

## Original Research Article

# A study on clinical profile of acute stroke

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## ABSTRACT

**Background:** Stroke or cerebrovascular accident is one of the leading causes of morbidity and mortality in adult life. Ischemic strokes are most common type of strokes and they account for 80-85% of cerebrovascular accidents worldwide. Hypertension, diabetes, dyslipidemia and smoking have been identified as major risk factors. Present study was undertaken to evaluate the clinical and investigation profile of different types of strokes.

**Methods:** A total of 100 patients with brain stroke from November 2015 to October 2016 were included. Adult patients with stroke who attended the emergency department within 24 hours of attack were included. Patients with known chronic liver or kidney diseases, transient ischemic attack, active infections, history of neoplasia and alcoholic patients were excluded from the study. A thorough physical examination was conducted and stroke was defined as per World Health Organization criteria. Blood investigations were done including Magnetic resonance imaging and computed tomography scan. The data obtained was coded and entered into Microsoft excel worksheet. The data was analyzed using SPSS statistics software version 20.0.

**Results:** Majority of the patients (71.00%) were males and 29.0% of the patients were females. Most of the patients were aged between 61 to 70 years (27.00%). Most of the patients had ischaemic stroke (80.00%) followed by haemorrhagic stroke (20%).

**Conclusions:** Ischemic stroke is the more common as compared to hemorrhagic stroke. Detection of vascular risk factors and primary prevention measures should be initiated during late adolescence or early adulthood.

**Keywords:** Ischemic stroke, Hypertension, Clinical profile

## INTRODUCTION

A stroke, or cerebrovascular accident (CVA), is abrupt onset of a neurologic deficit of vascular origin. WHO defines the clinical syndrome of "stroke" as, rapidly developing clinical signs of focal (or global) disturbance of cerebral function with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than vascular origin.<sup>1</sup>

Majority of stroke are ischemic (80%); while others result from primary hemorrhage either intracerebral or into the subarachnoid space. Acute ischemic stroke is result of

stroke caused by thrombosis or embolism and is more common than hemorrhagic stroke. Ischemic strokes constitute 85-87% of all cases.<sup>2</sup> Hemorrhagic stroke constitute spontaneous intracerebral hemorrhage and subarachnoid hemorrhage, and account for the remainder of cases. According to the World Health Organization (WHO), stroke is the second leading cause of death world-wide.<sup>3</sup> Thus, cerebrovascular disease is a huge public health problem imposing both as a large disease burden and a large economic burden on our country.<sup>4</sup> The mortality rate of stroke in the acute phase is as high as 20% and it remains higher for several years after the acute event in stroke patients than in the general population.<sup>5</sup> Stroke is an illness of escalating

socioeconomic importance, especially among the ageing population.

In some geographical areas or within or some racial and ethnic groups, stroke incidence may be unusually high. Incidence of stroke varies considerably from country to country. Based on the review of available information in India, the prevalence of stroke was estimated as 203 per 100,000 population above 20 years, amounting to a total of about 1 million cases.<sup>6</sup> Up to 85% of all strokes are of ischemic origin.<sup>7</sup> Numerous risk factors are involved in the development of stroke, such as hypertension, cigarette smoking, hyperlipidemia and diabetes mellitus.<sup>8</sup>

Recent study identified that 7% of medical and 45% of neurological admissions were due to stroke with a fatality rate of 9% at hospital discharge and 20% at 28 days.<sup>9</sup>

In a recent study conducted in India, Latin-America and China, chronic diseases as a whole (stroke, heart disease, diabetes, chronic respiratory disease, and malignancy) accounted for the majority of death among the elderly.<sup>10</sup> Individual Indian studies have estimated that the prevalence rates increases from 0.1-0.3/1000 in the <45 year age group to 12-20/1000 in the 75-84 year age group.<sup>11</sup> In India stroke in younger people is high (18-32% of all stroke cases) compared to high income countries.<sup>12</sup> Men are more likely to have a stroke than women: the male/female sex ratio for India is 7:1.<sup>13</sup> This may be due to differences in risk factors such as smoking and drinking which are more prevalent among men in India compared with women.<sup>14</sup>

In a recent study conducted in Gujarat, It was found that modifiable risk factors such as hypertension (40%), alcoholism (35%), smoking (28%) and hyperlipidaemia (17%) are the commonest cause of stroke among the elderly;<sup>10</sup> and smoking, alcoholism, increased BMI, diabetes and hypertension are significantly associated with strokes among young people.<sup>15</sup> by 2050, the global number of old people (aged  $\geq 65$  years) will exceed the number of young people (aged  $< 65$  years) for the first time since formal records began.<sup>16</sup>

This growth in the aged population, together with the influence of aging on stroke, suggests that the incidence and economic cost of this disease will rise.<sup>17</sup> One report estimates that the global occurrence of first-ever strokes will increase to 18 million by 2015, and to 23 million by 2030. Moreover, this study estimates that the death toll from stroke will reach 6.5 million per year by 2015 and 7.8 million per year by 2030.<sup>18</sup> Hence the present study was undertaken to evaluate the clinical and investigation profile of different types of strokes admitted in the tertiary care hospital.

## METHODS

This hospital based cross sectional study was undertaken in the department of general medicine of a tertiary care teaching hospital situated in north Karnataka, India from

November 2015 to October 2016. A total of 100 consecutive patients with brain stroke who attended the emergency within 24 hours of stroke were studied. Adult patients with stroke who attended the emergency department within 24 hours of attack and willing to participate in the study by giving written informed consent for the study were enrolled. Patients with known chronic liver or kidney diseases, TIA, active infections, history of neoplasia and alcoholic patients were excluded from the study. Prior to the commencement, ethical clearance was obtained from ethics and research committee.

Patients were screened for the eligibility and those fulfilling the selection criteria were briefed about the nature of the study. In case of comatose patients, the relatives/caretakers were informed about the study. The patients/caregivers expressing their willingness to participate in the study were enrolled after obtaining a written informed consent. Patients were interviewed and demographic data like gender and age were noted. Demographic data such as age and sex were recorded. History of other co-morbid conditions such as, hypertension, diabetes mellitus, personal history such as habits of alcohol consumption, smoking, were noted. A thorough physical examination was conducted for vitals (pulse rate, blood pressure and respiratory rate) followed by systemic examination. The diagnosis of stroke was entertained after fulfilling WHO definition of stroke by the patient. The ischemic nature of stroke was established by CT/MRI scan. These findings were recorded on a predesigned and pretested proforma. Further, Blood sample was collected for laboratory investigations. Blood samples were collected under all aseptic precautions; blood samples were collected by venepuncture and collected in vacutainer. The sample was collected within 6 hours of admission in order to investigate hemoglobin, platelet count, white blood cell count, random blood sugar and serum creatinine. Also, imaging studies i.e. MRI or CT scan of brain was done. All cases were provided treatment according to the diagnosis and routine hospital protocols. All cases were followed up till the hospital stay to assess outcomes, mortality, morbidity and complications.

The data obtained was coded and entered into Microsoft excel worksheet. The data was analyzed using SPSS statistics software version 20.0. The categorical data was expressed in terms of rates, ratios and proportions. The continuous data was expressed as mean  $\pm$  standard deviation (SD).

## RESULTS

Most of the patients were aged between 61 to 70 years (27.00%) as shown in (Table 1) and the mean age was  $58.49 \pm 13.97$  years as shown in (Table 2). Majority of the patients (71.00%) were males and the male female ratio was 2.44:1. Investigations revealed anemia, raised total WBC count, hyperglycemia and raised BUN in 41, 25, 52

and 14% of the patients respectively and their distribution is depicted in (Table 2). The most common comorbid condition was hypertension (38.00%) followed by hypertension with diabetes mellitus (23%). The other risk factors include dilated cardiomyopathy (DCM), ischemic heart disease (IHD), hypertension with IHD, hypertension with DCM, Diabetes with atrial fibrillation, diabetes with IHD with frequency as shown in (Table 3). Most of the patients were conscious (56.00%), 18% were stuporous, drowsy, 16% were arousable, 5% were comatose, 3% were disoriented and 2% were drowsy. Tachycardia was noted in 4.00% of the patient, bilateral conducted sounds were noted in 18% of the patients and bilateral crept in 1% of the patients as shown in (Table 4). Most of the patients had ischemic stroke (80.00%) while hemorrhagic

stroke was noted in 20% of the patients.

**Table 1: Distribution of patients according to the age.**

Age group (years)	Total (n=100)	
	Number	Percentage (%)
18 to 30	1	1.00
31 to 40	7	7.00
41 to 50	25	25.00
51 to 60	23	23.00
61 to 70	27	27.00
71 to 80	10	10.00
81 to 90	5	5.00
91 to 100	2	2.00
<b>Total</b>	<b>100</b>	<b>100.00</b>

**Table 2: Clinical and biochemical profile of the study population.**

Variables	Mean (n=100)		Median	Range	
	Mean	SD		Min	Max
Age (years)	58.49	13.97	58.00	27.00	95.00
Pulse rate (min)	86.04	14.50	85.00	56.00	168.00
Systolic blood pressure (mmHg)	151.12	23.79	150.00	90.00	200.00
Diastolic blood pressure (mmHg)	90.02	10.93	90.00	60.00	110.00
Hemoglobin (g/dl)	13.15	1.81	13.40	8.00	17.30
Total WBC count (Cumm)	9861.34	2534.40	9762.50	4500.00	19570.00
RBS (mg/dl)	156.55	62.93	144.00	81.00	458.00
Blood urea nitrogen (mg/dl)	26.15	9.85	23.50	11.00	66.00
Serum creatinine (mg/dl)	0.95	0.31	0.98	0.10	1.50

**Table 3: Distribution of patients according to the past history.**

Past history	Distribution (n=100)	
	Number	Percentage (%)
Hypertension	38	38.00
Hypertension with diabetes mellitus	20	23.00
Diabetes mellitus	8	8.00
Hypertension with diabetes mellitus with IHD	3	3.00
IHD	2	2.00
Hypertension with IHD	2	2.00
DCM	1	1.00
Diabetes mellitus with atrial fibrillation	1	1.00
Diabetes mellitus with IHD	1	1.00
Hypertension with DCM	1	1.00
No past history	20	20.00
<b>Total</b>	<b>100</b>	<b>100.00</b>

**Table 4: Distribution of patients according to systemic examination.**

Systemic examination	Findings	Distribution (n=100)	
		Number	Percentage (%)
CVS system	No abnormality detected	96	96.00
	Tachycardia	4	4.00
	<b>Total</b>	<b>100</b>	<b>100.00</b>
Respiratory system	Bilateral basal crept	1	1.00
	Bilateral conducted sounds	18	18.00
	No abnormality detected	81	81.00
	<b>Total</b>	<b>100</b>	<b>100.00</b>

## DISCUSSION

Stroke is major public health problem which has a significant morbidities and mortalities. Worldwide, it is the third most common cause of death in adults. Stroke occurs predominantly in males at late years of life. Several studies documented that systemic hypertension, diabetes mellitus, hyperlipidemia, IHD, atrial fibrillation,

smoking and long-standing alcohol intake are contributing factors for stroke. The prevalence of risk factors varies in different population. Despite numerous prior studies of stroke, risk factors much remains unknown and several inconsistencies continue to exist. However, the minor differences in the prevalence of stroke risk factors in different communities are probably due to differences in culture, disease patterns, living habits and distribution of various ethnic groups. Stroke or CVA is a frequent cause of death and disability and is a major problem in most part of the world.<sup>19</sup> After heart disease and carcinoma, stroke is the third leading cause of death in developed countries.<sup>19</sup> Of patients with first-ever stroke captured in the Mumbai registry, CT imaging was done in 89.2 and 80.2% were ischemic strokes and 17.7% hemorrhagic strokes.<sup>12</sup> In the Trivandrum registry, 69.7% of patients underwent imaging. Of those, 83.6% were ischemic strokes, 11.6% intracerebral hemorrhages, and 4.8% subarachnoid hemorrhages, respectively.<sup>20</sup>

It is reported that, the male sex has been listed as a risk factor for stroke. In the present study also, male preponderance was noted as 71.00% of the patients were males and 29.0% of the patients were females. The male female ratio was 2.44:1. Mehndiratta et al showed a ratio of 1:08 in North India where as Zunni et al demonstrated a similar ratio of 1.2:1 in Africa.<sup>21,22</sup> Study by Kay et al found male to female ratio of 1.9 to 1 and this male predominance was consistent with many previous studies of cerebral infarction in Asia and elsewhere.<sup>23</sup> Male predominance was observed to be highest in Asia with a lower male/female ratio has been noted in European and North American studies.<sup>23</sup> In this study age ranged between 27 to 95 years. The mean age was 58.49±13.97 years. The most common age group was 61 to 70 years (27.00%). The mean age was 58.49±13.97 years. These findings were comparable with epidemiological data in the literature which states that, age is an important non-modifiable risk factor for stroke. The mean age of stroke onset in the South Asian region (for example, 63 years in India and 59 years in Pakistan) is lower than in Western countries (for example, 68 years in the USA and 71 years in Italy).

In this study the most risk factor was hypertension (38.00%) followed by hypertension with diabetes mellitus (23%). Hypertension was documented in 47.2% of the entire cohort of patients in study by Kay et al and was the most common risk factor.<sup>23</sup> The risk factors in descending order in their study were dyslipidemia, smoking, diabetes and alcohol excess. These risk factors were observed in 42.6, 38.9, 24.3 and 15.1% of the entire cohort of patients respectively. Hypertension was a frequent risk factor with 32 to 65% of the young ischemic stroke patients. This risk factor was also noted more commonly in Asian studies among young black patients in the United States (55%) and in recent European studies (39.1%). Cigarette smoking is a known risk factor for ischemic stroke, increasing its relative risk three-fold.<sup>23</sup> In a hospital based retrospective study done in Kolkata,

reported approximately equal no of hemorrhagic (399) and ischemic stroke (393) in 792 patients of strokes who underwent CT scan. Hypertension was observed in 77.3% of ICH cases.<sup>24</sup>

Diabetes mellitus is one well known, studied risk factor causing macrovascular complications. When compared with non-diabetic patient stroke risk doubles in diabetes.<sup>25</sup> In Framingham study 10 to 14% person with stroke had diabetes. The higher prevalence seen in our study may be due to higher prevalence of diabetes in southern India from where most of the population under study hails. The data is in agreement with several other Indian studies.<sup>26</sup> 16% of patients had both hypertension and diabetes. From various studies it was concluded that strict control of blood pressure in diabetic patients will definitely reduce the incidence of stroke.<sup>27</sup>

More than half (56.00%) of the patients were conscious, while 18% were stuporous, drowsy, 16% were arousable, 5% were comatose, 3% were disoriented and 2% were drowsy. Systemic examination revealed tachycardia in 4.00% of the patients while bilateral conducted sounds were noted in 18% of the patients and bilateral crept in 1% of the patients.

In the present study majority of the patients had ischemic stroke (80.00%) while hemorrhagic stroke was noted in 20% of the patients. The frequency of ischemic stroke observed in the present study was consistent with epidemiological studies in the literature which states that, in India, frequency of ischemic stroke is between 60 to 80%.<sup>12,28-31</sup> Chandana et al reported 60% cases and 22% hemorrhagic stroke which is similar to present study.<sup>32</sup> Ischemic strokes are most common type of strokes and they are caused by either cerebral thrombosis or embolism. They account for 80-85% of cerebrovascular accidents worldwide. One of the most common causes leading to ischemic stroke is narrowing of blood vessels of head or neck. Narrowing of vessels are mainly due to atherosclerosis and cholesterol deposition. Non modifiable risk factors for stroke include age, sex and genetic factors. The modifiable risk factors for ischemic stroke include systemic hypertension, alcoholism, smoking, hyperlipidemia, diabetes etc. By targeting various modifiable risk factors, we can reduce the incidence of stroke. Study of Non-modifiable risk factors also help in identifying high risk population. Hemorrhagic stroke may be due to subarachnoid hemorrhage or intracerebral hemorrhage. Sub arachnoid hemorrhage accounts for 1-7% of all strokes and intracerebral hemorrhage constitutes 7-27% of all strokes worldwide. Indian government, launched national program for prevention and control of cancer, diabetes, cardiovascular diseases and stroke (NPCDCS) to address high prevalence of non-communicable diseases (NCDs).<sup>33</sup> Risk factor control requires, multidisciplinary approach, which includes approaching social determinants of health, health-care financing, improving medical education, and health system strengthening.

## CONCLUSION

Ischemic stroke constitutes a larger percentage of stroke subtypes on this part of the country. Proper strategy to prevent and treat stroke is the need of the hour. Control of risk factors require multidisciplinary approach, which include approaching social determinants of health, health-care financing, improving medical education, and health system strengthening.

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