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# A study of risk factors and clinical profile of patients with cerebrovascular stroke

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**Abstract**
**Background:** *Cerebrovascular accident or Stroke is the leading cause of morbidity and mortality in adults. Ischemic stroke is the commonest type of stroke found across the world. The clinical presentation may vary depending on the site of involvement and major etiological factors identified showed hypertension, dyslipidemia, and smoking. We in the present study tried to evaluate the profile of patients with cerebrovascular stroke in a tertiary care hospital.*

**Methods:** *This prospective cross-sectional study was conducted in the Department of General Medicine, Govt. Medical College and Hospital Nalgonda. During the study period, n=50 patients were studied based on the inclusion and exclusion criteria. A detailed general examination was carried out. A comprehensive Neurological examination including fundoscopy was done. The patients were subjected to CT scanning and other biochemical investigations.*

**Results:** *During the study period n=50 patients were studied based on the inclusion and exclusion criteria Out of n=50 patients n=32 (64%) were male and n=18(36%) were female patients. The major risk factors for Cerebrovascular stroke appears to be Hypertension with n=32(64%). 80% of patients presented with the features of motor weakness that included hemiplegia/hemiparesis. Among them, 58% were right-sided weakness and 42% were with left-sided weakness. N=25(50%) of patients with speech involvement that included dysarthria and aphasia. ischemic infarct was commonly found in the parietal region (33.33%), hemorrhagic infarct was found more frequently in the parietal region & basal ganglia in 21.43%.*

**Conclusion:** *This study concluded that ischemic stroke is one of the common than hemorrhagic stroke. Age and male sex are non-modifiable risk factors for cerebrovascular stroke. The modifiable risk factors are hypertension, diabetes mellitus, and hyperlipidemia. Therefore the early diagnosis of blood pressure and its strict control can reduce the burden of stroke in this group of population.*

**Keywords**: *cerebrovascular stroke, Risk Factors, clinical profile.*

## Introduction

WHO defined Stroke as rapidly developing signs of focal or global disturbance in cerebral functions with symptoms lasting for more than 24 hours or leading to death with no apparent cause other than vascular origin [1]. It is the second commonest cause of mortality and the fourth leading cause of disability worldwide. It is estimated that approximately 20 million will suffer from stroke out of which 5 million may die. The rate of mortality due to stroke is very less in developed countries as compared to developing countries were 85.5% of stroke patients die due to lack of treatment[2]. Estimates in India have shown that

0.9 – 4.5% of medical and 9.2 – 30% of neurological admissions in India were due to cerebrovascular stroke[3]. Ischemic stroke which is the common type is due to the narrowing of blood vessels of the head and neck. Narrowing of vessels is due to atherosclerosis and cholesterol deposition. As the lumen of blood vessels narrow progressively stasis of blood occurs which in turn leads to the formation of blood clots. The clots can occlude the vessels (thrombosis) or can dislodge and occlude small vessels distal to site embolism causing ischemic injury to the brain [4]. Hemorrhagic stroke is due to subarachnoid hemorrhage or intracerebral hemorrhage. Subarachnoid hemorrhage is the cause of 1% to 7% of all strokes and intracerebral hemorrhage constitutes 7% to 27% of strokes across the world [5]. Hypertension is the single most modifiable leading cause of cerebral infarction and cerebral hemorrhage [6, 7]. The increase in systolic and diastolic pressure can precipitate stroke. An increase in systolic blood pressure alone can contribute to stroke irrespective of diastolic pressure[8]. Smoking has also been a major risk factor for the development of stroke. It affects both the vessel wall and blood coagulation both. In smokers, the elasticity of blood vessels is reduced. The compliance of blood vessels reduces which in turn increases arterial wall stiffness [9]. Diabetes mellitus, insulin resistance can lead to early progression of atherosclerosis and development of hypertension obesity and dyslipidemia which constitute metabolic syndrome has also been identified as a risk factor for the development of stroke. In India, the prevalence of stroke is found to be more in urban areas than in rural areas. A system of registration of death which was introduced in India in 1998-1999 found 24% of death due to circulatory systems comprising of stroke and the stroke mortality from 1998 – 2004 was 8% [10-11].

## Material and methods

This prospective cross-sectional study was conducted in the Department of General Medicine, Govt. Medical College and Hospital Nalgonda. Institutional Ethical committee permission was obtained for the study. Written consent was obtained from all the participants of the study. The inclusion criteria were all the cases of acute stroke admitted to the Department of General Medicine, Govt. Medical College and Hospital Nalgonda. Exclusion criteria were cases of brain trauma, Infections, neoplasm, stroke in patients less than 20 years of age. After admission, a detailed history was obtained from the patients including the history of risk factors like hypertension, diabetes mellitus, smoking, history of coronary artery disease and TIA. During the study period, n=50 patients were studied based on the inclusion and exclusion criteria. A detailed general examination was carried out. A comprehensive Neurological examination including fundoscopy was done. The patients were subjected to CT scanning. Patients with cerebral infarcts were classified as lacunar infarcts when the size of infarct measured up to 1.5cm on CT. It was called non-lacunar when infarct size was >1.5cms on CT scan of the brain. Intracerebral hemorrhage was diagnosed based on the topographic location in CT scan. In addition to the above, the basic investigations like CBP, Biochemical analysis included RBS, lipid profile, ECG were obtained. If MRI was indicated the patients were referred to the higher center because of lack of MRI at our institute. All the available data was recorded in the MS Excel spreadsheet and analyzed using SPSS version 17 software on windows platform.

## Results

Out of n=50 patients, n=32 (64%) were male and n=18(36%) were female patients the male to female ratio was 1.7:1. The most commonly involved age group appears to be 51 - 60 years with n=14(34%) of patients followed by n=10(20%) in the age group 61-70 years. The 41-50 years were having n=9 (18%) of patients the other details are given in table 1.

**Table 1**: Demographic profile of the patients involved in the study

| Age group [Years] | Male | Female | Total | Percentage |
|---|---|---|---|---|
| 21 – 30 | 2 | 0 | 02 | 04 |
| 31 – 40 | 5 | 3 | 08 | 16 |
| 41 – 50 | 4 | 5 | 09 | 18 |
| 51 – 60 | 10 | 7 | 17 | 34 |
| 61 – 70 | 8 | 2 | 10 | 20 |
| 71 – 80 | 3 | 1 | 04 | 08 |
| Total | 32 | 18 | 50 | 100 |

The risk factors for Cerebrovascular stroke were studied and analyzed in the study. With the highest single risk factor for stroke appears to be Hypertension with n=32(64%) patients having hypertension. The second commonly involved risk factor was diabetes mellitus in n=20(40%) of patients. Out of these two factors n=11(22%) patients were having both hypertension and diabetes mellitus both. N=4(8%) of the patient had concomitant heart disease (coronary artery disease/RHD/Cardiomyopathy/AF). No predisposing risk factor was found in n=5(10%) of patients the other details are given in table 2.

**Table 2:** showing the risk factors for stroke patients in the study

| Risk Factors | No. of patients | Percentage |
|---|---|---|
| Hypertension | 32 | 64 |
| Diabetes | 20 | 40 |
| Smoking | 5 | 10 |
| Dyslipidemia | 10 | 20 |
| Alcohol | 19 | 38 |
| Family history of stroke | 2 | 4 |
| H/O CHD/RHD/ AF | 4 | 8 |
| Obesity | 12 | 12 |
| No-Risk Factor | 5 | 10 |

In this study, 28% of patients were with hemorrhagic stroke and 72% were found with ischemic stroke. Hence the commonest stroke in the study was ischemic stroke shown in table 3.

**Table 3:** showing the type of strokes in the study

| Type of stroke | Male | | Female | | Total | Percentage |
|---|---|---|---|---|---|---|
| | No | % | No | % | | |
| Hemorrhagic stroke | 08 | 25 | 06 | 33.33 | 14 | 28 |
| Ischemic stroke | 24 | 72 | 12 | 66.67 | 36 | 72 |
| Total | 32 | 100 | 18 | 100 | 50 | 100 |

In the present study 80% of patients presented with the features of motor weakness that included hemiplegia/hemiparesis. Among them, 58% were right-sided weakness and 42% were with left-sided weakness. N=25(50%) of patients with speech involvement that included dysarthria and aphasia. The other clinical features are shown in table 4.

**Table 4:** Frequency of clinical features in ischemic stroke patients

| Clinical Features | Percentage (n=50) |
|---|---|
| Motor weakness (Hemiplegia/ Hemiparesis/Monoparesis) | 80% (Rt sided 58%, Lt sided 42%) |
| Gait disturbances/Cerebellar signs | 8% |
| Speech involvement (Aphasia or Dysarthria) | 50% (42% Dysarthria, 8% Aphasia) |
| Headache | 6% |
| Vomiting | 8% |
| Altered sensorium | 10% |
| Seizures | 8% |
| Gait disturbances/Cerebellar signs | 8% |
| Coma | 10% |

In this study, the topographic distribution ischemic infarct was commonly found in the parietal region (33.33%), followed by temporal region 27.78% and basal ganglia in 13.89% frontal in 11.11%. Thus findings were favoring middle cerebral artery territory involvement. The topographic distribution of hemorrhage was found more frequently in basal ganglia 21.43%, parietal region 21.43%, and thalamus 14.29% shown in table 5.

**Table 5:** Showing the Topographical distribution of strokes by CT Scan

| CT scan showing the areas of involvement | Ischemic Stroke | | Total / percentage | Hemorrhagic stroke | | Total / percentage |
|---|---|---|---|---|---|---|
| | Male | Female | | Male | Female | |
| **External capsule** | 1 | 0 | 1 (2.78%) | 0 | 0 | 0 (0.0%) |
| **Internal capsule** | 1 | 1 | 2 (5.55%) | 0 | 1 | 1 (7.14%) |
| **Basal Ganglia** | 3 | 2 | 5 (13.89%) | 2 | 1 | 3 (21.43%) |
| **Frontal** | 2 | 2 | 4 (11.11%) | 0 | 1 | 1 (7.14%) |
| **Parietal** | 9 | 3 | 12 (33.33%) | 2 | 1 | 3 (21.43%) |
| **Temporal** | 7 | 3 | 10 (27.78%) | 1 | 1 | 2 (14.29%) |
| **Occipital** | 0 | 1 | 1(2.78%) | 1 | 0 | 1 (7.14%) |
| **Thalamus** | 1 | 0 | 1 (2.78%) | 1 | 1 | 2 (14.29%) |
| **Cerebellum** | 0 | 0 | 0 (0.0%) | 1 | 0 | 1 (7.14%) |
| **Total** | 24 | 12 | 36 (100%) | 8 | 6 | 14 (100%) |

## Discussion

There have been several studies on stroke however; there are several inconsistencies concerning etiology, risk factors, and non-modifiable risk factors. We in the present study tried to evaluate the risk factors for stroke in this group of population. The youngest patient in our study was 26 years old and the oldest was 74 years old. The mean age was 56.5 years 62% of our patients were older from 51 to 80 years and 38% of the patients were younger from 20-50 years. Aiyar et al;[13] found the mean age of stroke-affected patients was 55.39 years agreeing with the results of the present study. Similarly, Naik M et al; [14] found the mean age of 58.27 years, L Pinheiro et al;[15] found the mean age of the patients with stroke 54.85%. In the present study, there was over all-male preponderance in stroke cases the ratio of M: F was 1.7:1. Aiyar et al; [13] and Kay Sin Tan et al; have found the ratio of M: F was 1.9:1. In the study 64% of patients were with hypertension in a similar study TK Banarjee et al; [16] found that in urban population systemic hypertension emerged as the single most important risk factor. In other studies, Naik M et al; [14] have found hypertension in 40.66% of the patients with stroke. The second risk factor for stroke in this study was Diabetes mellitus in 40% of patients. It has been found that the incidence of stroke in diabetics is double as compared to that of non-diabetic individuals[17]. The Framingham study has shown that the risk of stroke in diabetic patients is from 10 -14%[17]. The higher prevalence of stroke in patients with diabetes mellitus is because the south Indian population generally has higher diabetes as compared to the other regions and our study included the South Indian population. In our study dyslipidemia was found in 20% of patients RP Eapen et al;[18] found dyslipidemia in 17% of patients and AA Sallam et al; [19] found dyslipidemia in 13.9% of the patients with stroke. In this study history of CHD/RHD/AF was found in 8% of patients. RP Eapen et al; [18] found a history of CHD in 9% of patients and IR Kaur et al; [20] have found a history of CHD in 6% of patients of stroke. In this study 72% of patients were with ischemic stroke Devichand et al;[21] found 75% of ischemic stroke and Aiyar et al;[13] found 70% of the stroke to be ischemic type. The hemorrhagic stroke was found in 28% of patients studies have shown hemorrhagic stroke range from 25-32%[13,18,21]. In the study, the most common feature was hemiplegia/hemiparesis in 80% of patients and speech disturbance in 44% of patients it correlates with most of the studies conducted in this field.

Concerning topographical areas involved in the ischemic stroke parietal region was involved in 33.33% of patients followed by temporal in 27.78% and basal ganglia in 13.89%. Eapen et al;[18] have also shown that the most common site was parietal in 5% of their patients followed by basal ganglia and frontal lobe. The area involved showed that the middle cerebral artery was commonly involved as also found by Devichand et al; [21]. The common site of hemorrhage in the present study was in basal ganglia 21.43%, parietal region 21.43%, and thalamus 14.29%. This correlates with studies of Eapen et al; [18] and Aiyer et al;[13] who have shown that the multiple hematoma sites are common in the thalamic and ganglionic region.

## Conclusion

This study concluded that ischemic stroke is one of the common than hemorrhagic stroke. Age and male sex are non-modifiable risk factors for cerebrovascular stroke. The modifiable risk factors are hypertension, diabetes mellitus, and hyperlipidemia. Therefore the early diagnosis of blood pressure and its strict control can reduce the burden of stroke in this group of population.

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