

## Study of Brain Imaging in Accelerated Hypertension

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### ABSTRACT

#### BACKGROUND

Accelerated hypertension is defined as a rapid and inappropriate intense elevation of blood pressure with or without a risk of rapid damage to target organs such as the heart. It is a common presentation to the emergency department and appears without history of hypertensive diseases in 23% of cases. The present study was conducted to study the brain imaging in cases admitted with accelerated hypertension to find the incidences of brain parenchymal insult in case of accelerated hypertension in a tertiary healthcare institute.

#### METHODS

The observational study was done among patients presenting with hypertensive emergencies admitted under the Department of Medicine, KIMS, Karad, from August 2018 to December 2018. On admission, detailed history was taken, and complete clinical examination was done. It was an observational study.

#### RESULTS

Majority of the cases had a haemorrhagic stroke (16.66%), followed by 4.16% cases of transient ischaemic attacks and 4.16% cases of ischaemic stroke.

#### CONCLUSIONS

Acute intracerebral haemorrhage was the most common form of end organ damage in present study. The hospital mortality among the patients with hypertensive emergencies were 18.75%.

#### KEY WORDS

Accelerated Hypertension, Hypertensive Crisis, Brain Imaging, Blood Pressure

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## BACKGROUND

Accelerated hypertension is a rapid and excessive high blood pressure elevation with or without a risk of rapid harm to target organs such as the heart.<sup>[1]-[3]</sup> It is a typical presentation to the emergency department and occurs in 23 percent of patients without history of hypertensive diseases.<sup>[4,5]</sup>

Among the patients with elevated blood pressure, hypertensive encephalopathy is a neurological condition. It is marked by fast-growing signs and symptoms including nausea, hallucinations, visual disturbances, impaired mental status, and focal neural indications. Although the condition is typically manageable if the hypertension is treated early, if it is not detected and the medication is postponed, it may be lethal. The medical results are not clear enough to make the diagnosis complicated.<sup>[6]</sup>

Volhard and Fahr<sup>[7]</sup> first addressed hypertensive emergency syndrome in 1914 and was characterized by extreme, acute hypertension, along with proofs of renal disease and symptoms of chest, head, retina and kidney coronary damage, with increasingly fatal heart attack, renal insufficiency and stroke. The epidemiology of hypertensive crises parallels the distribution of essential hypertension in the community, being much higher among African-Americans and the elderly; however, men are affected two times more frequently than are women.<sup>[8]</sup> In 1939, before extensive use of anti-hypertensive agents, the first comprehensive review in natural history with malignant high blood pressure was reported.<sup>[9,10]</sup> Untreated malignant hypertension was 79 percent one-year mortality and average survival of 10.5 months in this landmark study by Keith and his colleagues.<sup>[11]</sup>

While HC is uncommon in a clinical trial setting, certain drug interaction research studies, including tyramine in conjunction with monoamine oxidase inhibitors, may cause HC. In addition to the activation of the renin-angiotensin vasopressins system, endothelial and catecholamine are postulated to take important roles in the pathophysiology of the hypertensive emergencies, a quick upward blood pressure in patients with a range of BP from 180/100 to 110 mmHg or a sudden increase in systolic BP above baseline of over 60 mmHg.<sup>[12]</sup>

### Clinical Manifestations of Hypertensive Crises

Hypertensive crisis manifestations clinically involve end-organ dysfunction. Organ dysfunction (excluding in children and during the pregnancy) is uncommon when diastolic pressure is lower than 130 mmHg. However, the absolute blood pressure level may not be as significant as the increase rate. A systolic blood pressure of 200 mmHg or up to 150 mmHg diastolic pressure can be tolerated without development of hypertensive encephalopathy, in patients whose blood pressure has been long lasting, whereas children or pregnant women can develop encephalopathy with a blood pressure of 100 mmHg diastolically.<sup>[13,14]</sup> Signs and symptoms are different from patient to patient with hypertensive crises. Patients of high-tension encephalopathy exhibit nausea, impaired level of consciousness and/or specific neurological symptoms. These patients may have arteriolar changes, blood cells, exudates, and a papilledema

during physical exams.<sup>[15]</sup> They are retinopathic. Other patients with angina, acute myocardial infarction or acute ventricular failure may experience a cardiovascular manifestation of high blood pressure. In some patients, acute renal failure with oliguria and/or haematuria could lead to serious renal injury.<sup>[8]</sup>

Acute blood pressure ranges from a mild disease to a life-threatening process in pregnant patients. The clinical characteristics may vary with severe headaches, severe headaches, annoying mental conditions, acute strokes, severe upper right-hand abdominal pain, congestive heart failure or oliguria. This can only be inferred by execution in the vast majority of cases. The decision to continue to deliver after consulting medical and obstetric practitioners should be made.<sup>[16]</sup>

A major changeable risk factor for stroke is that of hypertension, with an estimated 51 percent of stroke deaths attributable globally to high systolic blood pressure. Timing, type of stroke, thrombolytic use, medically competitive conditions and pharmacological variables determine the management of stroke hypertension.

## METHODS

The observational study was done among patients presented with hypertensive emergencies admitted under department of medicine, KIMS, Karad, from August 2018 to December 2018 on admission, detailed history was taken, and complete clinical examination was done. It was an observational study. The Present study was conducted after obtaining approval from institutional ethical committee. All the cases were enrolled in this study after taking their due consent.

### Inclusion Criteria

1. 180 mmHg systolic blood pressure and above or above 120 mmHg diastolic blood pressure.
2. Evidence of injury whether clinically or in the laboratory.

### Criteria for Exclusion

1. People below 18 years of age or older than 40 years of age
2. Hypertension caused by breastfeeding in patients with valvular heart disease.

### Diagnostic Criteria

Hypertensive emergency treatment will be established. We obtained written informed consent in all cases to participate in the study.

### Data Collection Procedure

This experiment included all patients who met the requirements for inclusion or omission. The permission was received from the clinicians and attendants included in the study to carry out the examinations and interventions required. A Proforma was prepared that included detailed history, medical review and appropriate research available at our hospital. A thorough diagnostic evaluation were undertaken, recognizing neurological deficiencies. For all cases, specific examinations such as haemoglobin, total white cell count, erythrocyte sedimentation level, daily urinalysis, blood glucose, blood urea, serum creatinine, serum electrolyte, serum lipid profile, chest X-ray, CT scan head,

electrocardiography, fundoscopy, urinary albumin was conducted. The results were analysed to assess the aetiology, risk factors, and the pattern of clinical and radiological profile. 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 21 software. The data was summarized and tabulated accordingly.

**RESULTS**

In this study, we found that the majority of cases with elevated hypertension were male (56.25%), followed by 43.75% females. We found that most instances of elevated hypertension belonged to the age group of 56-65 years, (29, 16%), accompanied by 46-55% (26, 16%) and 66-75% (16, 66%). The study participants had a median age of 57.41±14.12 years.

Our analysis of their high blood pressure and diabetic diagnosis shows that most of the instances of hypertension (67.70%) are identified and 12.5% were known for their diabetes mellitus and 4.16% for ischaemic heart disease. In the present study, they observed that most of the participants in the trials submitted headaches (81.25%), accompanied by giddiness of 37.5%, 35.42% of those with headaches, 19.79% of cases of dyspnoea, limbo fatigue in 15.62%, and oedema in 10.41% of the instances.

At briefing, they measured the systolic and diastolic blood pressure of all the study subjects. They observed that on admission the average systolic blood pressure was 183±24,7 mm Hg while on admission the average diastolic blood pressure was 99,68±18,03 mmHg.

We have encountered alleged brain imaging injuries (CT / MRI Brain). They observed that most patients had a haemorrhagic stroke (16.66%), accompanied by 4.16% of intermittent ischaemic attacks and 4.16% with an ischaemic stroke.

Gender	Number of Cases	Percentage
Males	54	56.25%
Females	42	43.75%
<b>Total</b>	<b>96</b>	<b>100%</b>

*Tables 1. Gender Distribution*

Age Group	Number of Cases	Percentage
<25 years	1	1.04%
26-35	7	7.29%
36-45	12	12.5%
46-55	25	26.04%
56-65	28	29.16%
66-75	16	16.66%
>76 years	7	7.29%
<b>Total</b>	<b>96</b>	<b>100%</b>

*Tables 2. Age Distribution*

Blood Pressure	Mean	Standard Deviation
Mean SBP	183	24.7
Mean DBP	99.68	18.03

*Tables 3. Distribution of Study Subjects According to Their Blood Pressure*

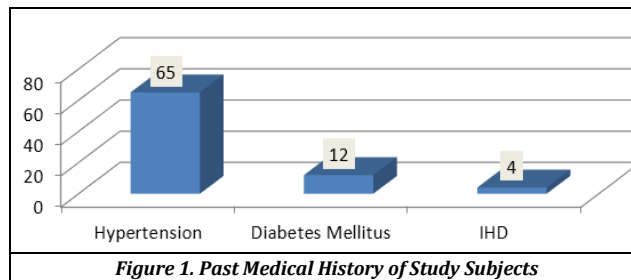
Clinical Presentation	Number of Cases	Percentage
Headache	78	81.25%
Giddiness	36	37.5%
Chest pain	34	35.42%

Dyspnoea	19	19.79%
Limb weakness	15	15.62%
Oedema	10	10.41%
Pallor	11	11.45%

*Tables 4. Distribution of Study Subjects According to Their Clinical Presentation*

Brain Imaging Findings	Number of cases	Percentage
Haemorrhagic stroke	16	16.66%
TIA	4	4.16%
Ischaemic stroke	4	4.16%

*Tables 5. Distribution of Study Subjects according to their Brain Imaging Findings*



**DISCUSSION**

In the present study, we observed that majority of the cases presented with accelerated hypertension were males (56.25%), followed by 43.75% female cases.

Hypertensive heart crises in the new clinical trial of tertiary healthcare. The number of men with high blood pressure is lower than that of females. 66 percent of these cases are persons. Some of them were Martin.<sup>[17]</sup> In their hypertensive disaster study, 55% of people in hypertensive emergencies are male was the potentially strongest in groups aged 56-65 years (29.16%), accompanied by age 46-55 years (26.16%) and 66-75 years (16.66%). This has been followed by 46-55%. The average age for these subjects was 57.41±14.12.

Hypertensive conditions and diabetic status have been assessed, we have observed that most of the cases were known for high blood pressure (67.70%), 12.5% for diabetes, and 4.16% for ischemic heart disease.

Garcia GM also noted that many (65.9%) of the clinicians have already been treated with hypertension in their research. Increasingly, Zampaglione et al,<sup>[4]</sup> notes that (92 percent) of their clinicians have experienced hypertensives. The study conducted by Martin et al. showed 26 percent of patients with diabetes mellitus.<sup>[17]</sup>

In this study, we found that most of the studied subjects had headache as their complaint (81,25 per cent) followed by 37,5 per cent giddiness, 35,42 per cent chest pain, 19,79 per cent dyspnoea, 15,62 per cent limb weakness and oedema among 10,41 per cent cases.

Martin et al<sup>[17]</sup> observed throughout their research that 48 per cent, 25 percent, and 18 per cent for their patients had symptoms of cognitive defects, dyspnoea, and chest pain. Zampaglione et al.<sup>[4]</sup> Numerous patients recorded chest pain (27%) or neurological problems (22%) in their report of dyspnoea. The present study evaluated the systemic and diastolic blood presences of all the study subjects, including hemiparesis (75%), autism (16.6%) and vW. We found that on admission the average systolic blood pressure was

183±24,7 mmHg whereas on admission the median diastolic blood pressure was 99,68±18,03 mmHg.

Martin et al,<sup>[17]</sup> respectively. A mean systolic blood pressure of 193±26 mmHg and a median diastolic blood pressure of 129±12 mmHg were recorded for their patients. They have encountered alleged brain imaging injuries (CT /MRI Brain). They observed that most patients had a haemorrhagic stroke (16.66%), accompanied by 4.16% of intermittent ischaemic attacks and 4.16% with an ischaemic stroke.

The study shows a ventricular collapse (25 percent), acute ischemic stroke (39 percent) and an acute myocardial infarction (8 percent), respectively, intra-brain haemorrhage (17 percent). Zampaglione, other people.<sup>[4]</sup> In their study, target organ damage (23 percent), intracerebral and ischemic acute (24 percent) and ventricular dysfunction (4.5 percent) have been found in their patients.

With hypertensive encephalopathy there are unique medical and radiological results than in other types of hypertension. The subacute condition of hypertensive encephalopathy requires a number under days of increasing pressure. For example, for 0 days before presentation, all our patients had worsening headache and reported an increase in blood pressure.

Moreover, more extreme high blood levels, which are predisposed to intracranial haemorrhage and infarction, is induced by drugs or other sympathomimetic chemicals. Bleeds is probably due to sudden rises, typically at established vascular pathological shifts, in the hydrostatic forces, which overpower autoregulatory mechanisms. The infarction may be related to the extreme vasoconstriction caused to the sympathetic nerves along intracranial arteries by their direct effects.<sup>[18,19]</sup>

The outcome in the study showed an in-hospital mortality of 18.75% among these patients.

## CONCLUSIONS

Hypertensive emergencies are most commonly seen in 45-65 years age group. The threat of acute organ damage due to high blood pressure is lower in the recorded hypertensives. The most common form of diagnosis is cognitive dysfunction. Intracerebral haemorrhage is the most severe hypertensive emergency.

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