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A Study of Risk Factor and Clinical Manifestation in Patients with Ischemic Stroke

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Abstarct
Background: *Cerebrovascular accident (CVA) is the major leading cause of death and disability in both developed and developing countries. It is a neurological emergency and stroke patient should be taken immediately to a medical facility for diagnosis and treatment. The symptoms of a stroke depend mainly on the area of the brain that has been affected and the amount of tissue damaged.*
Aim: *The aim of this study was to investigate various clinical presentations in ischemic stroke patients.*
Methods: *A descriptive hospital-based study of the neurological symptoms and signs of 100 patients with ischemic stroke, including Glasgow Coma Scale (GCS), severe headache, cranial nerve palsy, aphasia, hemiplegia, monoplegia, ataxia, vertigo, eye movement disorder, were analyzed in the study.*
Results: *We analysed 100 patients having confirmed acute ischemic stroke. UMN types of facial nerve weakness were the most frequent presentation (88%). But it was not found as an isolated presentation and usually associated with limb weakness, aphasia and other cranial nerve weakness. The hemiplegia were the second most frequent presentation (82%), in which left side hemiplegia were dominating (44%) as compared to 38 % in right side. Right side with aphasia were 18% and without aphasia were 20% depending on speech area involved. Pure aphasia without limb weakness was found in only 3 patients (3%). Total aphasia irrespective of limb weakness were found in 21 %. Facio-brachial weakness found in 3 % cases while one patient (1%) had pure monoplegic type presentation. Five (5%) patients had acute ataxic manifestation, (5%) had lower cranial nerve involvement and one (1%) has internuclear ophthalmoplegia. Anterior circulation was involved in 62% case and remaining 38% had posterior circulation stroke. Low GCS (< 7) was found in 12 % case mainly in large anterior circulation or extensive brainstem involving stroke patients. Out of which 8% had mortality during hospital stay and remaining 4% were discharge with severe morbidity after prolonged hospital stay.*
Conclusion: *In the current study facial nerve palsy with limb weakness, acute onset hemiplegia, and aphasia had significantly higher prevalence in ischemic stroke patients.*
Keywords: *Ischemic Stroke, Nerve Palsy, Aphasia, Hemiplegia.*

Introduction

Stroke is a major global public health problem. Global Burden of Diseases (GBD) study reported nearly 5.87 million stroke deaths globally in 2010, as compared to 4.66 million in 1990 . This indicated a 26 per cent increase in global stroke deaths during the past two decades. With the rising proportion of mortality, stroke still remains the second leading cause of death worldwide. [1-3] Mortality during hospital admission is 15% and up to 20%–25% during the next 30 days. Although, 50%–70% of the patients recover from the neurological dysfunctions, 15%–30% of stroke victims suffer permanent disabilities.

According to the estimates from the GBD study in 2001, over 85 per cent of the global burden of stroke was borne by low- and middle-income countries (LMICs)[2]. The incidence rate of stroke in LMICs has increased from 56/100,000 person-years during 1970-1979 to 117/100,000 person-years during the period 2000-2008, almost double increase in past four decades. [4]

Two types of brain stroke are hemorrhagic and ischemic. Hemorrhagic stroke, which is due to blood vessel rupture, accounts for 20% of CVAs. Ischemic stroke due to brain vessels occlusion and blockage includes 80%.[1-2] Ischemic stroke subtypes were large artery, small artery, cardiac, lacunar or undetermined.

In order to prevent complications and permanent defects, early diagnosis is the key in stroke patients, however, distinguishing the type of stroke and area of involvement in brain plays a crucial role in patient care. Simple clinical findings are helpful in distinguishing the type of stroke, involved arterial system and area affected in brain[1-2] but need for non-contrast computed tomography (CT) scan or magnetic resonance imaging (MRI) is an undeniable fact.[5-9]

Very few studies described various clinical findings, especially neurological signs and symptoms, and some of them presented formulas to distinguish stroke types, ischemic stroke subtypes, severity, arterial system and part of the brain involved based on clinical evaluations. These characteristics including GCS scoring, focal or non-focal symptoms, negative or positive symptoms, cranial nerve involvement and sudden or gradual onset result in primary segregation of stroke types in the emergency department that leads to early diagnosis and treatment. [10]

Regarding this issue, in the present study, we aim to identify the rate of neurological findings, such as Glasgow Coma Scale (GCS) , cranial nerve involvement, speech abnormality, eye signs and symptoms, vertigo, limb weakness in stroke patients and evaluate their prevalence in ischemic stroke, in order to introduce a guidance to ischemic stroke subtypes, severity and affected arterial system that can be more advantageous in districts without CT and MRI imaging possibility. On the other hand, in developing countries, imaging facilities are not available in most of the small districts and towns, where early diagnosis of ischemic stroke can lead to early patient referral to centers with fibrinolytic therapy facilities and decrease in stroke injuries.

Material & Method

Participants of adult age-sex group diagnosed with ischemic stroke as defined by the World Health Organization (WHO) 12 were considered in this study. Data were collected from April 2017 to March 2018. The study was approved by hospital's Ethics Committee. Written informed consent was obtained from consecutive hundred adult patients with ischemic stroke admitted < 2 weeks, in whom brain imaging (computed tomography/magnetic resonance imaging) confirmed infarction. Patients with primary intracerebral/ subarachnoid hemorrhage and those who died or were discharged from the emergency department without inpatient admission were excluded. We collected data on demographics, risk factors, diagnosis modalities, imaging findings and stroke characteristics were collected at the time of admission. For data collection, WHO STEPS stroke approach was followed. Patients were contacted telephonically and by face-to-face interview 90 days after discharge to

assess their outcome. The outcome was measured using modified Rankin scale (MRS 0–2: good outcome; 3–6: poor outcome).

Statistical analysis

The statistical measures calculated were descriptive statistics, Chi-square (χ^2) test and independent t-test. For the comparison of categorical variables, Chi-square (χ^2) test were used. Frequency of the various symptoms with respect to number of participants was calculated. Cross tabulation of toxicity symptoms with the other variables were also calculated by using Chi-square (χ^2) test with descriptive statistics and represented. P< 0.05 was considered as statistical significant. Statistical analysis was performed with SPSS software (IBM SPSS Statistics, NY, USA).

Results

Demography

We enrolled total consecutive hundred in patients during study period from april 2017 to march 2018. Data were analyzed, among them 56 were male and 44 were female. Stroke of Anterior circulation were more common in both gender but the posterior circulation patients were younger (PC: 57 ± 14 vs. AC: 59 ± 16 years, P= 0.01) [Table 1]

Table 1: Demographic details of ischemic stroke in patients with anterior circulation versus posterior circulation

Variables		Anterior circulation	Posterior circulation	Total/Percentage
No.of Patient		62 (62%)	38 (38%)	100 (100%)
Gender	Men	40 (71.4%)	16 (28.5%)	56 (100%)
	Women	32 (72.7%)	12 (27.2%)	44 (100%)
Age Mean ± SD		59 ± 16	57 ± 14	--

Risk factors and clinical features

The higher percentage of anterior circulation stroke patients had a previous TIA {AC 08 (%) vs. PC 02 (%), P <)} while a significant percentage of posterior circulation stroke patients had Rheumatic /congenital heart disease { PC 03(%) vs. AC 01 (%),P <)}. Another risk factors like Hypertension, Diabetes mellitus, Coronary artery disease, dyslipidemia, smoking and drug addiction were equally associated with both types of circulatory ischemic stroke. [Table 2].

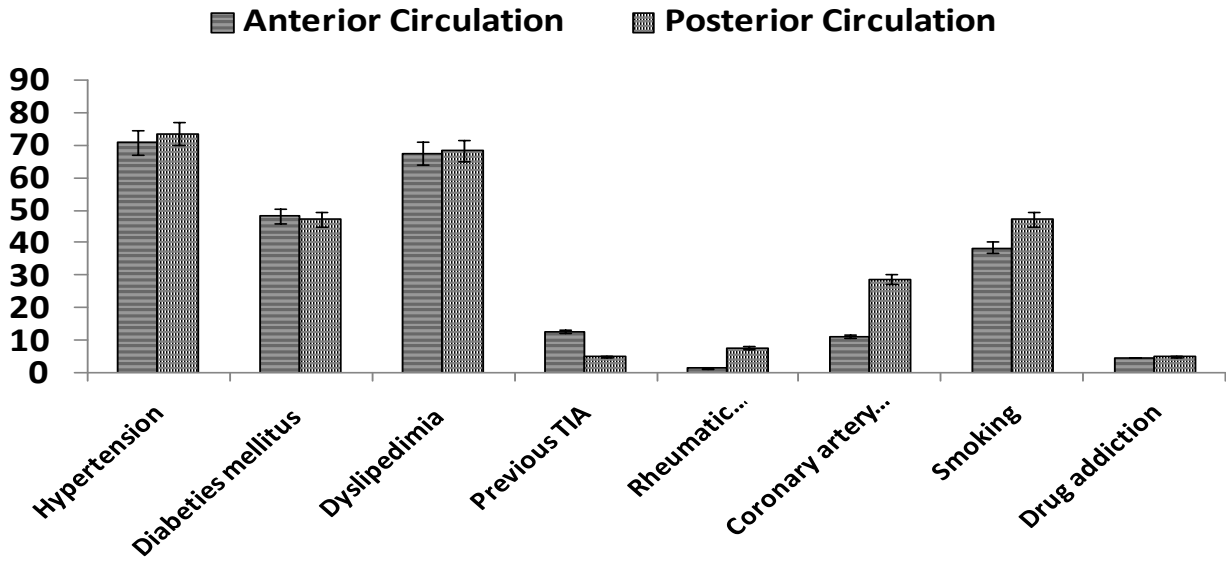

Figure-2 Repsents the symptomatic comparison between the anterior Circulation and posterior circulation population

Anterior circulation stroke patients have most likely had aphasia (AC 19 [%] vs. PC 02 [%], P <) Hemiplegia(AC 56 [%]vs. PC 26 [%], P <) and monoplegia (AC 01 [%]vs. PC 00 [%], P <) but less likely to have vertigo (AC 10 [%]vs. PC 18 [%], P <), Ataxia (AC 00 [%]vs. PC 05 [%], P <) Lower cranial nerve palsy (AC 00 [%]vs. PC 05 [%], P <) and eye movement abnormality (AC 00 [%] vs. PC 01 [%], P <)., facial weakness and low GCS were equally associated with both groups. [Table 3].

Symptomatic Outcome

Total 92 (%) patient were discharged from hospital, 88(%) within < =2 week. From remaining 12(%) , 08 (%) patients were died in four weeks in hospital stay. While 4 (%) were discharged with severe morbidity after prolonged hospital stay. All these 12 (%) were those who had a low GCS on admission.

At 90 days follow up, 3(%) patients were died at home. In remaining 89 (%) outcomes was not significantly different in both groups on MRS scale

Table 2: Comparison of risk factors of ischemic stroke in patients with anterior circulation versus posterior circulation

Parameters / Health effects	Anterior Circulation (n=62)			Posterior Circultion (n=38)		
	No.	%	Sig.	No.	%	Sig.
Hypertension	44	70.967		28	73.68	
Diabeties mellitus	30	48.38		18	47.36	
Dyslipedimia	42	67.741		26	68.42	
Previous TIA	08	12.90		02	5.26	
Rheumatic /congenital heart disease	01	1.61		03	7.89	
Coronary artery disease	07	11.290		11	28.9	
Smoking	24	38.70		18	47.36	
Drug addiction	03	4.838		02	5.263	

Note: Prevalence of self reported toxicity symptoms such as headache vs smoking (χ^2 = 16.00, p<0.001); muscle pain vs smoking (χ^2 = 9.65, p<0.001); tremor vs smoking (χ^2 = 13.10, p<0.001); stress vs smoking (χ^2 = 8.38, p<0.005); altered taste vs smoking (χ^2 = 3.96, p<0.05); sleep problem vs smoking (χ^2 = 8.20, p<0.005); trouble walking vs smoking (χ^2 = 6.27, p<0.01); cardiac problem vs smoking (χ^2 = 5.02, p<0.01).

Table 3: Comparison of sign and symptoms of ischemic stroke in patients with anterior circulation versus posterior circulation

Parameters / Health effects	Anterior Circulation (n=62)			Posterior Circultion (n=38)		
	No.	%	Sig.	No.	%	Sig.
Hemiplegia	56	90.322581		26	68.4211	
Monoplegia	01	1.6129032		00	0	
Aphasia	19	30.645161		02	5.26316	
Vertigo	10	16.129032		18	47.3684	
Loss of sensation	12	19.354839		09	23.6842	
Low GCS (< 7)	07	11.290323		05	13.1579	
Facial weakness	58	93.548387		30	78.9474	
Lower cranial nerve palsy	00	0		05	13.1579	
Ataxia	00	0		05	13.1579	
Eye movement abnormality	00	0		01	2.63158	

Note: Prevalence of self reported toxicity symptoms such as headache vs smoking (χ^2 = 16.00, p<0.001); muscle pain vs smoking (χ^2 = 9.65, p<0.001); tremor vs smoking (χ^2 = 13.10, p<0.001); stress vs smoking (χ^2 = 8.38, p<0.005); altered taste vs smoking (χ^2 = 3.96, p<0.05); sleep problem vs smoking (χ^2 = 8.20, p<0.005); trouble walking vs smoking (χ^2 = 6.27, p<0.01); cardiac problem vs smoking (χ^2 = 5.02, p<0.01).

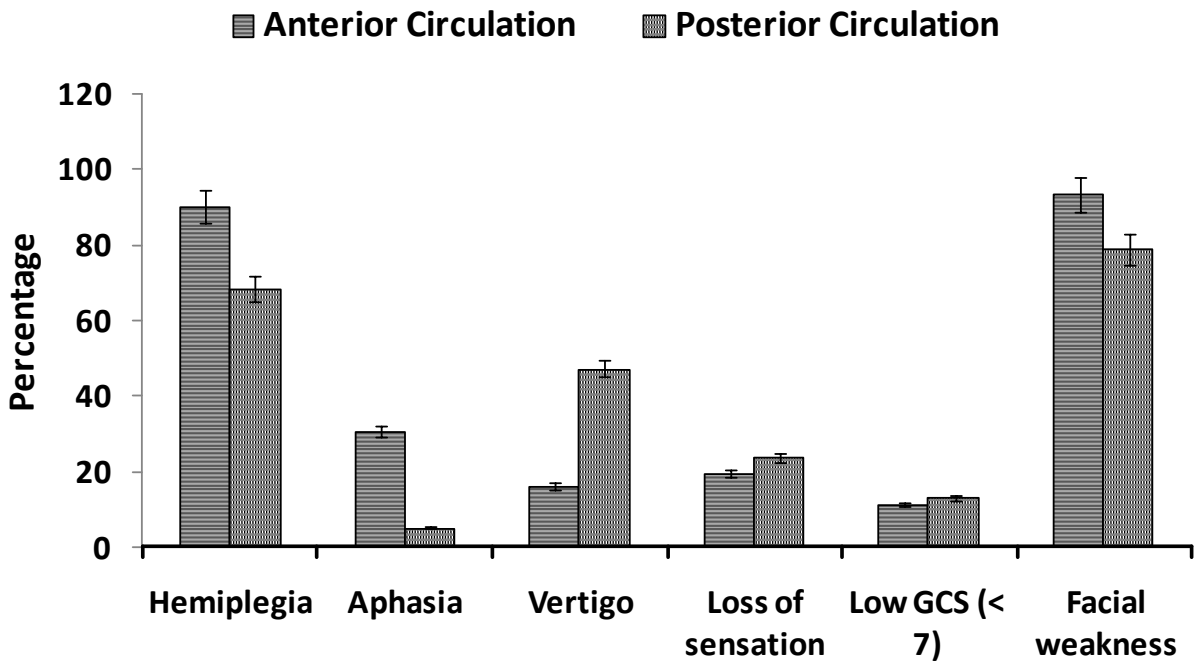

Figure-2 Repsents the symptomatic comparison between the anterior Circulation and posterior circulation population

Discussion

We provide data for the comprehensive information on demographics, risk factors, symptomatological, mechanisms, imaging characteristics, and outcomes of inpatient ischemic stroke in India. Our results emphasize an urgent need to address modifiable and vascular risk factors in India and other developing countries. The mean age (57 years) and the percentage of women (44%) were significantly lower than that of Western and Chinese populations. (ref 4,12,13). The below-60-year age groups, predominantly men, are the key income generators suggesting a heavier financial burden of stroke in India. The lower percentage of women may also reflect cultural bias, with men more likely to seek medical care.

Our study provides good insights about ischemic risk factors in India. We observed a higher rate of diabetes mellitus, hypertension and dyslipedimia as compared with western populations. A high rate of smoking in the form of cigarettes, biddis, and hookah, confer a higher risk of stroke particularly in men. [11-14] Drug abuse was found relatively infrequent in our study that was concurrent with earlier study.[15] Large-artery atherosclerosis involving anterior circulation was the most common subtype. Rheumatic and congenital heart disease was relatively common even among our adult population likely reflecting under diagnosis in childhood age . Previous transient ischemic attack history also found in significant no of patient particularly in anterior circulation group further confirming a high rate of undiagnosed and untreated intracranial atherosclerosis.[16]

Clinically, the large artery disease was suspected by the cerebral cortical impairment (e.g. aphasia and restricted motor involvement) or brainstem or cerebellar dysfunction.[15] In our study Hemiplegia and aphasia were more common in anterior circulation group, reflecting the large artery involvement, A history of transient ischemic attack in the same vascular territory, or carotid bruit supported the clinical diagnosis. Radiologically intra or extracranial atherosclerosis were confirmed.

We observed lower cranial nerve palsy, vertigo, ataxia and eye movement abnormality significantly in posterior circulation group

involving the brain stem or cerebellum. These features are more common in cardioembolic type of ischemic stroke than large artery. [16-18] Significantly higher percent of rheumatic and congenital heart disease as well as coronary artery disease in this group support these results, however the overall higher rate of diabetes mellitus and hypertension in my study subjects may contribute.

As opposed to prior studies, we only included imaging confirmed ischemic stroke, and this one is the unique study providing detailed arterial information with clinical correlation. Vascular imaging was obtained in all patients and typically completed on admission to facilitate thrombolysis or embolectomy decisions. [17-18]

Stroke severity was high, a significant proportion had large infarcts. These results may be explained by admission bias, that is, the limited availability of hospital beds and lack of health insurance leads to severe/unstable stroke patients getting admitted. We did observe lower mortality, presumably because of differences in study population (stroke care units versus rural or urban settings) although advances in care, such as thrombosis, embolectomy and the prevention of early poststroke complications, may also have contributed.

Nevertheless, the known differences between rural and urban settings may require different sets of guidelines to be developed. Our data may prove useful in advancing stroke care and designing stroke guidelines in developing countries.

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