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General Medicine

COMPARATIVE STUDY OF RISK FACTORS BETWEEN ISCHEMIC AND HEMORRHAGIC STROKE

Dr.P.chandrakanth	3rd year postgraduate.Department of general medicine.MGM hospital,Warangal Telangana.
Dr Pavan Kumar*	MD general medicine. PROFESSOR OF MEDICINE Department of general medicine. MGM hospital,Warangal Telangana.*Corresponding Author

ABSTRACT **INTRODUCTION** Stroke or cerebrovascular accident by definition is a syndrome of rapidly developing clinical signs of focal or global disturbance of cerebral circulation with symptoms lasting 24hrs or longer or leading to death with no apparent cause other than of vascular origin In India, for every 55 seconds one case of stroke has been reported. To presume, for every 5 minutes someone is dying of stroke. Identification and control of modifiable risk factors is the best strategy with excellent choices on the anvil to scale down the incidence of stroke.
OBJECTIVES
1)To compare the clinical findings and risk factors in cases of hemorrhagic and ischemic stroke comprehensively.
2)To predict the factors determining in hospital mortality outcome of the stroke
METHODS
This prospective study was conduct at Mahatma Gandhi memorial Hospital,Warangal,representing mostly of low socioeconocmic rural and urban population with low literacy rate. The present study covered 100cases admitted with the confirmed stroke in the ct scan or mri. Patients were enquired about the risk factors like Hypertension , DM, smoking and alcohol. Then patients were submitted for other investigations like complete hemogram, blood sugar, Urea, creatinine, Serum electrolytes,Fasting lipid profile. Stroke cases were classified as ischemic or hemorrhagic by trained physicians using all available data. **RESULTS** In the study 49 cases are ischemic and 44 cases are haemorrhagic and 7 cases accounted for sub arachnoid haemorrhage.majority of cases are in between 66-75 years age group.haemorrhagic stroke occurred in younger people.63% of ischemic stroke has incidence of smoking.Triglyceride levels were higher in ischemic stroke patients.16 moratlities out of 100,in which 11 were due to haemorrhage. **CONCLUSION** Ischemic stroke is common than intraparenchymal bleed i;e haemorrhagic stroke. Males are more affected than females. High levels of LDL-C and Total cholesterol and diastolic blood pressure are independent risk factors for mortality in stroke patients. Although alcohol,low HDL and high LDL are strongly associated with ischemic stroke,the independent risk factors for the development of stroke are high LDL and low HDL. Alcohol and smoking associated with ischemic stroke but has significant impact on development of haemorrhagic stroke.

INTRODUCTION

Stroke or cerebrovascular accident by definition is a syndrome of rapidly developing clinical signs of focal or global disturbance of cerebral circulation with symptoms lasting 24hrs or longer or leading to death with no apparent cause other than of vascular origin.Disorders of cerebral circulation include any disease of the vascular system that causes ischemia or infarction of the brain or spontaneous hemorrhage into the brain or subarachnoid space. In India, for every 55 seconds one case of stroke has been reported. To presume, for every 5 minutes someone is dying of stroke.Identification and control of modifiable risk factors is the best strategy with excellent choices on the anvil to scale down the incidence of stroke. Also for good measures, the number of cases can be decimated by leaps and bounds.

The role of several common factors such as smoking, blood cholesterol, blood glucose, and blood pressure is well established in causing ischemic heart disease but the relations between those risk factors and ischemic stroke have been inconsistent. For example, the role of blood cholesterol in the etiology of ischemic stroke is much less clear.One large collaborative study did not find a clear association between total cholesterol and risk of stroke, but included only fatal strokes and there was no separation of ischemic from hemorrhagic stroke.

In order to better define the risk factors of ischemic stroke, it is necessary to more precisely diagnose the patients using comprehensive investigations including neuroimaging as well as cerebrovascular and cardiac evaluation.

In Developing countries like India it is very difficult for the patients to afford for the post stroke treatment like taking MRI in the aid of thrombolysis, surgeries for ICH, and other supportive therapies like physiotherapy, speech therapy etc. Because of these shortcomings, we are losing more number of patients than in western countries. Clinical trails showed that if the risk factors like Systemic hypertension, Diabetes mellitus, Dyslipidemia, smoking etc. are modified and treated well in advance, then both the morbidity and mortality rates due to stroke can be brought down to an amazingly lower level.

So, it is high time in this new era of medicine to create awareness on these risk factors in a country like ours where health awareness, affordability and medical facilities are low.

This observational study encompasses the risk factors associated with ischemic and hemorrhagic stroke with additional note on the mortality rate.

EPIDEMIOLOGY OF STROKE

Stroke, a highly prevalent condition, exacts a substantial societal toll in the form of the "Dreaded-D's," which are the leading cause of chronic disability, the second leading cause of dementia, and the fourth leading cause of death in the United States . The worldwide impact of stroke seems to be even more pronounced than it is in the U.S., but overall estimates vary widely and may not necessarily be consistently reliable. In the U.S., the prevalence of stroke is roughly 3% of the adult population, which translates to approximately 7 million individuals. Approximately 800,000 primary (first-time) or secondary (recurrent) strokes occur each year in the U.S., with the majority being primary strokes (roughly 600,000) [1]. Of these strokes, approximately 87% are ischemic infarctions, 10% are primary hemorrhages, and 3% are subarachnoid hemorrhage. Worldwide estimates indicate that primary hemorrhages constitute a higher percentage of all strokes, ranging from 10% to 25%. Individuals of Asian, African, and Latin American origin tend to have a higher frequency of primary hemorrhage than persons of European origin [1]. In addition, although primary hemorrhage accounts for 10 to 17% of all strokes in Western countries, in Asian it is approximately 25%.

INCIDENCE

The incidence of stroke rapidly increases with age, doubling for each decade after age 55 . Among adults ages 35 to 44, the incidence of stroke is 30 to 120 of 100,000 per year, and for those ages 65 to 74, the incidence is 670 to 970 of 100,000 per year. Stroke does occur among children, but the incidence in comparison with adults is substantially lower (i.e., approximately 1 to 2.5 of 100,000 per year), and roughly 50 to 75% of strokes among children are as a result of hemorrhage . Sickle cell disease is the most common cause of childhood stroke, with the

highest incidence between ages 2 to 5 years. (2).

PREVALENCE
Prevalence of asymptomatic cerebral ischemia noted on brain imaging among persons aged 55 to 64 years is 11%, and this rises to 22% for those aged 65 to 69 years, 28% for those aged 70 to 74 years, 32% for those aged 75 to 79 years, 40% for those aged 80 to 85 years, and 43% for individuals ≥85 years of age . U.S. data revealed that 17.8% of the U.S. population ≥45 years of age with no prior diagnosis of stroke or TIA reported at least 1 symptom of stroke. Prevalence of these stroke related symptoms were more likely among blacks vs whites, persons with lower income and lower educational attainment, and those with fair to poor perceived health status.

Mortality:
Stroke is the third leading cause of death after Cancer and heart diseases. Stroke mortality increases with age. Figures from various countries vary every year with the incidence in India being one every five minutes.(3) Sudden death is very rarely caused by stroke. One of the causes of sudden death in stroke is intracerebral hemorrhage. Stroke mortality is higher in winter than in summer. Moreover causes of death may be due to other diseases like pneumonia, associated coronary heart diseases, bedsores etc. Disability: In this era that witnesses a parade of scientific and technological triumphs, disability management is still in the grass root level. Among the survivors of stroke, 10% require assistance with activities of daily living, 20% require assistance with ambulation and 16% require institutional care. Disability management requires comprehensive team directed towards educating the patient and the family, preventing complications and physiotherapy which is a costly affair in a developing country like ours.

Materials & Methods of study
This prospective study was conduct at Mahatma Gandhi memorial Hospital,Warangal,representing mostly of low socioeconocmic rural and urban population with low literacy rate. The present study covered 100cases admitted with the confirmed incidence of stroke defined as rapid onset of a neurological deficit or subarachnoid hemorrhage with deficits persisting for at least 24 hrs. (unless either death ensued within 24 hrs. of symptom onset or CT /MRI showed a lesion consistent with the symptoms) and no underlying brain trauma, tumor or infection to cause the symptoms. Stroke cases were classified as ischemic or hemorrhagic by trained physicians using all available data. When abstractor could not determine type of stroke based on physical diagnosis or imaging reports a study physician in consultation with neurologist reviewed the documentation to classify the stroke type.

Inclusion Criteria:
1) Patients with age of more than 45 years were included as most of that age group
2) Patients with CT scan documenting lesion.

Exclusion Criteria:
1. Stroke in young that is < 45 years.
2. Stroke patients with cardioemboli and venous thrombosis.

Methods of study
A detailed history in each case regarding onset, predisposing factors, and nature of stroke was recorded. This was followed by a detailed clinical examination to look for the GCS and the presence of seizures. Patients were enquired about the risk factors like SHT, DM, smoking and alcohol. Then patients were submitted for other investigations like complete hemogram, blood sugar, Urea, creatinine, Serum electrolytes and X ray chest.

A fasting lipid profile was done by automated analyzer in all patients within 48 hrs. onset of stroke. Serum TG level does not change in acute stroke and its measurement within first 48 hours seems to be a good reflection of usual TG concentrations in individual patients. The cardiovascular system was examined and followed by ECHO whenever necessary.

One senior cardiologist performed the echocardiography. Whenever possible, this cardiologist, who was blinded to clinical details, determined presence of thrombus. Special attention was paid to the structure of the mitral, aortic, tricuspid, and pulmonary valves (different grades of regurgitation and stenosis were assessed) and presence of vegetations.

E.C.G. was taken for all the cases to rule out acute coronary syndrome, arrhythmias, evidence for long standing hypertension.

C.T. scan was taken for all cases within 24 hrs. MRI was taken for patients with posterior circulatory stroke. The results of all the data are expressed in tabular forms for analysis.
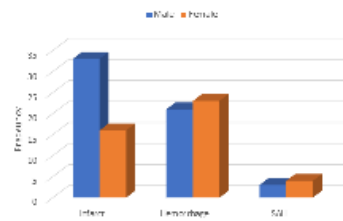
OBSERVATION AND RESULTS
Table 1 : Age Distribution among study population

Age Intervals	Frequency	Percent
46 - 55 Years	10	10
56 - 65 Years	40	40
66 - 75 Years	44	44
76 - 85 Years	6	6
Total	100	100
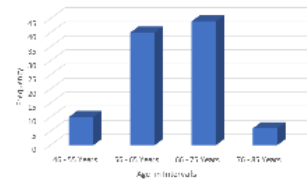
Table 2 : Gender Distribution among study population

|	Infarct	Hemorrhage	SAH
Male	33	21	3
Female	16	23	4

Table 3 : Gender and comorbidity distribution among study population

Variables	Infarct n = 49	Hemorrhage n = 44	SAH n = 7	P- value*
Sex (M:F)	33:16	21:23	3:4	0.108
Hypertension History	19(38.80%)	25(56.80%)	4(57.10%)	0.206
Diabetic history	24(49%)	19(43.20%)	4(57.10%)	0.778
Smoking	31(63.30%)	19(43.20%)	2(28.60%)	0.062
Alcohol	27(55.10)%	13(29.50%)	2(28.60%)	0.032*
Seizures	4(8.20%)	18(40.90%)	3(42.90%)	<0.001*
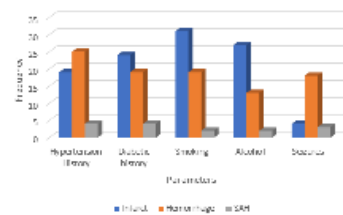
Table 4 : Gender and comorbidity distribution among study population

Variables	Infarct n = 49(M±SD)	Hemorrhage n=44 (M±SD)	SAH n=7 (M±SD)	P value*
Age	67.12±8.03	63.64±7.028	62.14±7.84	0.041
SBP	157.35±13.65	176.82±25.93	174.29±20.95	<0.001
DBP	104.16±13.15	116.77±19.79	119.71±19.88	0.001
HDL	34.49±5.59	42.45±8.42	42.57±9.28	<0.001
LDL	148.49±15.80	135.27±24.21	136.14±23.22	0.008
TC	231.9±17.49	227.32±26.71	227.71±22.23	0.605
TGL	248.69±28.14	243.77±34.18	243.86±32.95	0.735
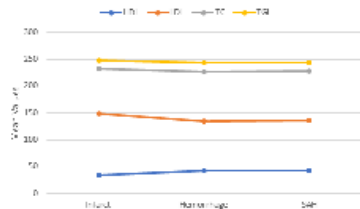
Table 5 : Multivariate analysis of variables predicting the development of stroke

Variables	Signi.	Exp(B)
DBP	0.84	1.089
HDL-C	<0.001	0.76
LDL-C	0.31	1.56
Seizures	0.42	2.93

Table 4 : Variables predicting mortality of stroke patients

Variables	Signi.	OR	Lower limit	Upper limit
DBP	0.042	1.029	0.982	1.078
HDL	0.531	1.051	0.981	1.125
LDL	<0.001	1.092	0.995	1.199
TC	<0.001	1.03	0.978	1.084

DISCUSSION

In the present study there are total 49 cases of ischemia 44 cases of haemorrhage and 7 cases accounted for subarachnoid haemorrhage. Males are more in number than females in the development of stroke. In contrast to one study conducted by Ahmed khan et al(6),where females outnumbered males. Haemorrhagic stroke occurred commonly in females than in males whereas ischemic stroke is most common in females. This could be attributed to significant sex differences in the effect of triglycerides and smoking and physical activity on subclinical atherosclerosis in middle aged women and men.(7) Majority of strokes occurred in between 66-75 years of age group. Mean age for ischemic stroke is 67.12 years. For haemorrhagic stroke it is 63.64 years, for SAH it is 62.14 years. Haemorrhagic stroke occurred in younger people more commonly.The mean age in hospital based study conducted by Lady reading hospital in 2004 was 54.38(6). Regarding smoking 63% of patients with ischemic stroke had significant history of smoking. 43% of patients had significant history of smoking associated with haemorrhagic stroke.14 out of 19 patients have accepted smoking with SI of 200(20 cigars/day for 20 years). This study suggests that increased risk of haemorrhagic stroke, intracranial bleed and SAH in current smokers with a graded increase in risk of smoking on how many cigarettes smoked per day. Regarding Alcohol dependence 13 out of 44 gave positive history for haemorrhagic stroke. In ischemic stroke 27 out of 49 patients gave significant quantity of alcohol intake. Mean systolic BP at the time of arrival to emergency in case of haemorrhagic stroke was 176.82 and ischemic stroke was 157.35 and SAH was 174.29. High systolic bp in haemorrhagic stroke can be explained by the occurrence of cerebral edema in haemorrhagic stroke with the elucidation of cushings reflex. Mean DBP was 116 in haemorrhagic stroke and 104 in ischemic stroke. Correlation between DM and stroke is strikingly more linear in cases of ischemic stroke than with haemorrhagic stroke with percentage being 24% and 19%. Triglyceride levels were higher in patients with ischaemic stroke than with haemorrhagic stroke with 248.69 and 243.77 respectively. This establishes increased relation of triglycerides with ischemia. Mean total cholesterol levels in all subtypes was above 200.The mean level for ischemic stroke was 231.9 which was higher when compared to haemorrhagic stroke 227.3.An increased risk of high cholesterol was associated with ischemic stroke reported in number of studies(4,5) Mean LDL levels in haemorrhagic stroke was 135.27 and 148.49 in ischemic stroke which was significantly higher. Higher level of LDL-C is an important risk factor for atherosclerotic vascular disease. Mean HDL was 42.45 in haemorrhagic and 34.49 in ischemic stroke respectively. One study suggests that association between HDL-C and stroke was more important in atherosclerotic disease.(11). Serum HDL cholesterol was inversely associated with risks of SAH,and infarction but not with intracerebral bleed.(10). High diastolic pressures and high LDL cholesterol and high total cholesterol was associated with mortality in only ischemic stroke.(11,12). In multivariate analysis by logistic regression it was found that there was significant linear association between the development of ischemic stroke and low HDL and high LDL levels.18 out of 44 patients of haemorrhagic stroke

developed seizures(40%) where as only 8% of ischemic stroke patients developed seizures. In patients who had seizures had huge infarcts in CT scan and increased intracranial tension in patients with gtcs. Radio imaging in cases of stroke ct scan brain showed ischemia in 54 patients out of 100 cases of which 20 were lacunar infarcts. Patients with small haemorrhage in ct scan presented with altered level of consciousness in cases of infarct altered level of consciousness was seen only if the infarct was large. Hospital mortality rates revealed that there were total of 16 deaths of which 11 were due to haemorrhage,3 due to ischemia,2 due to SAH.Out of 11 deaths due to haemorrhage 7 were males and 4 were females. Out of 3 deaths due to ischemia 2 were males and one was female.One male and female constituted SAH deaths.The important significant factor in mortality is presence of high BP at the time of presentation. The course of study demonstrated that variables like high DBP High LDLC and high triglycerides showed significant associations with mortality rates on in ischemic stroke. HDL levels had a reasonable effect on the development of stroke but not on mortality rates. The mean systolic BP was higher than overall mean systolic BP in patients who succumbed to death.The mean diastolic bp was also higher in patients who died than overall mean. While looking into smoking as a risk factor for mortality the study found that majority percent of patients who succumbed to death were smokers. Its difficult to associate its association with mortality with haemorrhagic stroke. This study showed more prevalence of ischemic stroke than intraparenchymal bleed with men outnumbering women. Also haemorrhagic stroke occurred more in women. The mean ages for both sexes was found to be 67.12 and 63.64 respectively. Although the univariate analysis suggested smoking, alcohol consumption ,low levels of HDL and high levels of LDL and total cholesterol as risk factors for development of stroke. The multivariate analysis favoured only low HDL and high LDL as the most important significant risk factors. High levels of diastolic bp at the time of admission along with high levels of low density cholesterol and total cholesterol ascertain their impact on the mortality due to stroke. Certain short comings are there due to emergence of diseases like APLA, homocystinemia etc, in the occurrence of stroke ,they need to be excluded.it was not possible due to lack of lab facility. Also due to economic constrains MRI to diagnose the site of aneurysms in cases of SAH could not be done in all cases. This study continues to raise public awareness regarding the risk factors of stroke and prevention of stroke in long run

CONCLUSION
The following are the conclusions of study

- Ischemic stroke is common than intraparenchymal bleed i;e haemorrhagic stroke. Males are more affected than females.
- High levels of LDL-C and Total cholesterol and diastolic blood pressure are independent risk factors for mortality in stroke patients.
- Although alcohol,low HDL and high LDL are strongly associated with ischemic stroke,the independent risk factors for the development of stroke are high LDL and low HDL.
- Alcohol and smoking associated with ischemic stroke but has significant impact on development of haemorrhagic stroke

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