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A STUDY OF CLINICAL PROFILE OF STROKE WITH SPECIAL REFERENCE TO RISK FACTORS

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ABSTRACT: BACKGROUND AND OBJECTIVES Stroke is a complex disease in which environmental and genetic factors make about equal contributions to the etiology. Etiology can vary in different population due to differences in lifestyle, dietary habits and variations in the gene pool. Hypertension, diabetes, dyslipidemia and smoking have been identified as major risk factors. Many of the risk factors for stroke are preventable or controllable. The present study aims at studying various clinical presentations of stroke and evaluating the frequency of association of various modifiable and non-modifiable risk factors in stroke. **METHODOLOGY:** This study was done at Sri Siddhartha Medical College (SSMC) Hospital, Tumkur over a period of 2 years. Total number of patients enrolled was 100. Patients were selected and excluded as per our inclusion and exclusion criteria. Informed consent was obtained. Clinical profile of each patient was recorded, analyzed and compared with other similar studies. Number of patients with each risk factor and their respective percentage was calculated. The data was compared with the studies carried out worldwide and in the Indian subcontinent and noted for any differences in the association of risk factors. **RESULT:** Between Sep 2012 and Aug 2014, 100 patients admitted with stroke at Sri Siddhartha Medical College Hospital, Tumkur were randomly selected. The male to female ratio was 1.94:1(n=100, males 66: females 34). The clinical profile of stroke found in this study was comparable to various Indian and international studies. Patients were aged between 28 and 85 years. Mean age was 63.6years. Hemiparesis was the presentation in 92%. Four percent presented with monoparesis of upper limb. Imaging showed infarct in 94% and hemorrhage in 6%. The commonest modifiable risk factor in our study was dyslipidemia in 79% of patients. Hypertension was present in 65% patients. Smoking was the third common modifiable risk factor in our patients i.e. 53%. Diabetes mellitus which is an established risk factor was found in 34% patients. **CONCLUSION:** Stroke being one of the most common cerebrovascular diseases has drawn attention of researchers all over the world. Targeting the risk factors for preventing cerebrovascular accidents in the first place will help in reducing the burden of this often disabling disease. In this study carried out at SSMC Hospital, Tumkur the clinical profile of stroke and association of risk factors studied were comparable to various studies conducted worldwide and in the Indian subcontinent.
KEYWORDS: Ischemic stroke, hemorrhagic stroke, Clinical profile, Risk factors.

INTRODUCTION: Stroke or a cerebrovascular accident is the sudden death of brain cells due to inadequate blood flow. The WHO clinically defines stroke as the rapid development of clinical signs and symptoms of a focal neurological disturbance lasting more than 24hours or leading to death with no apparent cause other than vascular origin.[1,2]

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Stroke is a clinical syndrome divided into two broad categories that define its pathophysiology:

1. Ischemic strokes are caused by either cerebral thrombosis or embolism and account for 80%–85% of all strokes worldwide.
2. Hemorrhagic strokes are caused by subarachnoid hemorrhage or intracerebral hemorrhage and account for 1%-7% and 7%-27% respectively of all strokes worldwide.[3]

It is the second leading cause of death and one of the commonest causes of disability in adults. WHO data as per 2007 world health report states that 15 million people suffer from stroke worldwide each year. Of these, 5 million die and another 5 million are permanently disabled. High blood pressure contributes to over 12.7 million strokes worldwide.[4]

The studies on epidemiology of stroke are comparatively more limited in developing than developed countries. While India is still struggling with the problems of communicable diseases, non-communicable diseases are on the rise. Stroke is potentially the most devastating consequence of vascular disease, causing serious long-term disability and incurring extremely high medical, emotional and financial costs.[4]

For India the overall age adjusted prevalence rate for stroke is estimated to lie between 84-262/100,000 in rural and between 334-424/100,000 in urban areas. Whilst individual studies have reported varying annual incidence rates for stroke the Global Burden of Disease Study estimated a population-based annual incidence of stroke in India to be 89/100,000 in 2005 which is projected to increase to 91/100,000 in 2015 and to 98/100,000 in 2030.[5]

The Global Stroke Initiative launched by the WHO provides guidance through its STEPS program to generate population-based data on burden of stroke and to use such data to develop strategies for prevention and management.[6] since 2004, the STEPS program is currently being implemented in various sites in India through the Indian Collaborative Acute Stroke Study. The initial data supports the high prevalence of vascular risk factors and the relatively young age of stroke cases in India.[6] In India the prevalence of stroke in younger individuals is high (18-32% of all stoke cases) compared with high-income countries.[5]

Risk Factors: Epidemiologic studies of the risk factors for stroke are important for determining the origin and its prevention. In the past several decades many studies have successfully identified non-modifiable risk factors for stroke such as age, gender, race, ethnicity, heredity, and several well established modifiable risk factors also. Hypertension, atrial fibrillation, dyslipidemia, diabetes, cigarette smoking, physical inactivity, carotid stenosis, transient ischemic attack and other cardiac disorders are all potentially treatable conditions that predispose to stroke.

Despite substantial advances for treatment of patients with acute stroke, effective primary stroke prevention remains the best means for reducing the stroke burden.[7] More than 70% of all strokes occurring each year are first strokes and therefore primary prevention of stroke is of immense public health importance.[8] High-risk or stroke-prone individuals can be identified and targeted for specific management and interventions.

The ultimate public health benefit, however, depends on not only identification of stroke risk but also on assessing global vascular risk and the management and modification of these risks. Many preventive strategies are available to manage number of factors that increase the risk of a first stroke. Such successful implementation in preventive medicine remains a great challenge worldwide.[9]

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Defining stroke types helps in determining the most effective therapy and is clearly related to prognosis.

Computed tomography or magnetic resonance imaging should be performed to confirm the type of stroke. The main goal of treatment is to maximize physical and cognitive function by limiting acute complications and facilitating rehabilitation.

AIM: To study the clinical profile in patients presented with stroke and to analyze the associated risk factors.

METHODOLOGY: The subjects of the study are selected from patients admitted in the wards or ICU under the Department of General Medicine at Sri Siddhartha Medical College Hospital, Tumkur, who are diagnosed with stroke. Period of Study – 2years (1st September 2012–31st August 2014). 100 patients who satisfied the inclusion and exclusion criteria were randomly selected.

Inclusion Criteria: All patients who are diagnosed with Stroke (According to WHO definition).

Exclusion Criteria: Patients with post epileptic paralysis, history of head injury, sub arachnoid hemorrhage, and neurological deficits due to tumors.

On admission a detailed history was taken and a complete clinical examination done. In history special attention was paid to the previous history of stroke, history of smoking, physical activity, alcohol consumption, diabetes mellitus, hypertension, heart disease and family history. A detailed neurological examination was carried out. All the basic investigations like complete hemogram, blood sugar, lipid profile, blood urea, serum creatinine and ECG has been done on admission. CT or MRI was done to all the patients to identify the type of stroke. The data collected was presented in terms of percentages, and compared with previous studies. The association of risk factors was assessed with chi square test and p value <0.05 was taken as significant.

RESULTS: One hundred cases of stroke in the study were aged 28 to 85 years, average age 63.6 years (Males: 64.62 yrs. Females: 61.61yrs). The maximum number of cases was between 60 to 79 years.
Incidence of stroke in young (age less than 45yrs) was 13%. Stroke in middle age (45-65yrs) was 43%. Stoke in elderly (>65yrs) constituted 44%. 66% of patients were males and 34% were females, M: F ratio was 1.95:1 which decreased to 1.32:1 in stroke in elderly (>65yrs).
Motor weakness was present in 96% of patients. 52% of patients had difficulty in speech. 40% of patients had altered sensorium. Sensory symptoms were present 8% of patients. Table 1 shows the pattern of clinical presentations. Among the identifiable risk factors dyslipidemia was the most frequently associated risk factor. Seventy nine patients had dyslipidemia (79%). Hypertension was the next frequent association in 65% of the patients. Smoking was the third most common risk factor in 53% of patients. Diabetes was present in 34% of patients. The risk factors profile of the patients is shown in table 2.

Out of 100 patients hemiparesis was present in 92 patients, cranial nerve involvement was seen in a total of 52 patients, and aphasia was present in 30 patients. Out of this 23 patients had motor aphasia, 4 patients had sensory aphasia and 3 patients had global aphasia. 19 had dysarthria, 4 patients had monoparesis. Objective evidence of sensory impairment was present in 6 patients. Clinical findings of cardiac disease was seen in 13 patients, and ECG was found to be abnormal in 27 patients. 8 had ischemic changes, 10 had atrial fibrillation, and 11 had evidence of left ventricular

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hypertrophy. Analysis of examination findings is shown in table 3. On imaging studies (CT or MRI) 94 patients had infarct and 6 patients had hemorrhage.

Analyzing the frequency of occurrence of risk factors, 67% had 1 to 3 risk factors, 21% had 4 to 5 risk factors, and 8% had more than 6 risk factors. Only 4 patients had no identifiable risk factors. Among age wise analysis of risk factors, dyslipidemia, hypertension, tobacco use, diabetes, cardiovascular diseases were significantly associated with stroke. Age wise analysis of risk factors is shown in table 4. Among sex wise analysis of risk factors, dyslipidemia, smoking, alcohol abuse, past history of stroke were more frequently seen in males, whereas diabetes, hypertension, cardiovascular diseases, including valvular diseases were almost equally seen in women and men. (Table 5).

Among infarct patients, most commonly occurring risk factors were dyslipidemia (82%), hypertension (62.8%), tobacco use (60.6%), family history of stroke (39.4%), diabetes mellitus (34%). Among intracerebral bleed patients, hypertension was present in 100% of the patients, followed by dyslipidemia and tobacco use, alcohol use and past history of stroke in 66.7% of the patients. Occurrence of risk factors with type of stroke is shown in table 6.

DISCUSSION: The mean age of the patients in this study was 63.6yrs which was comparable to most of the Asian studies. (65.9%yrs-Mumtaz Ali et al, 58.27yrs- Naik et al).[10,11] In the present study 73% of patients were aged more than 60yrs. Age is the most important no modifiable risk factor. It is well established that the greater the age, greater the risk for ischemic stroke.[12] there was a significantly larger male predominance in studies from Australasia and the Americas compared to studies from Europe.[13]

Sex ratio in the present study was 1.95:1 which was comparable to Mahajan et al study.[14] it emphasizes the fact that male gender is a risk factor for stroke. A study from Pakistan showed even higher male to female ratio.[10] Textbooks have often mentioned the incidence rates to be about 25% to 30% higher among men, but the present study accounts for an overall risk increase for men by 33%. This might be due to the positive effects of estrogen on the cerebral circulation.[15]

A lifetime exposure to ovarian estrogens may protect against ischemic stroke, at least of the non cardioembolic type.[16] an effect that seems to cease with menopause.[17] Moreover, ischemic heart disease peripheral artery disease, and cigarette smoking are more prevalent among male stroke patients. These conditions are associated with large-vessel disease.[18,19]

In the present study incidence of ischemic stroke was 94% and cerebral hemorrhage was 6%. In developed countries, about 85-90% of strokes are due to cerebral infarction and 10-15% due to intracranial hemorrhage. Hemorrhagic stroke constitutes a larger percentage in Asians. The incidence of Hemorrhagic stroke in various Asian countries is as follows: Malaysia 33%, Indonesia and Singapore 26%, Taiwan 28%, Thailand, Hong Kong, Philippines and Korea 30 % while in India, the incidence of hemorrhagic stroke ranged from 35-40 % in different studies.[20]

The hospital based studies in Pakistan have almost the same results.[21] the lower incidence of hemorrhage in this study may be due to geographical variation. Hemorrhagic strokes are usually associated with loss of consciousness and convulsions. So it is possible that many of these patients might have been referred to higher neurological centers by the local physicians. A comparison of clinical manifestations of stroke in different studies is shown in Table 7, and is found to be similar to the other studies.

Comparison of risk factor assessment in different studies is shown in table 8. In our study the frequency of dyslipidemia in patients with stroke was found to be 79 % (n=79). Dyslipidemia was the

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major risk factor in all the age group. This incidence is very high compared to any other studies. This may be due to geographical variation.

Most of our patients were not on statins at the time of admission. Most of the previous studies has taken 240mg/dl as the cut off value for total cholesterol. In this study it is taken as 200mg/dl. This may be one reason for higher incidence.

Moreover, instead of fasting lipid profile, blood sample at the time of admission was sent for lipid analysis. It is known that lipid levels tend to rise following an acute vascular event. In this study hypertension emerged as the second most important and common risk factor for stroke (n=65, 65%).

The result correlates with that of a study in the urban population of Calcutta in 2001 where hypertension was found to be the most important risk factor.[22] in a study in Himachal Pradesh by Mahajan et al hypertension was found in 62% and in a Pakistan study 68%.[14,10] Diabetes mellitus has long been recognized as a risk factor for vascular disease. It doubles the risk of stroke compared with non-diabetics. In this study diabetes appears to be associated with stroke in about 34% people. 10-14% cases of stroke are attributable to diabetes was found in Framingham study.

The higher prevalence seen in our study may be due to higher prevalence of diabetes in southern India from where most of the population under study hails. The data is in agreement with several other Indian studies.[23] Smoking appears as an important risk factor for ischemic stroke in this study. Fifty three patients (53%) out of total 100 with stroke were smokers. This study correlates with Donnan et al, who found smoking as a strong risk factor for cerebral infarction.[24]

Thirteen (13%) patients had concomitant cardio vascular diseases and 10% patients had atrial fibrillation (AF) which acted as the potential source of cerebral embolism. In Mahajan et al study, AF was present in 6%.[14] it is estimated that approximately 20% ischemic strokes are cardioembolic. So it is obvious from this study that any finding suggestive of underlying heart disease in a patient of stroke should raise the suspicion of ischemic stroke.

In this study 33 patients (33%) had previous history of stroke or transient ischemic attack (TIA). History of previous stroke was present in 10% in Mahajan et al.[14] and 16.6% in Kora SA et al.[25] Actually TIA is a major risk factor for disabling stroke, implying a 13 fold increased risk of stroke in the next one year.[26]

Thirty three (33%) patients were found to be alcoholic. For cerebral infarction chronic heavy drinking and acute intoxication have been associated with an increased risk among young adults.[27] in older adults risk is increased among heavy-drinking men. Some studies have supported a J-shaped dose-response curve between alcohol intake and ischemic stroke risk, with protection for those drinking up to 2 drinks per day and an increased risk for those drinking >5 drinks per day compared with non-drinkers.[27]

The dose-response relationship between alcohol and stroke is consistent with the observed deleterious and beneficial effects of alcohol. The deleterious effects of alcohol for stroke may occur through various mechanisms, including increasing hypertension, hypercoagulable states, and cardiac arrhythmias and reducing cerebral blood flow. However, there is also evidence that light-to moderate alcohol intake can reduce the risk of coronary artery disease, increase HDL cholesterol, and increase endogenous tissue plasminogen activator.[27] the limitation of the study was that the daily quantity and the type of alcohol could not be specified.

Sex wise analysis of risk factors showed high occurrence of dyslipidemia in both sexes. Incidence of HTN was 68.18% in males and 58.82% in females. Figures are comparable with other

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studies. There were no female smokers, but 29.41% were chewing tobacco. 78.78% of males were smokers.

These figures are correlating with other similar studies. Fifty percent of males were alcohol users. Past history of stroke or TIA was more common in males (40.9% vs. 17.64% in females).

Similar data was not available in the other studies mentioned. This may reflect increased number of risk factors in males. Family history was similar in both sexes. Incidence of cardiovascular diseases was more in females (M-21.21%, F-38.23%).

More number of females with rheumatic heart disease (RHD) may be a contributing factor to it. Age wise analysis of the data showed that dyslipidemia is common in all age groups. Hypertension was less prominent in young age (30.76%) compared to middle and old age groups (79.06% and 61.36%). This is because most of the stroke in young was due to RHD.

Alcoholism and smoking were less in young group (both 15.38%). As expected the incidence of diabetes mellitus was less in the young group (7.69%) compared with 51.16% in the middle age. As the hemorrhage group included only 6% patients, comparison between hemorrhage and infarct groups was not logical. All the 6 patients with hemorrhagic stroke were hypertensives.

CONCLUSION: In this study, the clinical profile and the association of risk factors studied were comparable to various studies conducted worldwide and in the Indian subcontinent. Dyslipidemia (81%), hypertension (65%), Tobacco use -smoking or chewing (62%), diabetes mellitus (34%), past history of stroke or TIA (33%), Alcohol use (33%) and cardiovascular diseases (27%) were the major risk factors. Figures were comparable to other similar studies. The higher incidence of dyslipidemia can be attributed to lower cut off values and changing lifestyle of the population.

Stroke being one of the most common cerebrovascular diseases has drawn attention of researchers all over the world. As our knowledge continues to evolve about pathogenesis and therapeutic options, epidemiological aspects and risk factors associated with stroke remain as important as ever. Targeting these risk factors for preventing cerebrovascular accidents in the first place will help reducing the burden of this often disabling disease.

Clinical Presentation	No. of Patients	Percentage
Motor weakness	96	96
Difficulty in speech	52	52
Altered sensorium	40	40
Sensory symptoms	8	8
Visual disturbances	2	2
Sphincter disturbances	16	16
Headache	6	6
Convulsions	5	5
Nasal regurgitation	6	6
Table 1: Pattern of Clinical Presentations		

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Risk Factors	No. of Patients	Percentage
Dyslipidemia	81	81
Hypertension	65	65
Smoking	53	53
Diabetes Mellitus	34	34
PastH/0 TIA or Stroke	33	33
Alcohol	33	33
Family H/o HTN	29	29
H/o cardiovascular Disease	27	27
Family H/o DM	18	18
Family H/o Stroke	14	14
Tobacco chewing	9	9
RHD	7	7
Table 2: Risk Factor Profile of Patients with Stroke		

Clinical Feature	No. of Patients	No. of Patients
Dysarthria	19	19.00%
Motor aphasia	23	23.00%
Sensory aphasia	4	4.00%
Global aphasia	3	3.00%
Cranial nerves VII	47	47.00%
IX and X	3	3.00%
VII, IX and X	2	2.00%
Tone Increased	87	87.00%
Decreased	6	6.00%
Normal	7	7.00%
Athetosis	2	2.00%
Right Hemipariesis	52	52.00%
Left Hemipariesis	40	40.00%
Monopariesis left upper limb	2	2.00%
Monopariesis right upper limb	2	2.00%
Quadriparesis	1	1.00%
Only aphasia	3	3.00%
Sensory Impairment	6	6.00%
Table 3: Pattern of Examination findings		

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Risk Factors	Total n=100	Age≤44 yrs. n=13	Age 45- 65 yrs. n=43	Age≥66YRS n=44	p value
Dyslipidemia	n=81(81%)	n=8(61.5%)	n=40(93%)	n =33(75%)	0.01
HTN	n=65(65%)	n=4(30.76%)	n=34(79.06%)	n=27(61.36%)	0.004
Tobacco use smoking/chewing	n=62(62%)	n=2(15.38%)	n=28(65.11%)	n=32(72.22%)	0.0007
Diabetes	n=34(34%)	n=1(7.69%)	n=22(51.16)	n=11(25%)	0.003
Past H/o TIA or Stroke	n=33(33%)	n=3(23%)	n=11(25.88%)	n=19(43.18%)	0.15
Alcohol use	n=33(33%)	n=2(15.38)	n=20(46.51%)	n=11(25%)	0.03
Cardiovascular diseases	n=27(27%)	n=8(61%)	n=10(23.25%)	n=9(20.45%)	0.01

Table 4: Association of Risk Factors According to Age of the Patients

Risk factor	Total n=100	Males n=66	Females n=34	p value
Dyslipidemia	n=81(81%)	n=58(87.87%)	n=23(67.64%)	0.01
HTN	n=65(65%)	n=45(68.18%)	n=20(58.8%)	0.35
Tobacco use Smoking/chewing	n=62(62%)	n=52(78.7%)	n=10(29.4%)	0.001
Diabetes Mellitus	n=34(34%)	n=25(37.8)	n=9(26.47%)	0.25
Past h/o stroke or TIA	n=33(33%)	n=27(40.9%)	n=6(17.64%)	0.01
Alcohol use	n=33(33%)	n=33(50%)	n=0	0.0002
Family H/o stroke DM or HTN	n=39(39%)	n=26(39.39%)	n=13(38.2%)	0.9
Cardiovascular Diseases	n=27(27%)	n=14(21.21%)	n=13(38.23%)	0.06

Table 5: Association of Risk Factors with Sex of the Patients

	No.	Dyslipidemia.	HTN	Tobacco	DM	Alcohol	Previous Stroke/TIA	RHD	Family history
Infarct	94	77 (81.9%)	59 (62.76%)	57 (60.63%)	32 (34%)	29 (30.85%)	29 (30.85%)	7 (7.44%)	37 (39.36%)
Hemorrhage	6	4 (66.66%)	6 (100%)	4 (66.66%)	2 (33%)	4 (66.66%)	4 (66.66%)	0	2 (33%)

Table 6: Association of Risk Factors with Type Of Stroke

Manifestations	SK Mahajan et al.[14]	Kora SA et al.[25]	Present study
Motor deficits	83%	63%	96%
Dysarthria	25%	-	19%
Altered sensorium	28%	57%	40%
Convulsions	06%	-	05%
Speech disturbances	46%	37%	52%
Sensory disturbances	-	05%	08%
Visual disturbances	-	47%	02%
Cranial nerve involvement	74%	53%	52%

Table 7: Comparison of Clinical Manifestations of Stroke in Different Studies

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Risk factors	Present study	Mahajan et al.[14]	Kora SA et al.[25]	Mumtaz Ali Marwat et al.[10]	Naik M et al.[11]
Dyslipidemia	79%	-	10.5%	13.6%	-
Hypertension	65%	62%	37%	68%	40%
Smoking	53%	60%	52%	13.6%	40.66%
Diabetes	34%	09%	05%	54.5%	06.6%
Past H/o stroke or TIA	33%	10%	16.6%	-	-
Alcohol use	33%	-	21%	-	30.66%
Family H/o hypertension	29%	-	-	-	-
Family H/o Diabetes	18%	-	-	-	-
Family H/o Stroke	14%	-	-	-	-
H/o Cardio vascular disease	13%	09%	10%	32%	06%
Atrial fibrillation	10%	06%	-	-	-
Tobacco chewing	09%	-	-	-	28.66%
RHD	07%	06%	05%	06.8%	-
Table 8: Comparison of Risk Factors in Different Studies					

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