

Original Research Article

An observational study of clinicoetiological profile of stroke patients in a new tertiary care hospital in North Odisha, India

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Received: 08 June 2019

Revised: 13 June 2019

Accepted: 06 July 2019

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ABSTRACT

Background: Stroke is one of the leading causes of morbidity and mortality in India. The objective was to study the clinical profile, risk factors, neurological characters, pattern of brain stroke, areas of brain affected as per CT scan findings in patients with stroke.

Methods: This observational study was carried out from June 2018 to Jan 2019 of all new patients admitted with stroke in Pandit Raghunath Murmu Medical College and Hospital, Baripada, Mayurbhanj, Odisha, India.

Results: The incidence of stroke is maximum in 46-60 years of age group. The average age+SD was 59.3+13.5 in our study. 274 (46.52%) patients had ischemic stroke and 315 (53.48%) patients had hemorrhagic stroke. The male to female ratio was 1.46:1. Anterior circulation (86.42%) was the most common territory involved in the brain. The most common risk factor was hypertension with 77.76% followed by dyslipidemia (53.99%). The most common clinical presentation was hemiplegia (85.23%).

Conclusions: The incidence of stroke is maximum in 46-60 years of age group. The average age+SD was 59.3+13.5 in our study. 274 (46.52%) patients had ischemic stroke and 315 (53.48%) patients had hemorrhagic stroke. The male to female ratio was 1.46:1. Anterior circulation (86.42%) was the most common territory involved in the brain. The most common risk factor was hypertension with 77.76% followed by dyslipidemia (53.99%). The most common clinical presentation was hemiplegia (85.23%).

Keywords: Cerebrovascular stroke, Diabetes, Hemorrhagic stroke, Hypertension, Ischemic stroke, Risk factors

INTRODUCTION

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.¹ Stroke is the second leading cause of death worldwide, causing 6.2 million deaths in 2015.²

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.³ Some of the recent studies have demonstrated the stroke pattern to considerable extent in our country with a prevalence rate 471/100000 population.⁴

Recent studies identified that 7% of medical and 45% of neurological admissions were due to stroke with a mortality rate of 9% at time of discharge and 20% at 1 month.⁵ Hypertension, alcoholism, smoking and dyslipidemia are the most common causes of stroke among the elderly and smoking, alcoholism, increased body mass index, DM and hypertension are significantly associated with stroke among young people.⁶

In India Community Surveys have shown a crude prevalence rate for hemiplegia in range of 200 per 1, 00, 000 population. It accounts for nearly 1.5% of all urban admissions, 4.5 percent of all medical and about 20% of neurological cases.⁷ Stroke is becoming an important cause of premature death and disability in low-income and middle-income countries like India, largely driven by demographic changes and enhanced by the increasing prevalence of the key modifiable risk factors.

Worldwide, cerebrovascular accidents (stroke) are the third leading cause of disability.⁸ Stroke, the sudden death of some brain cells due to lack of oxygen when the blood flow to the brain is lost by blockage or rupture of an artery to the brain, is also a leading cause of dementia and depression.⁹

Globally, 70% of strokes and 87% of both stroke-related deaths and disability-adjusted life years occur in low and middle-income countries.¹⁰ Over the last four decades, the stroke incidence in low- and middle-income countries has more than doubled. During these decades stroke incidence has declined by 42% in high-income countries.¹⁰

On average, stroke occurs 15 years earlier in-and causes more deaths of – people living in low- and middle-income countries, when compared to those in high-income countries. In low- and middle-income countries, 34% of strokes (versus 9% in high-income countries) are of hemorrhagic subtype and up to 84% of stroke patients in low- and middle-income countries (versus 16% in high income countries) die within three years of diagnosis.⁹

The reasons for the younger age of onset, higher rates of hemorrhagic subtype and higher case fatality, are unknown. Stroke is becoming an important cause of premature death and disability in low-income and middle-income countries like India, largely driven by demographic changes and enhanced by the increasing prevalence of the key modifiable risk factors. In India, nearly 1/5th of patient with first ever stroke admitted to hospitals has been estimated to be aged 40 years or, less. Ischemic and hemorrhagic stroke accounts for about 85% and 15%, respectively.²

Ischemic stroke may be due to an obstruction within the blood vessel that supplies blood to the brain. Hemorrhagic stroke occurs due to the weakening of blood vessel which would rupture and bleed into the surrounding brain tissues. This blood would accumulate and compress the surrounding tissues.^{11,12}

METHODS

This observational study was carried out amongst 589 acute stroke patients that fulfils the inclusion and exclusion criteria and admitted in medicine ward of Pandit Raghunath Murmu Medical College and Hospital, Baripada, Dist. Mayurbhanj, Odisha, India from June 2018 to Jan 2019. The case sheets of the patients were retrieved from the medical records department of the hospital and relevant data extracted and analyzed. Authors have only CT scan machine in hospital, for MRI authors have to send patients to higher centers.

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±SD, frequencies and percentages.

RESULTS

During the study period authors included 589 cases in our study that fulfills inclusion and exclusion criteria. All the cases were studied for the clinical presentation, risk factors,

neurological presentation, pattern of brain strokes and pattern of area of brain affected as per CT scan findings. Table 1 shows that the incidence of stroke is maximum in 46-60 years of age group which comprises of 39.05% of total patients, followed by 61-75 years of age group which comprises of 33.28% of total patients. 16.81% patients were of age ≤45 years. In our study, the youngest patient was 18years old and oldest was 98 years old.

The average age±SD were 59.3±13.5 in our study. Table 2 shows the mean age was 61.0±13.3years in ischemic stroke group and 57.9±13.6 years in hemorrhagic stroke group. Table 3 shows 274 (46.52%) patients had ischemic stroke and 315 (53.48%) patients had hemorrhagic stroke. in CT scan authors found lacunar infarct in 48 (17.58%) cases and wedge shaped infarct in 29 (10.62%) cases with ischemic stroke.

Table 1: Age distribution of patients as per stroke type.

Age group	Ischemic stroke		Hemorrhagic stroke		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
15-30	9	3.28	9	2.86	18	3.06
31-45	25	9.12	56	17.78	81	13.75
46-60	100	36.50	130	41.27	230	39.05
61-75	109	39.78	87	27.62	196	33.28
>76	31	11.31	33	10.48	64	10.87
Total	274	100	315	100	589	100

Table 2: Mean age of patients as per gender and stroke type.

Gender	Ischemic stroke		Hemorrhagic stroke	
	n	Mean age (years±SD)	n	Mean age (years±SD)
Male	164	61.3±13.9	186	58.8±13.1
Female	110	60.6±12.2	129	56.7±14.3
Total	274	61.0±13.3	315	57.9±13.6

Table 4 shows out of 274 ischemic stroke patients 164 (59.85%) were males and 110 (40.15%) were females. Out of 315 hemorrhagic stroke pts 186 (59.42%) were males and 129 (40.95) were females. Out of 589 pts, 350 were males and 239 were females. The male to female ratio was 1.46:1. From above observation it can be

concluded that incidence of stroke is more common in male sex. Table 5 shows overall index stroke was on the left side in 272 (46.18%) patients and it was on the right side in 235 (39.39%) patients.

There were 85 (14.43%) patients also had bilateral stroke, out of which 66 (24.09%) patients had ischemic stroke compared to 19 (6.03%) patients with haemorrhagic stroke.

Table 3: Type of index stroke.

Type of stroke	Number of patients n (%)
Ischemic	274 (46.52%)
Hemorrhagic	315 (53.48%)
Total	589 (100%)

Table 4: Gender wise distribution of different types of strokes.

Gender	Ischemic stroke		Haemorrhagic stroke		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Male	164	59.85	186	59.05	350	59.42
Female	110	40.15	129	40.95	239	40.58
Total	274	100	315	100	589	100

Table 5: Side of the lesion: laterality of index stroke.

Side of the lesion	Ischemic stroke		Haemorrhagic stroke		Total	
	Frequency	Percentage (%) (n=274)	Frequency	Percentage (%) (n=315)	Frequency	Percentage (%) (n=589)
Right side	101	36.86	131	41.59	235	39.39
Left side	107	39.05	165	52.38	272	46.18
Bilateral	66	24.09	19	6.03	85	14.43
Total	274	100	315	100	589	100

Table 6: Site of the lesion.

Site of the lesion	Frequency	%
Anterior circulation	509	86.42
Posterior circulation	44	7.47
Both anterior and posterior circulation	36	6.11
Total	589	100

Table 6 shows Anterior circulation (86.42%) was the most common territory involved in the brain. Table 7 shows the quantitative parameters of the stroke patients. Mean systolic blood pressure was 152.2±32.5 mm Hg and mean diastolic blood pressure was 91.7±16.6 mm Hg. Table 8 shows that the most common risk factor was hypertension with 77.76% followed by dyslipidemia (53.99%), tobacco chewing (33.28%), renal dysfunction

(23.94), smoking (19.51%), alcohol (17.49%), H/O of previous cerebrovascular accident (7.81%), diabetes (6.96%).

Table 7: Quantitative parameters of patients.

Parameters	Mean±SD
Systolic BP	152.5±32.5
Diastolic BP	91.7±16.6
Haemoglobin	11.6±5.0
Total cholesterol	174.6±39.0
Triglyceride	122.3±47.6
HDL	56.5±13.1
LDL	101.7±25.8
Serum urea	40.3±25.1
Serum creatinine	1.4±0.8

Table 8: Risk factors profile of stroke patients.

Risk factors	Ischemic stroke		Hemorrhagic stroke		Total	
	Frequency (n=274)	Percentage	Frequency (n=315)	Percentage	Frequency (n=589)	Percentage
Hypertension	194	70.80	264	83.81	458	77.76
Diabetes	31	11.31	10	3.17	41	6.96
HTN and diabetes	27	9.85	8	2.54	35	5.94
Dyslipidemia	141	51.46	177	56.19	318	53.99
Morbid obesity	1	0.36	0	0	1	0.17
Smoking	61	22.26	66	20.95	127	21.56
Alcohol	34	12.41	69	21.9	103	17.49
Tobacco	85	31.02	111	35.24	196	33.28
Alcohol and tobacco	27	9.85	62	19.68	89	15.11
CKD/ Renal dysfunction	51	18.61	90	28.57	141	23.94
RHD/ Valvular heart disease	2	0.73	1	0.32	3	0.51
CAD	2	0.73	2	0.63	4	0.68
DCM	2	0.73	0	0	2	0.34
Atrial fibrillation	3	1.09	0	0	3	0.51
Past history of stroke	35	12.77	11	3.49	46	7.81

Table 9 shows that most common clinical presentation was hemiplegia (85.23%) followed by speech involvement (67.23%), altered sensorium (53.82%), UMN facial palsy (47.54%), giddiness (9.34%),

convulsion (8.32%) and deep coma (6.96%). Table 10 shows most common site of hemorrhage was ventricular (19.02) followed by thalamus (16.47%), basal ganglia (13.07%), external capsule (12.56%) and internal capsule

(9%). Also shows 12 (2.04%) cases among all cases of stroke. Table 11 shows most common site of infarct was parietal (18.51%), followed by peri ventricular (10.87%), occipital lobe (7.98%), basal ganglia (7.30%) and frontal

lobe (5.43%). Thus, findings were favoring middle cerebral artery territory involvement which is most commonly involved in thrombotic stroke.

Table 9: Clinical features of stroke patients.

Clinical features	Ischemic stroke		Haemorrhagic stroke		Total	
	Frequency (n=274)	Percentage	Frequency (n=315)	Percentage	Frequency (n=589)	Percentage
LT Hemiplegia	102	37.23	124	39.37	226	38.37
RT Hemiplegia	120	43.80	156	49.52	276	46.86
Hemiplegia	222	81.02	280	88.89	502	85.23
Speech involvement	164	59.85	232	73.65	396	67.23
UMN facial palsy	107	39.05	173	54.92	280	47.54
Fasciobrachial palsy	1	0.36	0	0	1	0.17
Altered sensorium	121	44.16	196	62.22	317	53.82
Convulsion	30	10.95	19	6.03	49	8.32
Instability of gait/ Ataxia	7	2.55	3	0.95	10	1.70
Sensory Impairment	3	1.09	0	0	3	0.51
Headache	9	3.28	18	5.71	27	4.58
Vomiting	9	3.28	21	6.67	30	5.09
Giddiness	30	10.95	25	7.94	55	9.34
Coma	7	2.55	34	10.79	41	6.96
Visual Impairment	6	2.19	2	0.63	8	1.36

Table 10: Topographic distribution of cerebral hemorrhage.

Affected areas of brain on CT scan of brain	Frequency (n=589)	%
Frontal lobe	10	1.7
Parietal lobe	37	6.28
Temporal lobe	14	2.38
Basal ganglia	77	13.07
Caudate nucleus	3	0.51
Centrum semi vale	0	0
Ventricular	112	19.02
Para ventricular	12	2.04
Internal capsule	53	9
External capsule	74	12.56
Lentiform nucleus	0	0
Midbrain	1	0.17
Thalamus	97	16.47
Occipital lobe	6	1.02
Pons	1	0.17
Medulla oblongata	0	0
Brainstem	3	0.51
Cerebellar	9	1.53
Sub Arachnoid Hemorrhage	12	2.04

Table 11: Topographic distribution of cerebral infarction.

Affected areas of brain on CT scan of brain	Frequency	%
Frontal lobe	32	5.43

Affected areas of brain on CT scan of brain	Frequency	%
Parietal lobe	109	18.51
Temporal lobe	30	5.09
Basal ganglia Occipital lobe	43	7.30
Caudate nucleus	2	0.34
Centrum semi vale	3	0.51
Peri ventricular	64	10.87
Internal capsule	19	3.23
External capsule	12	2.04
Lentiform nucleus	0	0
Midbrain	0	0
Thalamus	10	1.7
Occipital	47	7.98
Pons	2	0.34
Medulla oblongata	0	0
Brainstem	1	0.17
Cerebellar	13	2.21

DISCUSSION

In the present study, the age range was from 18 years to 98 years with mean age 59.3±13.5 years which is closely related to study by Naik M, Rauniyar RK, Sharma UK et al, who found mean age of 58.27 years.¹³ The incidence of stroke is maximum in 46-60 years of age group which comprises of 39.05% of total patients. It also correlates with the finding of Aiyar et al which comprised 34% of total patients in 51-60 age groups.¹⁴

Young stroke (≤45 years) comprised 16.81% of all patients which closely correlates with study done by Patne S V et al who have 16.26% and by Gauri et al who have 19%.^{15,16} The male to female ratio was 1.46:1 which correlates with study done by Patne SV et al, with M: F ratio was 1.4:1¹⁵. From above observation it can be concluded that incidence of stroke is more common in male sex which correlates with the study done by Aiyar et al, Pinhero et al.^{17,18} Our study shows anterior circulation was the most common territory involved in the brain among stroke patients. In the present study, most common risk factor was hypertension (77.76%) which correlates with the study done by Abdu-AlrhamanSallam et al which had hypertension (67%).¹⁹

Hypertension was found in 83.81% of haemorrhagic stroke compared to 70.80% of ischemic stroke. Mean systolic blood pressure was 152.2±32.5 mm Hg and mean diastolic blood pressure was 91.7±16.6 mm Hg in our study. Thus, authors can say that 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

In present study, dyslipidemia was 53.99% which was much more as compared with study done by Abdu-Alrhaman Sallam et al (13.9%), Eapen et al (17%).^{19,21} In

present study Authors found anemia in 24.28% cases which is more commonly associated with ischemic stroke patients which is correlated with Eapen et al study where anemia was found in 33% cases. In present study authors found renal dysfunction in 23.94% cases which is more commonly associated with haemorrhagic stroke patients.²¹

In this study authors got alcohol in 17.49% cases which are more common among haemorrhagic (21.9%) patients than ischemic (12.41%) patients. Authors can conclude that alcoholism is most significant as a risk factor in haemorrhagic stroke which correlates with Eapen et al, study H/O of previous cerebrovascular accident was found in 7.81% of cases which correlates with study done by Kaur et al in which H/O of previous cerebrovascular accident was found in 9% of cases.^{20,21} In present study, diabetes patients were 6.96% which is correlated to study done by Eapen et al (8%).²¹

In present study, most common clinical presentation was hemiplegia 85.23% which was followed by speech involvement 67.23%. This observation closely correlates with the study done by Chitrabalam Pet al in which most common clinical presentation was hemiplegia (in <45 years was 93.3%, and in >45 years was 89.2%) followed by speech involvement (in <45 years was 43.3%, and in >45 years 30.8%).²²

In present study, most common type of stroke was hemorrhagic (53.48%) as compared to ischemic (46.52%) as hemorrhagic stroke comprises nearly 34% in low to middle income countries.⁸

Authors present study shows most common site of hemorrhage was ventricular (19.02) followed by thalamus (16.47%), and basal ganglia (13.07%). These findings correlates with study done by Aiyer et al and

Eapen et al where it has been concluded that in multiple hematoma sites most common was thalamic ganglionic region.^{17,21} In the present study, most common site of infarct was parietal (18.51%), followed by peri ventricular (10.87%), followed by occipital lobe (7.98%). This observation was consistent with study done by Eapen et al, in which most common site was parietal.²¹

Thus, findings were favoring middle cerebral artery territory involvement which is most commonly involved in ischemic 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 16.81 % of pts 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. After hypertension, dyslipidemia, tobacco chewing, renal dysfunction and alcohol intake were associated with hemorrhagic stroke, H/o CVA and diabetes were amongst leading risk factors and more prevalent in ischemic stroke. So, it is strongly recommended that there should be strict control of blood pressure, dyslipidemia, cessation of tobacco chewing and alcohol intake for prevention of stroke. Most common clinical presentation was hemiplegia followed by speech involvement and altered sensorium. 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.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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Cite this article as: Behera BP, Maharana DN, Mohanty PS. An observational study of clinico-etiological profile of stroke patients in a new tertiary care hospital in North Odisha. *Int J Res Med Sci* 2019;7:3095-102.