

A Retrospective Observational Study Assessing the Risk Factors and Clinico Radiological Pattern of Stroke Patients at a Tertiary Care Center**Manish Kumar¹, Prashant Kumar Thakur², Krishna Kumar Jha³**¹Senior Resident, Department of Medicine, DMCH, Darbhanga, India²Post-Graduate Resident, Department of Neurology, CMCH Coimbatore, Tamil Nadu, India³Professor, Department of Medicine, DMCH, Darbhanga, India

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Conflict of interest: Nil

Abstract**Aim:** The aim of present study was to assess the risk factors and clinico radiological pattern of stroke patients at a tertiary care center in Darbhanga.**Methods:** This observational study was carried out among 200 stroke patients who satisfied the inclusion and exclusion criteria and were admitted in medicine ward of DMCH Darbhanga, India for the period of one year. The case sheets of the patients were retrieved from the medical records department of the hospital and relevant data extracted and analyzed.**Results:** 90 (45%) patients had ischemic stroke and 110 (55%) patients had hemorrhagic stroke. The incidence of stroke was maximum in 46-60 years of age group which comprises of 40% of total patients, followed by 61-75 years of age group which comprises of 32% of total patients. 17% patients were of age ≤ 45 years. In our study, the youngest patient was 19 years old and oldest was 90 years old. Out of 200 patients, 120 were males and 80 were females. The most common risk factor was hypertension in 78% followed by dyslipidemia (54%), tobacco chewing (34%), renal dysfunction (24), smoking (22%), alcohol (18%), H/O of previous cerebrovascular accident (8%), diabetes (7%). The most common site of hemorrhage was ventricular (20) followed by thalamus (16%), basal ganglia (13%), external capsule (12%) and internal capsule (9%). Also shows 4 (2%) cases among all cases of stroke. The most common site of infarct was parietal (18%), followed by peri ventricular (10%), occipital lobe (7%), basal ganglia (7%) and frontal lobe (5%). Thus, findings were favoring middle cerebral artery territory involvement which is most commonly involved in thrombotic stroke.**Conclusion:** In India like other developing countries there is a huge burden of stroke with significant regional variations of stroke. The occurrence rises with age with peak between 60 to 75 years. Young patients (age ≤ 45 years) were 16% of patients which is more dangerous in view of productive year lost. This study showed male predominance in stroke cases. Cerebral hemorrhage was more than infarction. Hypertension was amongst leading risk factors for both types.**Keywords:** Cerebrovascular accident, Diabetes, Hemorrhagic stroke, Hypertension, Ischemic stroke, Risk factorsThis is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Cerebrovascular disorders (CVD) are increasing in prevalence and incidence in India due to rapid escalation of risk factors including hypertension, diabetes mellitus, smoking and obesity affecting considerable proportion of adult population. Global burden of disease study shows that of the 9.4 million deaths in India, 619,000 were due to stroke. The Disability Adjusted Life Years (DALYs) lost were 28.5 million highlighting the fact that CVD leads to considerable mortality and morbidity. [1] Therefore, there is likely to be a major crisis in India unless national measures to prevent or control risk factors of CVD are instituted and adequate services are put in place for the management and rehabilitation of

stroke. [2] Another issue of concern is that 20- 30% of strokes occur in people younger than 45 years and is more frequently seen in India compared to the west. [2] Although there are numerous hospital based studies of stroke in India only a few population based surveys have been done to determine the prevalence of stroke and the very first survey on a large urban and rural population was conducted in late 1960's in Vellore. [3] During the last four decades community based studies in different regions of the country showed crude prevalence rates (CPR) of completed strokes varying from 52 472 per 100000 persons. A matter of

concern is that in the last two decades there is a significant increase in prevalence rate of stroke.

Pooled analysis through forecasting method has shown that the estimated prevalence rates of stroke for the years 2000 and 2015 are 108 and 133 per 100,000 population respectively, indicating a dramatic rise in prevalence of stroke over a period of 15 years and by 2015 it is estimated that there will be 1,667,372 cases of stroke in India. [4] The prevalence rates are similar to other developing countries. The overall annual incidence rates are available only from few regions in the country. [5]

Stroke is a serious and disabling cerebrovascular illness that can leave some victims with permanent disabilities and a lifetime of financial hardships. The absolute numbers of persons experiencing a first stroke, stroke survivors, stroke-related fatalities, and disability-adjusted life years lost in 2010 were high and had increased dramatically since 1990, with the majority of the burden occurring in low-and middle income countries. In 2010, 5.2 million, or 31%, of strokes were in children and young and middle-aged people; of these, roughly 74,000 and 4.0 million were in children and young and middle-aged adults from low income and middle income nations, respectively. [6-8]

Stroke is expected to become a major health problem in India, with the National Commission on Macroeconomics and Health predicting that 1.67 million strokes will occur in the country by 2015. The rapidly shifting lifestyles and population reshaping may be to blame for this. Other contributing factors include the high rates of hypertension, diabetes and dyslipidemia. [9,10] Stroke is a major contributor to health care expenses due to its prevalence and the high amount of money needed to treat each individual patient. As a result, stroke and its aftereffects should be considered seriously by policymakers, insurers, and providers of health care worldwide. [11]

The aim of the present study was to assess the risk factors and clinico-radiological pattern of stroke patients at a tertiary care center in Darbhanga.

Materials and Methods

This observational study was carried out among 200 stroke patients who satisfied the inclusion and exclusion criteria and were admitted in medicine ward of DMCH Darbhanga, India for the period of one year (1st January 2020 to 31st December 2020). The case sheets of the patients were retrieved from the medical records department of the hospital and relevant data extracted and analyzed.

Inclusion Criteria

- All patients above 15 years of age and having CT confirmed diagnosis of stroke

Exclusion criteria

- Patient below 15 years of age.
- Stroke due to trauma (head injury).
- Patients CT reports not showing confirmed diagnosis.
- Coagulation disorders, AV malformations, ICSOL.
- Patients with stroke-like conditions due to systemic diseases such as infection

All the patients' fulfilling the definition of acute stroke were subjected to CT scan head (plain). Findings of brain computerized tomography (CT) scan performed within one week of the onset of stroke were used for classification of the type of stroke. All the patients were assessed clinically through detailed history and clinical examination.

From the history, various demographic variables were collected including age, sex, history of transient ischemic attack/stroke, hypertension, diabetes mellitus, heart disease and addiction. Routine hematological and biochemical tests including Hb, serum urea, serum creatinine, blood sugar, and lipid profile were done.

For this study, hypertension was defined as blood pressure recording of more than 140/90 mmHg on three separate occasions on 3 different days. Patients who are already on antihypertensive medications were also taken as hypertensive.

Dyslipidemia was defined as serum triglycerides higher than 150 mg/dl, low-density lipoprotein cholesterol more than 100 mg/dl and high density lipoprotein cholesterol <50 mg/dl in females and <40 mg/dl in males. In addition, history of smoking, tobacco chewing, and alcohol intake was enquired and noted. Diabetic patients were diagnosed as per the American Diabetic Association guidelines. Patients on antidiabetic medications were also classified as diabetics.

Statistical Analysis

All the data were fed on excel spreadsheet, and statistical analyses were made using SPSS version 21.0 software. Results were expressed in average \pm SD, frequencies and percentages.

Results

Table 1: Type of index stroke

Type of stroke	Number of patients n (%)
Ischemic	90 (45%)
Hemorrhagic	110 (55%)
Total	200 (100%)

90 (45%) patients had ischemic stroke and 110 (55%) patients had hemorrhagic stroke.

Table 2: Age and gender distribution of patients as per stroke type

Age group	Ischemic stroke	Hemorrhagic stroke	Total	Percentage
	Frequency	Frequency	Frequency	
15-30	5	5	10	5
31-45	8	16	24	12
46-60	42	38	80	40
61-75	25	39	64	32
>76	10	12	22	11
Total	90	110	200	100
Gender				
Male	54	66	120	60
Female	36	44	80	40

The incidence of stroke was maximum in 46-60 years of age group which comprises of 40% of total patients, followed by 61-75 years of age group which comprises of 32% of total patients. 17% patients were of age ≤ 45 years. In our study, the

youngest patient was 19 years old and oldest was 90 years old. 90 ischemic stroke patients 54 were males and 36 were females. Out of 110 hemorrhagic stroke pts 66 were males and 44 were females. Out of 200 patients, 120 were males and 80 were females.

Table 3: Risk factors profile of stroke patients

Risk factors	Ischemic stroke	Hemorrhagic stroke	Total	Percentage
	Frequency (n=90)	Frequency (n=110)	Frequency (n=589)	
Hypertension	70	86	156	78
Diabetes	10	4	14	7
HTN and diabetes	9	3	12	6
Dyslipidemia	50	58	108	54
Morbid obesity	1	0	1	0.50
Smoking	24	20	44	22
Alcohol	14	22	36	18
Tobacco	30	38	68	34
Alcohol and tobacco	12	18	30	15
CKD/ Renal dysfunction	18	30	48	24
RHD/ Valvular heart disease	1	1	2	1
CAD	1	1	2	1
DCM	1	0	1	0.50
Atrial fibrillation	1	0	1	0.50
Past history of stroke	10	6	16	8

The most common risk factor was hypertension in 78% followed by dyslipidemia (54%), tobacco chewing (34%), renal dysfunction (24), smoking (22%), alcohol (18%), H/O of previous cerebrovascular accident (8%), diabetes (7%).

Table 4: Topographic distribution of cerebral hemorrhage

Affected areas of brain on CT scan of brain	Frequency (n=200)	%
Frontal lobe	3	1.5
Parietal lobe	12	6
Temporal lobe	6	3
Basal ganglia	26	13
Caudate nucleus	1	0.50
Centrum semi vale	0	0
Ventricular	40	20
Para ventricular	4	2
Internal capsule	18	9
External capsule	24	12
Lentiform nucleus	0	0
Midbrain	1	0.50
Thalamus	32	16
Occipital lobe	2	1
Pons	1	0.50
Medulla oblongata	0	0
Brainstem	1	0.50
Cerebellar	3	1.50
Sub Arachnoid Hemorrhage	4	2

The most common site of hemorrhage was ventricular (20) followed by thalamus (16%), basal ganglia (13%), external capsule (12%) and internal capsule (9%). Also shows 4 (2%) cases among all cases of stroke.

Table 5: Topographic distribution of cerebral infarction

Affected areas of brain on CT scan of brain	Frequency	%
Frontal lobe	10	5
Parietal lobe	36	18
Temporal lobe	10	5
Basal ganglia	14	7
Occipital lobe	14	7
Caudate nucleus	1	0.50
Centrum semi vale	1	0.50
Peri ventricular	20	10
Internal capsule	6	3
External capsule	4	2
Lentiform nucleus	0	0
Midbrain	0	0
Thalamus	3	1.5
Occipital	16	8
Pons	1	0.50
Medulla oblongata	0	0
Brainstem	1	0.50
Cerebellar	4	2

The most common site of infarct was parietal (18%), followed by peri ventricular (10%), occipital lobe (7%), basal ganglia (7%) and frontal lobe (5%). Thus, findings were favoring middle cerebral artery territory involvement which is most commonly involved in thrombotic stroke.

Discussion

According to the World Health Organization (WHO), stroke is a clinical syndrome characterized by rapidly developing clinical symptoms and/or signs of focal, and at times global (applied to

patients in deep coma and those with subarachnoid hemorrhage), loss of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin (Hatano, 1976). Stroke was found to be the second leading cause of death and was predominant at age above 60 years, simultaneously the fifth leading cause of death among age group of 15-59 years old. [12] Stroke is the second leading cause of death worldwide, causing 6.2 million deaths in 2015. [13] Stroke claims a life every 6 seconds. From 2000-2008, the overall stroke

incidence rates in low to medium income countries exceeded that of incidence rates seen in high income countries by 20%. According to WHO estimation, by 2050 nearly 80% of stroke cases may occur in low and middle-income countries like China and India. [14] Some of the recent studies have demonstrated the stroke pattern to considerable extent in our country with a prevalence rate 471/100000 population. [15]

90 (45%) patients had ischemic stroke and 110 (55%) patients had hemorrhagic stroke. The incidence of stroke was maximum in 46-60 years of age group which comprises of 40% of total patients, followed by 61-75 years of age group which comprises of 32% of total patients. 17% patients were of age ≤ 45 years. In our study, the youngest patient was 19 years old and oldest was 90 years old. Age is an important nonmodifiable risk factor for stroke. The mean age of stroke onset in India (i. e., 63 years). [16] Incidence of stroke was observed to be 16.0% among individuals aged less than 50 in this study. Previous hospital-based data from India observed a high proportion of young stroke (first-ever stroke onset below 40 years of age), ranging between 15 and 30%. [17] Out of 200 patients, 120 were males and 80 were females. Similar findings have been reported from Coastal south India in young adults (15-45 years). [18]

The most common risk factor was hypertension with 78% followed by dyslipidemia (54%), tobacco chewing (34%), renal dysfunction (24), smoking (22%), alcohol (18%), H/O of previous cerebrovascular accident (8%), diabetes (7%) which correlated with the study done by Abdu- Sallam AR et al [19] which had hypertension (67%). Hypertension was more significant as a risk factor in patients with haemorrhagic stroke closely followed by patients with ischemic stroke which correlates with study done by Kaur et al. [20]

The most common site of hemorrhage was ventricular (20) followed by thalamus (16%), basal ganglia (13%), external capsule (12%) and internal capsule (9%). Also shows 4 (2%) cases among all cases of stroke. The most common site of infarct was parietal (18%), followed by peri ventricular (10%), occipital lobe (7%), basal ganglia (7%) and frontal lobe (5%). Thus, findings were favoring middle cerebral artery territory involvement which is most commonly involved in thrombotic stroke. The research conducted by Pandian et al., revealed that 68% of the participants experienced an infarct, whereas the remaining 32% suffered from a hemorrhagic stroke. [21,22]

Conclusion

In India like other developing countries there is a huge burden of stroke with significant regional variations of stroke. The occurrence rises with age

with peak between 60 to 75 years. Young patients (age ≤ 45 years) were 16% of patients which is more dangerous in view of productive year lost. This study showed male predominance in stroke cases. Cerebral hemorrhage was more than infarction. Hypertension was amongst leading risk factors for both types. In cerebral infarction most common site was parietal followed by peri-ventricular, followed by occipital lobe. In hemorrhage most common site was ventricular followed by thalamus and basal ganglia. Authors need holistic approach and more research to combat this deadly and disabling disease.

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