Original Research Article

Prospective study of clinical profile of acute ischemic stroke in a tertiary care hospital of North India

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ABSTRACT

Background: Owing to the recent demographic shifts and negative lifestyle changes, stroke is one of the leading causes of mortality across every income group in most of the countries. It is of the utmost importance to devolve into the clinical profile, etiology and management of patients with acute ischaemic stroke.
Methods: It is a prospective case control study. Data was collected using a pre-tested pro forma meeting the objectives of the study. Patients who consented were divided into two groups and complete examination and investigations were carried out.
Results: There were 94 patients with AIS enrolled for the study. The mean age was 56.2 years, of which 68.08% were males and 31.92% were females. The mean time for these patients to reach the health facility was 12.6 hours and only 36.17% of patients reached in the window period of 4.5 hours and were eligible for thrombolysis. Hypertension, Diabetes and smoking were the most common risk factors in this order among others.
Conclusions: There is poor awareness regarding identification of stroke related symptoms and warning signs as majority of patients were unable to reach the hospital in the window period making them ineligible for thrombolysis. The leading etiology runs in the direction of modifiable risk factors which can be corrected at a primary prevention level.

Keywords: Ischaemic Stroke, Thrombolysis, Risk factors

INTRODUCTION

A major global challenge to public health problem is stroke. According to a report from the Global Burden Of Disease (GBD) 2016, Lifetime Risk Of Stroke Collaborations estimated global lifetime risk of stroke in 2016 for those aged 25 years or older was 24.9%, an increase from 22.8% in 1990.[1]

Notably, stroke remains the second leading cause of death worldwide, with 5.5 million deaths attributed to this cause in 2016.[2] Stroke was also the second most common cause of DALYs. Among patients aged 45-65 years, 8% - 12% of ischaemic stroke results in death within 30 days.

Women and men had similar age specific incidences at ages up to 55 years, but rather were greater in men at 55-75 years.

Despite gradual decline in overall stroke deaths in many countries, it still remains a leading cause of death and disability, particularly in Eastern Europe and Asia. (WHO, 2004) By 2020, 19 of 25 million annual stroke deaths will be in developing countries.[3] Of those who survive, approximately 30% require assistance with activities of daily lives, 20% require assistance with ambulation and 16% require institutional care. Socio economic factors, dietary and lifestyle choices, demographic transitions and different patterns of risk

factors namely modifiable and non-modifiable explain the incidences of strokes to great lengths. It has become apparent that population growth and ageing have the potential to result in a greater absolute pool of people at risk of stroke. Additionally improved stroke survival portends a higher prevalence of chronic stroke. Therefore it is of utmost importance to study the magnitude of this problem and evaluate the etiology, clinical profile of patients and treatment measures employed to address acute ischaemic stroke.

The primary objective of the present study was to evaluate the clinical profile of patients of acute ischemic stroke in a tertiary care hospital of north India.

METHODS

This study was conducted in the department of Medicine of our hospital over a period of four year (September 2011-August 2015). A total of ninety four patients with AIS were included in the study with consent. Subjects were cases of AIS with age >18 years presenting in the medical emergency, with persistent ischemic neurologic deficit, baseline CT scans showing no evidence of intracranial hemorrhage. Patients were admitted to intensive care unit with regular monitoring of vital parameters. All patients were evaluated in detail at the time of admission. Baseline investigations- blood glucose, serum electrolytes, BUN, ECG, hemogram, platelet counts, prothrombin time and concentration, APTT, CT scan were performed in all cases.[4] Exclusion criteria included rapidly improving or minor symptoms such as isolated ataxia or sensory symptoms, CT scan showing possible intracranial hemorrhage, history of seizure at stroke onset, stroke or serious head trauma within 3 months, history of intracranial hemorrhage, arterio-venous malformation, or aneurysm, symptoms consistent with subarachnoid hemorrhage, major surgery or serious trauma within 14 days, glucose <50 mg/dL, Current use of oral anticoagulants associated with elevated PT >15 sec or INR > 1.5, pregnancy.[4]

Study design

This was a prospective case control study.

The cases selected were divided into two groups as follows:

GROUP I: Included 31 patients presenting within 4.5 hours of onset of stroke and fulfilling inclusion criteria of >18 years of age, clinical diagnosis of ischemic stroke, persistent neurologic deficit, baseline CT scan showing no evidence of intracranial hemorrhage or edema of $\geq$50 of involved territory with no contraindications to thrombolysis.

GROUP II: Comprised of 63 patients presenting after 4.5 hours of stroke or having any of contraindication for thrombolytic treatment or Patient/surrogate unwilling for thrombolytic treatment.

Treatment

In Group I - rtPA 0.9 mg/kg IV (maximum of 90 mg.) alongwith standard treatment. Ten percent of the total dose of rtPA by bolus, rest by I.V. infusion over 1 hour.[5]

Group II – standard treatment which comprised of – exercise, aspirin 150 mg/day, I.V. mannitol if raised intracranial tension, antiepileptic drugs if seizures, anti-hypertensives if BP > 160/100.

All cases were closely monitored for bleeding complications, neurological deficit (modified Rankin Scale, Barthel index and NIHSS) and outcome. After discharge cases serially followed at 2 weeks, 1 month, 3 months, 6 months and 9 months. Ethical Clearance was obtained from institute's ethical committee. An informed consent was obtained in all cases.

RESULTS

The demographic characteristics (Table 1) of our study were in sync with the previously published literature. The mean age in group I is 60. 60+/- 11 years comprising a range of 42-75 years. Group II, on the other hand encompassed a greater range of age, running from 20-75 years, mean age being 54.55 +/-16.58 years.

Out of 94 patients enrolled, 68% were males, whereas 32% were females. Our study discussed various risk factors and co-morbidities (Table 2) existing in the selected group of patients to trace a possible relation to stroke in these patients.

Table 1: Demographic characteristics of two groups under study.

Characteristic	Total	Group I (n=31)	Group II (n=63)	Significance
Mean Age±SD (Range) in years	94	60.60±11.21 (42-75)	54.55±16.58 (20-75)	t=1.302; p=0.199
Gender				
Male	64	23 (74.19%)	41 (65%)	X^2=3.513; p=0.061
Female	30	8 (25.81%)	22 (35%)	

Table 2: Presence of various risk factors in the cases in the two groups.

Characteristic	Total (n=94)		Group I (n=31)		Group II (n=63)		Significance	
	No.	%	No.	%	No.	%	X^2	P
Previous h/o stroke	5	3.6	1	6.7	4	2.5	0.540	0.462
Hypertension	32	40.0	13	43.3	19	38	0.382	0.537
Diabetes mellitus	26	32.5	8	26.7	18	36	0.344	0.557
Smokers	16	29.1	7	46.7	9	22.5	3.089	0.079
Ischemic heart disease/MI	12	21.8	4	26.7	8	20.0	0.284	0.594
Peripheral vascular disease	9	16.3	2	13.3	7	17.5	0.138	0.710

Table 3: Duration of neurological symptoms in cases before arrival in the hospital.

SN	Duration	Total (n=94)	
		No.	%
1.	<4.5 hours	34*	36.17
2.	4.5-12 hours	17	18.08
3.	12-24 hours	24	25.53
4.	>24 hours	19	20.21
Mean duration±SD (Range) in hours		**Group I**	**Group II**
		3.12(1.5-4)	18(3.5-36)

*the three patients were unwilling for thrombolytic therapy. X^2=38.133; p<0.001

Table 4: mRS at presentation.

mRS	Total (N= 94)	Group I (n=31)		Group II (n=63)		Significance	
		No.	%	No.	%	X^2	P
0-1		0	–	0	–		
2-4	25	4	12.90	21	33.33	3.291	0.070
5-6	66	27	87.10	42	66.67		

Table 5: Barthel Index at Presentation.

Barthel index	Group I (n=31)		Group II (n=63)		Significance	
	No.	%	No.	%	X^2	P
>14	0	0.00	0	0.00		
8-14	3	9.68	2	2.13	2.716	0.099
0-7	28	90.32	61	96.82		

Among 40% of the patients were a known case of hypertension, closely followed by diabetes mellitus in 32.5% of the patients. 29.1% of the patients collectively were smokers, whereas 21.8% had a previous history of ischaemic heart disease and 3.65 % had a previous history of a stroke episode.

No significant difference between two groups was observed with respect to previous history of stroke, hypertension, diabetes mellitus, smoking status, ischemic heart disease and peripheral vascular disease (p>0.05).The mean duration of stroke in group I was 3.12 hours and in group II was 18 hours. So, overall only 36.17% patients came in therapeutic window period i.e. of 4.5 hours (Table 3).

This somewhat reflects poorly on the awareness and symptom identification amongst the population for a cerebrovascular accident, followed by lack of proper stroke centres and well equipped facilities with functional first action teams. National institute of health Stroke scale (NIHSS) quantifies impairment caused by stroke. It consists of 11 items, each of which scores a specific ability between 0 and 4. Individual scores from each item are summed in order to calculate a patient's total NIHSS score. Score between 0-4 indicates a minor stroke, 21-42 is indicative of severe stroke. At presentation, mean NIHSS (The National Institute of Health Stroke Scale) score in Group I was 23.40±3.94 whereas in Group II it was 29.25±6.81, thus showing no significant difference between two groups (p=1) (Table 6).

Barthel Index measures function at the activity level. It was one of the earliest standardised functional assessments. It assesses functional independence in stroke patients. At presentation, mean BI in Group I was 2.20±2.14 whereas in Group II it was 2.45±1.99, thus showing no significant difference between two groups (p=0.686) (Table 5).

Table 6: NIHSS at presentation.

NIHSS	Group I (n=31)		Group II (n=63)		Significance	
	No.	%	No.	%	X^2	P
0-4	0	0.00	0	0.00		
5-24	7	22.58	15	23.81	0	1.0
25-42	24	77.42	48	76.19		

$X^2=0$; p=1

Table 7: Radiological examination findings.

SN	Finding	Group I (n=31)		Group II (n=63)	
		No.	%	No.	%
1.	Baseline CT Head	31		63	
	Normal	11	35.48	24	38.09
	Abnormal	20	64.52	39	61.91
	(a) Infarct	7	35	17	43.5
	(b) Lacunar infarct	4(1)*	20	9(2)*	23.07
	(c) Diffuse atrophy	9	45	15	38.46
	(d) Intracerebral bleed/hemorrhagic transformation	0		0	
$X^2=0.180$ (df=1); p=0.671 (Normal vs Abnormal)					
2.	Repeat CT Head			Only in normal baseline	
	Normal	4	13.3	8	12.69
	Abnormal	27	86.7	16	25.39
	(a) infarct	21	60.0	8	12.69
	(b) lacunar infarct	11(2)*	33.3	11	15.0
	(c) diffuse atrophy	10	60.0	10	15.87
	(d) intracerebral bleeding/hemorrhagic transformation	2	6.7	0	0.0
$X^2=1.02$ (df=1); p=0.312 (Normal vs abnormal)					

*figure in parentheses shows number of CT scan showing both lacunar infarct and infarct

Modified Rankin score (mRS) is six point disability scale with scores ranging from 0-5. Score 0 being no residual symptoms, 5 being severe disability, bedridden, with incontinence and requiring continuous care.

At presentation, mean mRS (modified Rankin Scale) in Group I was 4.93±0.26 whereas in Group II it was 4.70±0.46. At presentation, mean MRS did not show a significant difference between two groups (Table 4).

Baseline CT was normal in 35.4% of patients in group I, and 38.09% patients in group II; however findings were revealed in the repeat CT done after duration of 3 days with only 13.3 % patients in group I and 12.69% patients in group II with a normal CT (Table 7).

Among 35% patients in group I and 43.5% patients in group II had infarcts as the abnormal finding in the baseline CTs done at day 0.

Haemorrhaging transformation was seen in 2 patients from group I (6.7%) in the repeat CT done after 3 days of admission. Most common findings remained that of infarct, 60% in group I and (17+8=25 of 63 patients) 39% in group II, followed by Lacunar infarct, 33.3% in group I and 23.07% in group II (Table 7).

MRI brain was done in patients who had CT scan remain non-conclusive, revealing an infarct and diffuse atrophy in majority of patients and intracerebral bleed in 2 of the patients (Table 8).

Table 8: Findings in MRI brain with CT head non-conclusive.

Finding	Group I, n=31		Group II, n=63	
	No.	%	No.	%
Abnormal MRI	4		8	
(a) infarct	4	100	8	100
(b) lacunar infarct	1	25	3	37.5
(c) diffuse atrophy	4	100	5	62.5
(d) intracerebral bleeding	2	50	0	0
X^2=0.998 (df=1); p=0.318 (Conclusive vs Inconclusive)				

Aetiology of stroke in our study explored the various territories which are commonly involved. 62 out of 94 patients (65.9%) had a large vessel occlusion, MCA being the most commonly involved vessel (45%), followed by ACA territory in about 11.7% of patients (Table 10). 32.9% of patients had evidence of small vessel occlusion. 8.5% of patients had cardio embolic strokes.

Table 10: Aetiology of stroke based on clinical point and radiological findings in group I and group II.

Aetiology	Total (n=94)		Group I (n=31)		Group II (n=63)	
	No.	%	No.	%	No.	%
Small vessel occlusion	31	32.9	8	25.8	23	36.50
Large vessel occlusion	62	65.9	21	67.7	41	65.07
MCA territory	43	45	14	45.1	29	46.03
ACA territory	11	11.7	4	36.36	7	11.11
Others	4	4.2	2	6.45	2	3.17
Cardio embolic	8	8.5	1	3.22	7	11.11
Others	0	0	0	0.00	0	0

X^2=0.253; p<0.881

Middle cerebral artery territory infarcts are most common, similar findings also found in studies – STARS (Standard Treatment with Alteplase to Reverse Stroke).[3,7] 31 cases of Group I were thrombolysed and remaining cases (Group II) were managed conservatively.

DISCUSSION

Authors are not unfamiliar with the sequelae and ramifications of Acute Ischemic Stroke. Our study devolved into the clinical profile and aetiology responsible for those manifestations.

The incidence of stroke increases dramatically with advancing age, and increasing age is the most powerful risk factor for stroke. The incidence doubles each decade past 55 years of age.[6] this study revealed ischaemic stroke is frequently common in elderly populations with a mean age of 56.2 years (range-42-75 years) with estimated incidences in India being 200-300 per million.[7] This result is similar to what was seen in study done by Ukoha Ob et al, and Maskey et al.[8-10]

The stroke leads to residual disability in half of the cases which causes considerable morbidity. There is an array of potential risk factors, both modifiable and non-modifiable which are responsible. This study titled Prospective Study of Clinical Profile of Acute Ischaemic Stroke in a Tertiary Care Hospital which was carried out in Department of Medicine from September 2011 to August 2015 aims to analyze the same.

The findings of our study are discussed here:

Demographic profile of the patients

We studied total 94 patients consisting of 64 males 30 females. The mean age of the patients was 60.60±11.21 years in group 1 and 54.55±16.58 years in group II. Other two studies (NINDS, 1995: ECASSII & III) also had male predominance. The mean age in NINDS was 67±10yrs and 66±11yrs, in ECASS III was 64.9±12.2 and 65.6±11yrs.

Risk factors for stroke

In this population, 40.0% of the patients were hypertensive, 32.7% were Diabetic, 29.1% were smokers, 21.8% were having Ischemic heart disease, 16.3% had Peripheral vascular disease, and 3.6% patients had history of previous stroke. In NINDS study there was hypertension in 66%, diabetes mellitus in 24%, 43% were smokers, 25% were having Ischemic heart disease.[11,12]

In ECASS III, 62% were hypertensive, 14% were diabetic, 30% were smokers and 7.7% have previous history of stroke.[13]

The report from Eighth Joint National Committee (JNC8) recommends treatment of a blood pressure goal of systolic blood pressure less than 150 mmHg and diastolic blood pressure less than 90 mmHg in patients more than or equal to 60 years without diabetes mellitus and chronic kidney disease and systolic blood pressure less than 140 mmHg and diastolic blood pressure less than 90 mmHg in all other adults greater than or equal to 18 years.[14]

Blood pressure treatment that results in a modest reduction in systolic blood pressure of 10-12 mmHg and 5- 6 mmHg diastolic is associated with a reduction of 38% in stroke incidence. (MacMohan and Rodgens, 1996).[15] More than five years may be required before a reduction in stroke risk approaches that of never smokers after cessation of smoking.[16]

Of total 94 patients 34 (36%) patients presented in interval of <4.5 hrs. of onset of symptoms however, three patients were unwilling for thrombolytic therapy. Thus, thrombolytic therapy was administered in 31 patients, kept in group I, and the remaining patients, group II were followed on standard treatment and the course of their deficit was observed. The mean duration of stroke in group I was 3.12 hours and in group II was 18 hours.

Disability at presentation

According to mRS, Barthel index and NIHSS scales in to groups are as follows:

According to mRS: in group 1, 87.11% have score of 5 and 12.9% had score of 2-4.While in group 2, 66.67% have score of 5 and 33.33% have score of 2-4 and none have score of 0-1 in both groups. Both the groups were comparable (p value >0.001).

According to Barthel index: in group I, 9.68% have score 8-14 and 90.32% have score of 0-7 and in group 2, 96.82% patients have score of 0-7 and 2.13% had score of 8-14. Both the groups were comparable (p value >0.001).

According to NIHSS: in group I, 22.58% patients have score of 5-24 and 77.42% patients had score of 25-42.In group 2, 23.81% had score of 5-24 and 76.19% had score of 25-42.

The mean NIHSS score was 23.40 ± 3.94 in group 1 and 29.25 ± 6.81 in group 2. Both the groups were comparable (p value >0.001). Thus, both the groups were comparable and have mostly severe disability at presentation.

In ECASS III, the baseline mean NIHSS score were 10.7 ± 5.6 in alteplase group and 11.6 ± 5.9 in placebo group. In NINDS, scores were 15.6 ± 7.2 in t-PA group and 16.1 ± 6.8 in placebo group.[5,13]

Yamaguchi T et al, concluded that alteplase, when administered at 0.6 mg/kg to Japanese patients, might offer a clinical efficacy and safety that are compatible with data reported in North America and the European Union for a 0.9 mg/kg dose.[18]

Aetiology on basis of clinical examinations and CT head finding

In group I, about 67.7% patients had large vessel occlusion of which 14 (66.67%) had MCA territory infarct and 4(19.1%) patients had ACA territory infarct and 2(9.5%) had others including posterior circulation infarct. 25.8% patients had small vessel occlusive disease. 3.22% patients had cardio embolic cause.

In group II, about 65% patients had large vessel occlusion of which 29 (70.37%) had MCA territory infarct and 7 (17.1%) patients had ACA territory infarct and 3.17%

had others including posterior circulation infarct. 31.50% of patients had small vessel occlusive disease. 11.11% patients had cardio embolic cause.

So overall 65.9% of patients had large vessel of occlusion with MCA territory comprising 43 (69.3%), ACA territory 11 (17.74%) and others including posterior circulation infarct comprising 4 (6.4%) of large vessel occlusion and 32.9% has small vessel occlusion.8.5% of patient had cardio embolic.

In NINDS, 14% of patients had small vessel occlusive and 39% patients had large vessel and 44% of patients had cardio embolic.[5,3] ECASS III, there were 18% patients had small vessel occlusive and 41% had large vessel occlusion and 42% had cardio embolic.[6,13] In SITS-MOST study group 8.3% had small vessel occlusion, 35% had large vessel disease, and 35% had cardiac etiology.

Comparison of CT and MRI findings

The baseline CT Head of group I was normal in 11 patients and 24 of 63 patients of group II. The repeat CT was done in all patients in group I and 24 of 63 cases of group II. MRI brain was done in 4 of 15 cases of group 1 and 8 of 63 cases of group 2 in which both CT were inconclusive. Infarct was present in all. Lacunar infarct was present in 2 patient of group I and 3 patients of group II. Heamorrhagic transformation was present in 2 patients of group II.

CONCLUSION

In the present study titled Clinical Profile of Acute Ischaemic Stroke in a Tertiary Care Hospital authors have studied 94 cases with acute ischemic stroke with mean age of 56.2 years and consisting of 52.7% males and 47.3% females. The mean time for both the groups to reach the hospital was 12.61 and only 36% patients presented to hospital in window period of <4.5 hours. So, public awareness, identification of symptoms, availability of facilities and expertise are the main areas to improve the thrombolytic rate in our population. The maximum cases comprised of large vessel occlusion (61.82%), MCA territory infarct being the most recurring (76.47%). Cardio-embolic stroke was seen in the least percentage (9.09%). Hypertension (40%) is the most important modifiable risk factor for stroke and most powerful for all form of vascular cognitive impairment. Followed by Diabetes Mellitus (32.7%) an antecedent risk increases the risk of ischemic cerebrovascular disease, an estimated two- fourfold as compared to the risk in people without DM. Smoking (29.1%) is third most important risk factor of the patients. Disability at presentation in this study according to various scales was calculated and interpreted. These were NIHSS, mRS, Barthel Index. Majority of patients presented in severe grade of disability in both groups and both groups were comparable as far as disability was concerned. Baseline

CT was normal in 35.4% of patients in group I, and 38.01% patients in group II, however findings were revealed in the repeat CT done after a duration of 3 days with only 13.3 % patients in group I and 12.69% patients in group II with a normal CT. Cerebrovascular accidents are an emerging pandemic. Quick and prompt responses by an active medical team are promising in the long run, which can limit the severity of disability.

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