

## An Observational Study to Evaluate the Clinical, Demographic Profile and Admission Blood Pressure as Prognostic Marker in Acute Nontraumatic Intracerebral Hemorrhage Patients

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### Abstract

**Aim:** To evaluate the clinical, demographic profile and admission blood pressure as prognostic marker in acute nontraumatic intracerebral hemorrhage patients.

**Methodology:** The present study was mainly centered on stroke patients (only hemorrhagic). The stroke was defined by criteria in WHO<sup>1</sup>. Stroke types were defined based on the criteria of the Oxford Community Stroke project. The detailed history and thorough clinical examination were done in each patient to assess the neurological deficit, to know the risk factors, and coincident diseases according to the proforma. Every patient underwent brain CT scan within 24 hours of onset of symptom. Then all the patient was assigned to subtypes (Hemorrhagic, Ischemic stroke) based on neuroimaging finding (CT-Scan) and those having nontraumatic hemorrhagic stroke were taken in our study. Blood pressure was measured in each patient in the supine position on arrival at the S.R.N. hospital, Allahabad. Patients in whom the cause of death was directly related to the hemorrhage were classified as patients with fatal outcome.

**Results:** Mean age of presentation was 61.549±12.38 years. The commonest anatomic location was thalamus 40.45 % (n=53) followed by basal ganglia 39.70% (n=52). The hematoma was visible on COMPUTED TOMOGRAPHY (CT) scan in 100% (n=131) of the patients with acute intra cerebral haemorrhage. The mean systolic blood pressure of all patients was 176.93±33.84 mm of mercury (n=131). The mean diastolic blood pressure of all patients was 100.09±17.47 mm of mercury (n=131). The mean arterial pressure in fatal group is higher in all groups except in pontine group where mean arterial pressure in nonfatal group is higher 140.00 (n=1)>115.53±43.39. Mean arterial blood pressure in fatal group was significantly higher 132.91±24.26 mm of mercury than in nonfatal group 119.36±16.59 mm of mercury (p<.05).

**Conclusion:** The mean systolic blood pressure and diastolic blood pressure at the time of admission was high. The commonest anatomic location was thalamus followed by basal ganglia. The Mean arterial blood pressure in fatal group was found significantly higher than in nonfatal group. Control of mean arterial blood pressure can reduce the fatal outcome.

**Keywords:** CT, blood pressure, MAP, intra cerebral haemorrhage.

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## Introduction

Stroke is one of the foremost causes of morbidity and mortality, and poses a major socioeconomic problem, especially in developing countries. The World Health organization (WHO) has defined cerebrovascular accident (CVA)/stroke as "a rapidly developing clinical signs of focal or global disturbance of cerebral function; lasting more than 24 hours or leading to death with no apparent cause other than vascular origin.[1]" Most cerebrovascular diseases are manifested by the abrupt onset of a focal neurologic deficit, as if the patient was "struck by the hand of God.". The clinical manifestations of stroke are highly variable because of the complex anatomy of the brain and its vasculature. Intracerebral hemorrhage is caused by bleeding directly into or around the brain; it produces neurologic symptoms by producing a mass effect on neural structures, from the toxic effects of blood itself, or by increasing intracranial pressure[2].

After coronary heart disease and cancer stroke is a third commonest cause of death worldwide. Moreover unlike the Caucasians, Asians have a higher prevalence of stroke but a lower level of coronary heart diseases[3]. Among the Asians, the number who died from stroke was more than three times that for coronary heart disease (CHD) which also suggests more prevalence of stroke than CHD in Asians[4-6].

Cerebrovascular disease is known in India since vedic times. For hemiplegia the term used in Ayurveda was pakshaghat. Other colloquial terms like adharang, lakwa etc. are also used. Cerebrovascular disease has recently assumed a prime position as a public health problem in our country, which faces the double burden of communicable disease and the growing epidemic of non-communicable disease. It was estimated that stroke represented 1.2 % of the total deaths in India, when all ages were included. The proportion of stroke death increased with age, and in the oldest group

(> 70 years of age) stroke contributed to 2.4% of all deaths[7].

There is diversity in incidence, aetiology and prognosis of hemorrhagic stroke in India and western country. Patients with acute stroke especially hemorrhagic stroke on admission to the hospital are often found to have high blood pressure[8-10]. Previous studies have shown variable results regarding the prognostic value of high blood pressure in acute stroke especially in hemorrhagic stroke[11-19]. Therefore, we planned this study to evaluate acute nontraumatic intracerebral hemorrhage patients admitted in S.R.N. hospital, Allahabad for various prognostic markers especially admission blood pressure.

## Material and Methods

The present observational study was conducted among 131 patient who presented as rapidly developing clinical signs of focal or global disturbance of cerebral function with CT proven intra cerebral hemorrhage admitted within 24 hours of symptom onset in medicine emergency ward in S.R.N. Hospital, Allahabad.

## Exclusion Criteria

1. Brain Tumor
2. Trauma
3. Stroke other than ICH
4. Patient having previous stroke
5. Bleeding disorder

## Methods

The present study is mainly centered on stroke patients (only hemorrhagic), the stroke was defined by criteria in WHO[1]. Stroke types were defined based on the criteria of the Oxford Community Stroke project[20]. The detailed history and thorough clinical examination were done in each patient to assess the neurological deficit, to know the risk factors, and coincident diseases according to the proforma. Every patient was diagnosed by brain CT scan within 24 hours of onset of

symptom then all the patient was assigned to subtypes (Hemorrhagic, Ischemic stroke) based on neuroimaging finding (CT-Scan, MRI) and those having nontraumatic hemorrhagic stroke were taken in our study. Blood pressure was measured in each patient in the supine position on arrival at the S.R.N. hospital, Allahabad. Patients in whom the cause of death was directly related to the hemorrhage were classified as patients with fatal outcome.

### Two groups were made

1. Group with fatal outcome
2. Group with nonfatal outcome

Prognostic factors were assessed in each group and data analyzed with appropriate statistical methods and results were interpreted accordingly.

### Criteria

Medical history, such as hypertension, diabetes mellitus, heart failure, and ischemic heart disease, was defined by patient self-report and medical treatment received. Previous stroke was defined as a neurological deficit 24 h prior to the current event. Pulse pressure was defined as the difference between systolic blood pressure and diastolic blood pressure on admission. Mean arterial blood pressure was defined as sum of diastolic blood pressure and one third (1/3) of pulse pressure. The level of consciousness was categorized into four levels, based on the Japan Coma Scale:<sup>21</sup> (i) alert; (ii) JCS Grade I (disoriented: awake without stimulation); (iii) JCS Grade II (somnolent: rousable with stimulation, but reverting to previous state if stimulus stops); and (iv) JCS Grade III (comatose: unrousable by any stimulation). We had taken three variable (1) alert-normal (2) disoriented / somnolent- JCS Grade I and JCS- Grade II and (3) coma- JCS Grade III. High systolic blood pressure was defined as >140 mm of mercury and high diastolic blood pressure was defined as >90 mm of mercury. (JNC,7 Guideline)[22]

### Results

Table 1: Age of intra cerebral hemorrhage patients (n=131) varied from 35 to 100 years. Mean age of presentation was 61.549±12.38 years. Mean age of presentation of males (n=71) was 61.028±12.60 years while for females (n=60) was 62.1667±12.20 years.

Table 2: In intra-cerebral haemorrhage the commonest anatomic location was thalamus 40.45 % (n=53) followed by basal ganglia 39.70% (n=52), lobar 15.26 % (n=20), pontine 3.05% (n=4), in descending order. Cerebellar hemisphere haemorrhage was seen in 1.52% (n=2) cases only.

Table 3: The hematoma was visible on COMPUTED TOMOGRAPHY (CT) scan in 100% (n=131) of the patients with acute intra cerebral haemorrhage. Headache at onset was seen in 8.3 % (n=11) of the patient with haemorrhage. Vomiting at onset of symptom was observed in 35.11 % (n=46) of the patients with hemorrhage. Sudden onset altered sensorium was noticed in 51.90 % (n=68) of patients. Left sided hemiparesis was seen in 21.37% (n=28) of patients. Right sided hemiparesis was seen in 26.71% (n=35) of patients.

Table 4: The mean systolic blood pressure in each group was high (JNC 7 guideline SBP>140 mm of mercury and DBP>90 mm of mercury)<sup>140</sup>. The mean systolic blood pressure of all patients was 176.93±33.84 mm of mercury (n=131). The mean diastolic blood pressure of all patients was 100.09±17.47 mm of mercury (n=131). The mean arterial blood pressure of all patients was 125.78±21.59 mm of mercury (n=131).

Table 5: The mean arterial pressure in fatal group is higher in all groups except in pontine group where mean arterial pressure in nonfatal group is higher 140.00 (n=1)>115.53±43.39. Mean arterial blood pressure in fatal group was significantly higher 132.91±24.26 mm of mercury than in nonfatal group 119.36±16.59 mm of mercury (p<.05) Mean arterial blood pressure of fatal outcome 130.22±20.04

mm of mercury in thalamus group is significantly higher than the nonfatal group 117.62±17.61 mm of mercury (p<.05). Mean arterial blood pressure of fatal

outcome group 137.69±29.58 mm of mercury in basal ganglia bleed was significantly higher than nonfatal group 121.92±14.74 mm of mercury(p<.05).

**Table 1: Age and sex distribution of acute intra cerebral hemorrhage**

Age Group (years)	Male		Female		Total	
	Number	%	Number	%	Number	%
0-20	-	-	-	-	-	-
20-40	5	7.00	-	-	5	3.8
40-60	23	32.4	18	30	41	31.3
60-80	35	49.3	37	49.3	72	55.0
80-100	8	11.3	5	8.3	13	9.9
Residence						
<b>Rural</b>	49	69	42	70	91	69.5
<b>Urban</b>	22	31	18	30	40	30.5
<b>TOTAL</b>	<b>71</b>	<b>54.2</b>	<b>60</b>	<b>45.8</b>	<b>131</b>	<b>100</b>

**Table 2: Topography of patients presenting with acute intra cerebral hemorrhage (computed tomography)**

Topography	No	%
BASAL GANGLIA	52	39.70
LOBAR	20	15.26
THALAMUS	53	40.45
PONS	04	3.05
CEREBELLUM	02	1.52
<b>TOTAL</b>	<b>131</b>	<b>100</b>

**Table 3: clinical feature and focal deficit in relation to site of bleed**

Clinical feature	Basal ganglia (52)	Lobar (20)	Pons (04)	Cerebellar (2)	Thalamus (53)	Total (131)
Headache	4	1	1	-	5	11
Vomiting	19	6	2	1	18	46
Deficit						
Left sided hemiparesis	13	2	-	1	12	28
Right sided hemiparesis	18	3	-	-	14	35
Sudden onset altered sensorium	21	15	4	1	27	68

**Table 4: Comparison of systolic, diastolic and mean blood pressure with site of bleed (ct scan)**

	Systolic blood pressure (in mm of mercury)	Diastolic blood pressure (in mm of mercury)	Mean arterial blood pressure (in mm of mercury)
Basal ganglia (52)	177.61±31.93	102.42±19.11	127.38±22.13
Lobar (20)	179.50±36.91	101.50±19.54	127.63±23.59
Cerebellar (2)	185.0±7.07	90.0	119.95±4.73
Thalamus (53)	175.50±34.51	97.84±14.08	124.04±19.76
Pons (4)	170.0±52.91	97.50±29.56	121.65±37.48
Total (131)	<b>176.93±33.84</b>	<b>100.09±17.47</b>	<b>125.78±21.59</b>

**Table 5: Mean arterial blood pressure in non-fatal and fatal outcome**

LOCATION OF HEMORRHAGE	NONFATAL (n=69)	FATAL (n=62)
THALAMUS (53)	117.62±17.62	130.22±20.04
BASAL GANGLIA (52)	121.92±14.74	137.69±29.58
LOBAR (20)	108.85±21.75	135.67±19.97
CEREBELLUM (2)	119.95±4.73	-
PONS (4)	140.00	115.53±43.39
TOTAL (n=131)	<b>119.36±16.59</b>	<b>132.91±24.26</b>

## Discussion

In our study, age of intracerebral hemorrhage patients ranged from 35 to 100 years and maximum numbers of intracerebral hemorrhage patients (n=72) were observed in 60-80 years of age group. Percentage of patients falling in this group was 55.00%. Second most common group was 40-60 years in which 31.3% patients were there (n=41). Overall, 81.3% patients of intracerebral hemorrhage were in age group 40-80 years i.e. in the 4<sup>th</sup> to 7<sup>th</sup> decade of life (n=113). The incidence of hemorrhagic stroke is strikingly related to age, with a more than doubling of incidence rates in each successive decade for person over 55 years of age (Robins M et al, 1981)<sup>23</sup>. Similar trend was reported by Wolf PA et al (1988)[14] in the Framingham study. R. Khodabandehlou et al (2005)[24] observed that 68% of intracerebral hemorrhage were between 60-80 years. Similar study being conducted by ICASS in which the maximum reported patients were in the age group 51-60 years, (Praful M D 2006)[25]. In our study hemorrhagic stroke in young (<40years) constituted 3.8%. Young stroke patients constitute 15–30% of

all stroke patients in India, as opposed to 3.0–8.5% of all stroke patients in the West[26]. Trivandrum stroke registry group observed that the median age for hemorrhagic stroke was 67 years and 3.8% of stroke were ≤40 years Sapna E. Sridharan et al.(2009)[27]

In the present study males constituted 54.2% while females constituted 47.8%. Thus, males were more prone for hemorrhagic stroke. Higher incidence in males may be due to higher proportion of males in our community and also to our socio-cultural trends. Similar trend was reported by Brown RD et al, (1989)[28]. Similar trend was also reported by Ove M.J. Ariesen, et al. (2003)[29]. Overall, men also have higher age - specific hemorrhagic stroke incidence than women (Sacco RL et al, 1998)[30]. Peter Appleros et al. (2009)[31] reported that the incidence rate of brain infarction and intracerebral hemorrhage was more common in men but women were more severely ill. The Framingham Heart Study, observed higher incidence of stroke of all types in men, However greater incidence of stroke was noted in women over the age of 85 years (petrea et al.,2009)[32].

Out of 131 patients of acute intra cerebral hemorrhage, 69.5% (n=91) were of rural population and 30.5% (n=40) were urban. Trivandrum stroke registry group observed that the annual incidence of stroke was higher in rural population. Sapna E. Sridharan et al. (2009)[27]. This can be explained by the fact that most of the population in India resides in villages and also that in the rural area health consciousness among people is poor.

In the present study out of 131 patients of intracerebral hemorrhage the commonest anatomic location was thalamus 40.45% (n=53) followed by basal ganglia and lobar accounting for 39.70% (n=52) and 15.26% (n=20) respectively. Cerebellar hemisphere haemorrhage was seen in 3.33% (n=2) cases only. R. Khodabandehlou et al (2005)[24] reported similar trend in thalamic hemorrhage but differs in other location with lobar second most common, followed by putamen and pontine internal capsule bleed was least common in their study. Weisberg et al (1990)[33] reported highest incidence of intracerebral hemorrhage in putamen, followed by lobar, thalamus, pons and cerebellar in descending order. There is another study by Kase et al (1998)[34], in which commoner sites were putamen, lobar, thalamic, cerebellar and pons in descending order. In India, similar trend was reported by the Kolkata study (das et al, 2007)[35] that the common site of intracerebral hemorrhage was basal ganglia-thalamus (75%) followed by lobar (12.5%), cerebellar (5%), brainstem (5%), and primary intraventricular region (2.5%). The difference in location of bleed may be due to smaller sample size.

In our study, the mean systolic blood pressure and diastolic blood pressure at the time of admission was high (JNC 7 guideline SBP>140 mm of mercury and DBP>90 mm of mercury)[22] with mean systolic blood pressure of all patients was 176.2±35.09 mm of mercury while mean diastolic blood pressure was 99.71±18.06 mm of mercury. Jd Wallace et al (1981)[8]

reported elevated blood pressure in 84% of patients at the time of admission. High blood pressure is often observed in acute stroke, especially in intracerebral hemorrhage patients on admission to hospital (britton m, 1990)[13] and (carlburg b et al 1991)[19]. Quereshi et al. (2001)[36] in their large cross sectional study showed that elevated systolic blood pressure(≥140 mm of mercury) has greater mortality outcome.

In our study, we had compared the admission mean arterial blood pressure in fatal outcome group and nonfatal outcome group as a whole as well as in different group based on the site of bleed diagnosed on computed tomography scan. The Mean arterial blood pressure in fatal group was found significantly ( $p<.05$ ) high 131.67±26.28 mm of mercury than in nonfatal group 119.36±16.59 mm of mercury ( $p<.05$ ). The mean arterial blood pressure in fatal outcome 130.22±20.04 mm of mercury in thalamic bleed was significantly higher than the nonfatal group 117.62±17.62 mm of mercury ( $p<.05$ ). The mean arterial blood pressure in fatal outcome group 137.69±29.58 mm of mercury in basal ganglia bleed was higher than nonfatal group 121.92±14.74 mm of mercury ( $p<.05$ ). Various similar studies had supported our observation. R fogenholm R et al. (1997)[37] reported that high first day mean arterial blood pressure had high mortality rate. Death was significantly associated with high mean arterial blood pressure Mark wiillmot et al, (2004)[38]. Dandapani et al. (1995)[39], had observed marked elevation of admission mean blood pressure had higher mortality in his study .The effect of blood pressure on outcome in acute stroke patient especially intracerebral hemorrhage patient apperes that very high blood pressure have detrimental effect to the outcome of intracerbral hemorrhage A H G Rasool et al (2004)[40]. The Keio Cooperative Stroke Study (Yasuo terayama et al, 1997)[41] have similar observation, with mean arterial blood pressure in fatal outcome group was

significantly higher than nonfatal group. In this study they also showed that, the mean arterial blood pressure in putamenial and thalamic bleed with fatal outcome, was significantly higher than nonfatal group of respective sites of bleed. Among patient with cerebellar, lobar, pontine bleed no significant correlation was observed between admission mean arterial blood pressure and clinical outcome. Very similar result was observed in our study.

In our study, most fatal outcome was present in thalamus (n=27), followed by basal ganglia (n=18), followed by lobar (n=14). No fatal outcome was present in cerebellar bleed. Percentage of fatal outcome was higher in pontine (75%), followed by lobar (70%). R. Khodabandehlou et al (2005)[24] observed that the acute mortality was higher in pontine and cerebellar haemorrhage than another site.

### Conclusion

The present study concluded that the mean systolic blood pressure and diastolic blood pressure at the time of admission was high. The commonest anatomic location was thalamus followed by basal ganglia. The hematoma was visible on COMPUTED TOMOGRAPHY (CT) scan in all the patients. The Mean arterial blood pressure in fatal group was found significantly higher than in nonfatal group. The present study opened new vistas for future research.

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