST-T CHANGES | 36 | 72 |
| LVH+ST-T changes | 12 | 24 |
| **ECHO** | **Number** | **% (N=50)** |
| Normal | 9 | 18 |
| LVH | 19 | 38 |
| LV Dysfunction | 15 | 30 |
| LVH+ LV DYSFUNCTION | 11 | 22 |
| RWMA | 6 | 12 |
| **CT Brain** | **Number** | **% (N=26)** |
| Normal | 3 | 6 |
| Infarct | 6 | 12 |
| Haemorrhage | 13 | 26 |
| SAH | 1 | 2 |
| | | |

LVH- Left Ventricule Hypertrophy, RWMA- Regional Wall Motion Abnormality, SAH-Subarachnoid Haemorrhage

The most common ECG change noted is ST-T changes in 72%, followed by LVH in 30%, and both in 24%. The most common abnormality on Echocardiography is LVH in 38%, LV dysfunction in 30%, combined features in 22% and RWMA in 12 %.

CT brain was performed in patients presenting with neurological symptoms and 13 patients have Haemorrhagic stroke, 6 have ischaemic stroke, 1 patient had Subarachnoid Haemorrhage and 3 have normal CT brain.

**TARGET ORGAN DAMAGE AND OUTCOMES**

| | Number | % (N=50) | Expired | % |
|---|---|---|---|---|
| CVA/Ischemia | 6 | 12 | - | - |
| CVA/Haemorrhage | 13 | 26 | 10 | 76% (N=13) |
| SAH | 1 | 2 | - | - |
| HTN Encephalopathy | 3 | 6 | - | - |
| AKI | 4 | 8 | - | - |
| CHF | 15 | 30 | 1 | 15% (N=15) |
| USA | 7 | 14 | - | - |
| MI | 6 | 12 | - | - |
| CKD+CHF | 10 | 20 | 1 | 10% (N=10) |
| CKD+ CVA/Haemorrhage | 2 | 4 | 1 | 50% (N=2) |
| CKD+USA | 2 | 4 | - | - |
| AKI+ CVA/Haemorrhage | 2 | 4 | - | - |
| AKI+CHF | 1 | 2 | - | - |
| AKI+CHF | 1 | 2 | - | - |

CVA- Cerebrovascular Accident; SAH-Subarachnoid Haemorrhage ; CHF- Congestive Heart Failure; USA- Unstable Angina MI- Myocardial Infarction; CKD- Chronic Kidney Disease; AKI- Acute Kidney Injury

The most common presentation is Congestive Heart Failure in 30%, followed by CVA with Haemorrhagic stroke in 26%. The mortality is 76% among patients with CVA haemorrhagic stroke.

**OUTCOME**

**Age and Mortality Distribution**

| AGE in years | Number | Expired | % |
|---|---|---|---|
| 30-39 | 5 | 1 | 20 |
| 40-49 | 9 | 2 | 22 |
| 50-59 | 16 | 4 | 25 |
| 60-69 | 14 | 3 | 21 |
| >70 | 6 | 3 | 50 |
| TOTAL | 50 | 13 | 26 |

13 patients of this study expired. The mortality is 20% in 30 to 39 years age group and is increasing with the age. It is 50% mortality in elderly more than 70 years age.

**DISCUSSION**

The prevalence of hypertension is increasing in India (2) and 1-3% of them experience a hypertensive emergency. In this observational study, males constituted 64%. In the study by Zampaglione et al (6), the proportion of men was more than females. According to Sandberg and Ji (7), men have higher

blood pressure than women, regardless of race and ethnicity. The differences are attributed to the sex chromosomes and hormones.

Average age is 56.46 years in our study. 60% of the subjects are in the age group of 50 to 70 years, 10% are between 30 and 39 years, youngest being 32 years and the oldest is 75 years. According to Nguyen et al (8) almost 20% of young adults are hypertensive.

Among the subjects in our study, 88% are known patients of hypertension and 68% of them are noncompliant with drug therapy. In the study by Martin et al (9) 83% were previously diagnosed hypertensive. The study by Rafighdoost MD, et al (10) study showed noncompliance to medications as an important factor for precipitating the hypertensive crisis. In their study, 75% of the subjects had stopped medications and only 25% had continued them. Similar observations are found in the study by Zampaglione et al (6) with 92% of known hypertensive among their patients. Poor compliance to medication was also observed to the extent of 80% in a study done by De Jager RL et al (11), where patients took on an average only 2 anti-hypertensive dugs instead of an average of 4 anti-hypertensive drugs prescribed. 52% of subjects had hypertension for 5 to 10 years duration.

At initial presentation, the mean (±SD) systolic blood pressure/diastolic BP in the present study is 205±16/118±6 and mean arterial pressure is 147±7. After 6 hours of admission, mean blood pressure is 157±23/97±5 and mean arterial pressure is 136±15. After 24 hours of admission, mean blood pressure is 139±36/ 82±21 and mean arterial pressure is 119±31. In the study by Martin et al (9), mean systolic blood pressure (SBP)/ diastolic blood pressure (DBP) of 193±26 mm Hg/129±12 mm Hg was observed. In the study from Indonesia, mean SBP/DBP at presentation was highest of 220±21/119±24 mmHg (12). Low initial SBP and DBP with a median of 188 (172–206) and 105 (99–115) mmHg were observed in a study in Korea, by Kotruchin P et al (12).

The most common symptom at presentation is dyspnoea in 56%, followed by chest pain in 30%. Neurological symptoms are hemiplegia in 34%, convulsions in 22 and altered sensorium in 24%. Dyspnoea prevalence was 10-30% and was one of the most prevalent symptoms in a review of Asians studies by Kotruchin P et al (12). Neurological deficit like hemiparesis was most common symptom among Thai and Indonesians (12).

46% of subjects consume alcohol, 38% use tobacco and 30% consume both alcohol and tobacco. Among alcoholics, the noncompliance to anti hypertension drug therapy is 46%. In a Western Indian study Goswami et al, 44.1% of study population had a habit of smoking while 21.7% had a habit of alcohol consumption (13). There is no significant difference in drug compliance in subjects with alcohol (p=1) and tobacco (p=0.698) usage. In a study by Dinesh and Krishna, prevalence of alcohol consumption was 34% and tobacco was 19% (14).

The most common ECG change noted is ST-T changes in 72%, followed by LVH in 30%, and both in 24%. In the study of Goswami et al (13), LVH noted in 54%, T wave changes in 34% and ST-T changes in 11%. 52% had ST segment of T wave abnormalities, 20% had ECG with voltage criteria suggestive of LVH and 4% had both in the study of Mahesh and Babulal (15). The most common abnormality on Echocardiography is LVH in 38%, LV dysfunction in 30%, combined features in 22% and Regional wall motion abnormality is seen in 12 %. Echocardiography showed regional wall motion abnormality in 34%, left ventricular dysfunction in 39%, left ventricular hypertrophy in 18% in the study of Mahesh and Babulal (15). 14 (28%) are Chronic Kidney Disease (CKD) patients and 8 (16%) have Acute Kidney Injury (AKI) i.e. 44% have renal dysfunction. In the study of Mahesh and Babulal (15), 52% had abnormal renal function test. CT brain was performed in 26 patients presenting with neurological

symptoms and 26% have Haemorrhagic stroke, 12% have ischaemic stroke, 2% have Subarachnoid Haemorrhage and 3% have normal CT brain.

The most common presentation is Congestive Heart Failure in 30%, followed by ACS (Acute Coronary Syndrome) in 26%, CVA with Haemorrhagic stroke in 26%, CVA with ischaemic stroke in 12%. Martin et al (9) reported acute ischemic stroke (39%), left ventricular failure (25%), intracerebral haemorrhage (17%), and acute myocardial infarction (8%) in their patients. In the study of Mahesh and Babulal (15), 46 patients had neurological target organ damage, 44 patients (44%) had cardiac organ damage. Stroke was the most common target organ damage in Asians. The next most common type of target organ damage varies from country to country (4).

13 (26%) patients of this study expired, which included 11 patients of CVA haemorrhagic stroke and 2 patients of CHF. The mortality is 76% in CVA haemorrhagic stroke (p=0.000098), 50% in CVA haemorrhagic stroke with CKD. The mortality is 20% in 30 to 39 years age group and is increasing with the age. It is 50% mortality in elderly more than 70 years age. The mortality in the study of Mahesh and Babulal (15) is 22%, 16% as per Salagre SB et al (16), 26.8% by Shao et al (17). The varying mortality in different studies may be influenced by factors like the accessibility of health care, transportation to nearest tertiary health care centre and prevalence of other risk factors like Diabetes mellitus, dyslipidaemia etc.

**Limitations of the study**: This is a single centre, limited sample size study. The various factors leading to the event of hypertensive emergency are not evaluated in detail and the treatment aspects of these patients is not studied.

**CONCLUSION:** The prevalence of Hypertension is increasing and the prevalence of noncompliance to antihypertensive therapy is between 60 to 80%. This predisposes a significant number of patients at risk for hypertensive crises, its associated mortality, morbidity and burden on health care. There is a need for detailed multi centre based study to evaluate the various factors contributing to the noncompliance and other risk factors contributing to the mortality. Public awareness and education strategies about hypertension have to be implemented extensively.

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