

ORIGINAL RESEARCH

Clinical study of acute ischemic stroke outcome at tertiary care hospital

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ABSTRACT

Background: Stroke or cerebrovascular accident is a leading cause of mortality and morbidity throughout the world including both developed and developing countries. Identification of potential prognostic factors for ischaemic stroke may enable better prediction for outcome and conducting early interventions may improve the prognosis. Present study was aimed to study outcome of patients of acute ischemic stroke at tertiary care hospital. **Material and Methods:** Present study was prospective, observational study, conducted in patients with ischemic stroke, confirmed by CT scan of brain, presenting within 72 hours of onset of symptom, willing to participate in study. **Results:** In present study 126 patients with acute ischemic stroke were included. Most common age group was 61-70 years (34.13 %) followed by 51-60 years (24.6 %) age group. Male patients (65.38 %) were more than female patients (34.13%). Male to female ratio was 1.9:1. Common risk factors observed were stage 1 hypertension (19.84 %), stage 2 hypertension (SBP>160, DBP>100) (25.4 %), diabetic (36.51 %), smoker (29.37 %), alcoholic (22.22 %), dyslipidemia (20.63 %), history of cardiovascular disease (18.25 %), obesity (15.87 %), family history of stroke (14.29 %) & tobacco chewing (10.32 %). On admission, according to NIHSS scale severity majority had minor stroke (37.3 %) followed by moderate stroke (35.71 %), moderate to severe stroke (18.25 %) & severe stroke (8.73 %). Functional outcome was assessed using the modified ranking score (MRS) at 6 months. Majority had MRS score 3 (44.29 %) followed by MRS score 2 (38.06 %), MRS score 1 (7.96 %). **Conclusion:** Areas for improvement in management of stroke are public awareness, lifestyle modification (modifiable risk factors are hypertension, smoking, dyslipidemia, alcohol consumption, and diabetes mellitus), early diagnosis, treatment & availability of facilities and expertise.

Keywords: ischemic stroke, modified ranking score, hypertension, diabetes mellitus

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INTRODUCTION

Stroke or cerebro-vascular accident is a leading cause of mortality and morbidity throughout the world including both developed and developing countries. Stroke is defined by the sudden

onset of focal neurological deficit resulting from pathological process of blood vessels. The pathologic process includes occlusion of vessel by thrombus or embolus, rupture of a vessel, an altered permeability of vessel wall, or increased viscosity or change in quality of blood flow.¹

Stroke can be ischemic or hemorrhagic. Hemorrhagic stroke, on the other hand, is a result of bleeding into the brain. While ischemic strokes are due to decreased blood flow, caused by blockage, to the portion of the brain with consequent cell death.^{2,3} Several risk factors like diabetes mellitus, heart disease, dyslipidemia, alcohol consumption, drug abuse, hypertension, and smoking are established contributors. Additionally, many undetermined social and cultural factors also influence the disease process significantly, evident as lifestyle-change and economic growth that are easily identifiable in India.⁴

Death from stroke in the low-income and middle-income countries accounted for 85.5% of stroke deaths worldwide. The socio-economic impact due to stroke on individual, families and health care institutions is enormous.^{5,6} Early identification of individual at risk could be of help in prevention of stroke. Also identification of potential prognostic factors for ischaemic stroke may enable better prediction for outcome and conducting early interventions may improve the prognosis. Present study was aimed to study outcome of patients of acute ischemic stroke at tertiary care hospital.

MATERIAL AND METHODS

Present study was Multi centre, prospective, observational study, conducted in the department of Medicine. Study duration was 1 year (June 2020 to May 2022). Study was approved by institutional ethics committee.

Inclusion Criteria

- Patients with ischemic stroke (defined as a syndrome of rapidly developing clinical signs of focal or global neurological disturbance lasting for more than 24 hours) , confirmed by CT scan of brain, presenting within 72 hours of onset of symptom, willing to participate in study.

Exclusion Criteria

- Age less than 40 years.
- Other co-morbid conditions such as acute myocardial infarction, hepatic encephalopathy, septicemia, chronic renal failure and gout.
- Patients with Hemorrhagic stroke, old cases of stroke, prior history of stroke and strokes secondary to trauma, neoplasm, vasculitis and infection.
- Patients who received thrombolytic agent, admitted within 3 h and had thrombolysis, diuretic or any other investigational drug during their hospital stay.

Study was explained to patients in local language & written consent was taken for participation. Detailed history taking and clinical examination was undertaken for every patient at admission. All routine investigations like complete hemogram, Blood glucose, liver and kidney function test, lipid profile, electrolytes, urine exam ECG were done. CT scan of brain was done in all patients after hospitalization. Treatment details were noted & follow up was kept till 6 months. Outcome was measured using modified Rankin Scale (mRS).⁷ The mRS is a 6-point, ordinal hierarchical scale that describes global disability with a focus on mobility

Table 1: The modified Rankin scale (mRS).

Grade 1 No significant disability despite symptoms; able to carry out all usual duties and activities
Grade 2 Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance
Grade 3 Moderate disability; requiring some help, but able to walk without assistance

Grade 4 Moderately severe disability; unable to walk without assistance, unable to attend to needs without assistance
Grade 5 Severe disability; bedridden, incontinent, and requiring constant nursing care and attention
Grade 6 Dead

Statistical Analysis was done during SPSS Software for Windows Ver. 23. The data obtained was expressed as mean \pm standard deviation. Correlation was computed by Pearson's correlation coefficient. Statistical analysis was done using descriptive statistics.

RESULTS

In present study 126 patients with acute ischemic stroke were included. Most common age group was 61-70 years (34.13 %) followed by 51-60 years (24.6 %) age group. Male patients (65.38 %) were more than female patients (34.13%). Male to female ratio was 1.9:1. Common risk factors observed were pre hypertension (SBP-120–139 DBP-80–89) (16.67 %), stage 1 hypertension (SBP-140–159 DBP-90–99) (19.84 %), stage 2 hypertension (SBP>160, DBP>100) (25.4 %), diabetic (36.51 %), smoker (29.37 %), alcoholic (22.22 %), dyslipidemia (20.63 %), history of cardiovascular disease (18.25 %), obesity (15.87 %), family history of stroke (14.29 %) & tobacco chewing (10.32 %).

Table 1: General characteristics

Characteristics	No. of patients	Percentage
Age groups (in years)		
<40	6	4.76
41–50	15	11.9
51-60	31	24.6
61–70	43	34.13
71–80	28	22.22
>81	3	2.38
Mean age (mean \pm SD)	65.33 \pm 13.46	
Gender		
Male	83	65.87
Female	43	34.13
Risk factors		
Blood pressure		
Normal Blood pressure	48	38.1
Pre hypertension (SBP-120–139 DBP-80–89)	21	16.67
Stage 1 hypertension (SBP-140–159 DBP-90–99)	25	19.84
Stage 2 hypertension (SBP>160, DBP>100)	32	25.4
Diabetic	46	36.51
Smoker	37	29.37
Alcoholic	28	22.22
Dyslipidemia	26	20.63
History of cardiovascular disease	23	18.25
Obesity	20	15.87
Family history of stroke	18	14.29
Tobacco chewing	13	10.32

On admission, according to NIHSS scale severity majority had minor stroke (37.3 %) followed by moderate stroke (35.71 %), moderate to severe stroke (18.25 %) & severe stroke (8.73 %).

Table 2: Distribution of patients according to NIHSS scale severity

Score	Stroke severity	No. of patients	Percentage
0	No stroke symptoms	0	0
1-4	Minor stroke	47	37.3
5-15	Moderate stroke	45	35.71
16-20	Moderate to severe stroke	23	18.25
21-42	Severe stroke	11	8.73

Functional outcome was assessed using the modified ranking score (MRS) at 6 months. Majority had MRS score 3 (44.29 %) followed by MRS score 2 (38.06 %), MRS score 1 (7.96 %), MRS score 4 (6.92 %) & MRS score 5 (0.69 %).

Table 3: MRS at 6 months

MRS score	No. of patients	Percentage
1	23	7.96
2	110	38.06
3	128	44.29
4	20	6.92
5	02	0.69

DISCUSSION

Ischemic stroke in young adults is growing as a major concern in the present decade because of its rising incidence and the fears related to disability and economic burden on the victimized young individuals.⁸ This rise in prevalence was attributed to increased accession to traditional risk factors, lifestyle modifications, and urbanization among young.⁹

The prognosis for functional recovery after a stroke is influenced by various clinical and medical factors such as age, comorbid illnesses, sex, severity of the initial deficit, severity and size of the infarct, aetiology and location of stroke, time interval from the onset to reach the hospital and the type of medical care, including stroke unit, stroke team, and stroke pathway.¹⁰ Diabetes is one of the vital comorbidity risk factor reported to be associated with occurrence, poor outcome, and recurrence in stroke patients^{11,12}. An increased incidence of stroke has been reported in advanced age among diabetic patients¹³

In study by Sreen A et al.,¹⁴ among 323 enrolled patients, 77.4% had ischemic strokes and 22.6 had intracranial bleed. Only 1.85% of patients could reach hospital within 4.5 hours. According to NIHSS 64.08% patients had mild to moderate stroke, and 35.9% had severe stroke. Mortality was 17.8% in ICH patients and 8.4% in ischemic stroke patients. The most common cause of mortality was infection (70.58%).

Madhavi K,¹⁵ studied 186 cases, 137 were males and 49 were females. A total of 150 patients were among the age group of 36 to 45 years. Dyslipidemia, smoking, and alcohol consumption were prevalent in the study group. Atherosclerotic strokes were predominant in the study population. NIHSS scores at admission had a significant impact on mRS scores after 3 months. In this study, only 4% reported the recurrence of stroke, whereas mortality was about 0.02%.

In study by Vaidya CV¹⁶ mean age was 60.20 years. Majority (32%) were in age group of 61–70 years young ischemic stroke (age ≤45 years) comprised of 17.14% of all patients. The male to female ratio was 1.6:1 with male predominance. Most of the patients (50.3%) were having right hemiplegia followed by left hemiplegia (40%). The common clinical presentation was hemiplegia (49.1%) followed by speech involvement (29.1%), altered sensorium (9.4%). Most

common risk factor was hypertension (30.1%) followed by previous history of stroke (16.1%), dyslipidemia (15.6%), and smoking (15.1%). The frequent site of the infraction was parietal (33.3%) followed by frontal (16.2%) and basal ganglia (10.7%).

Varadaraja J et al.,¹⁷ studied 460 patients with acute stroke. overall 121 (26.3%) patients developed complications. Majority of patients (44/121,36.4%) developed complications in the first one week hospital stay. The prevalence of neurological and medical complications was 15% and 11.3% respectively. Raised intracranial pressure (ICP) (8%), and pneumonia (4.3%) were more frequently observed complications. Acute stroke patients with complications had a statistically significant poor outcome (mRS 3 to 6) than patients without complications [n=103/121 (85.1%) vs. n=219/339 (64.6%); p <0.001]. On multivariable analysis, dyslipidaemia [odds ratio (OR) 5.128; p=0.001], hypertension (OR 2.037; p=0.002), age less than 45 years (OR 1.799; p=0.004), stroke severity with moderately severe to severe stroke (OR 4.067; p<0.001) were statistically significant predictors for the occurrence of complications.

In study by Nayak AR et al.¹⁸, HTN was a major risk factor associated with 67% (70.104) of patients with AIS. Multivariate analysis suggests higher odds of 4.088(95%CI, 0.721–23.179) and 2.437(95%CI, 0.721–23.179) for 12 and 18 months outcome in patients with AIS and HTN, respectively. Serum NSE and S-100ββ decreased at the time of discharge as compared to admission level in improved patients suffering from AIS with or without HTN, whereas levels of ITIH4 peptides 2 and 7 increased at the time of discharge (compared to its admission level) only in improved patients with AIS regardless of HTN or non-HTN condition.

In study by Sanjeeth,¹⁹ after 1 month of stroke among 3 patients who had baseline NIHSS score 1-4, all 3(100%) are independent at home, among 73 patients who had baseline NIHSS score 5-15, 47(64.4%) are independent and 26(35.6%) required assistance, among 7 patients who had score 16-20, 1(14.3%) patient was independent at home, 6(85.7%) required assistance, and among 10 patients who had score more than 20, 7(70%) died, 3(30%) required assistance and none of them are home independent. With the p value <0.001 which is statistically significant. Early diagnosis, treatment including lifestyle modification and prevention of diabetes may reduce the development of stroke and its complications and it presents a major challenge for health care professionals facing an epidemic of both diabetes and stroke. The specific causes for the adverse outcome and whether a more aggressive therapeutic approach can improve the prognosis of these patients should be assessed by future studies.

CONCLUSION

Areas for improvement in management of stroke are public awareness, lifestyle modification (modifiable risk factors are hypertension, smoking, dyslipidemia, alcohol consumption, and diabetes mellitus), identification of symptoms, early diagnosis, treatment, availability of facilities and expertise may lead to improved thrombolytic rate and outcome..

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