



RISK FACTORS OF STROKE- A STUDY IN A TERTIARY CARE HOSPITAL

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ABSTRACT **Background:** Stroke is the second leading cause of death and a leading cause of disability worldwide. There is a paucity of studies on the types of stroke and risk factors associated with it in Northeast India. Hence, it is imperative that a lot has to be done to overcome the challenges concerning risk factors of stroke. **Objectives:** To determine prevalence of risk factors for stroke and their association with different types of stroke. **Methods:** It was a hospital-based cross-sectional analytical study conducted among 100 patients aged more than 18 years with signs and symptoms of stroke, admitted in a Tertiary care hospital in Manipur from July 2018 to June 2020. A predesigned proforma was used to collect the sociodemographic data, clinical profiles, and information on risk factors for stroke. All investigations, including ECG and CT scan of the brain, were done to determine the type of stroke. Data were analysed using SPSSV21 for windows. **Results:** Males constituted nearly 2/3rd of the patients with stroke and the most common age group was 41-60 years, young stroke was present in 11.0% of the participants. Hypertension (62.0%) and Smoking (62.0%) were the most common risk factors, followed by Alcohol consumption (57.0%). **Conclusion:** It is important to know about modifiable risk factors of stroke which can help in prevention of stroke.

KEYWORDS : Stroke, Hypertension, Smoking.

INTRODUCTION

Stroke is second leading cause of death and third leading cause of disability worldwide^{1,2}. Stroke is defined by World Health Organization (WHO) as “rapidly developing clinical signs of focal (or global) disturbance of cerebral function lasting more than 24 hours or leading to death, with no apparent cause other than of vascular origin”. Globally, there are over 13.7 million new strokes each year as per 2016 statistics³. One in four people over age 25 years will have a stroke in their lifetime³. There are over 80 million people currently living who have experienced a stroke globally. 10% of people currently living have experienced a stroke under 44 years of age. Five and half million people die of stroke annually and 4% of deaths are under 44 years age. Over 116 million years of healthy life is lost each year due to stroke.

Globally 70% of stroke and 87% of both stroke-related deaths and disability-adjusted life years occur in low and middle income countries⁴. Over last 4 decades, strokes incidence has more than doubled in these countries. During same time incidence of stroke declined by 42% in high-income countries. On average stroke occurs 15 years earlier in people living in low middle income countries compared to those in high-income countries.

In stroke, haemorrhagic cause is high in Asian countries due to high prevalence of hypertension which may have been masked or partially treated. The estimated percentage of haemorrhagic stroke in western population is 10% of all stroke cases and in India it is 17.7%-32% of all strokes⁵.

At present diagnosis of stroke is mostly based on typical clinical presentation along with CT scan brain or MRI. Ischemic stroke is found to be more common compared to haemorrhagic stroke in many parts of world. Age, gender, race, ethnicity, and heredity have been identified as non-modifiable risk factors of stroke. Some common modifiable risk factors are Hypertension, Diabetes, Tobacco use, high Cholesterol, Atrial fibrillation, Alcohol. Various lifestyle factors have been associated with increased risk of stroke like obesity, physical activity, diet.

Even though large number of studies shows that ischemic stroke is the common type of stroke in the world, there is a lacuna about types of strokes in northeast India. Hence it is imperative that a lot of work has to be done to overcome current challenges concerning risk factors and their association with stroke. This study was carried out to create

awareness among healthcare professionals and patients regarding risk factors and management of stroke.

Objective:

1. To determine the prevalence of risk factors of stroke.
2. To assess the association of risk factors with different types of strokes.

METHODS:**Study Design**

A hospital based cross sectional analytical study was conducted at Shija Hospitals and Research Institute, Imphal, Manipur over a period of 24 months (June 2018 to July 2020).

Inclusion Criteria

All stroke patients (age 18 years and above) irrespective of etiology admitted in hospital were included. All were subjected to detailed history and information was collected in preformed proforma and undergo through general and systemic examination

Exclusion Criteria**Patients with**

1. Sign and symptoms of stroke resolved within 24 hours.
2. History of accident/trauma.
3. Tumour of brain.
4. Sepsis.
5. Psychological disorder.

Sample Size

Assuming hypertension to be present in 62% among the patients with stroke with an absolute precision of 10% at 95% confidence level, the sample was estimated to be 90.

The sample size was calculated using the formula

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Where

- n: Sample size
- Z: Statistics for a level of confidence (For the level of confidence of 95%, which is conventional, Z value is 1.96).
- P: Expected prevalence (P=62%).
- d: Absolute precision (d=10%).
- $n = Z^2 p(1-p)/d^2 = 3.84 * 62 * 32 / 10^2 = 90$

Considering a non response rate of 10%, the total sample size was estimated to be 100 patients with stroke.

All the patients who were admitted in the hospital with stroke during the study period were included in the study.

The study was conducted after approval from ethical committee.

Study Procedure

A predesigned proforma with special reference to assess the risk factors associated with stroke was used to collected data from the study participants. Focused clinical examination was carried out. A detailed systemic examination including weight, height, waist circumference, blood pressure, heart rate was recorded. The patients were classified as having ischaemic or haemorrhagic stroke definitive on the basis of CT scan brain. Haematological investigations such as Haemoglobin (Hb), Total leucocyte count (TLC), Random blood sugar, Blood urea, serum creatinine, serum Sodium, ESR, PCV, VDRL, Lipid profile estimation, ECG, Chest Xray was done. BMI was calculated based on Weight (Kg)/Height (m²) and WHO (Asia pacific classification of BMI was used).

Study variables

1. Independent variables Non-modifiable risk factors

- Age.
- Gender.
- Family history of stroke.

2. Modifiable risk factors

- Smoking.
- Alcoholism.
- Obesity.
- Dyslipidaemia.
- Diabetes/Hypertension/Heart disease.
- Migraine.
- OCP use.

- Lab findings.
- ECG findings.
- Types of Stroke.

Outcome variables

- Proportion of patients with specific risk factors.
- Association of risk factors with types of stroke.

Statistical Analysis

Data were entered and analysed by using SPSS version 21.01BM. Categorical variable like gender, smoking status, alcoholic status etc. are expressed as frequency and percentages. Continuous variables like age, haemoglobin level are expressed as mean (standard deviation) or median (interquartile range) depending upon the type of distribution. The association between risk factors and the type of stroke are tested using Chi square test or independent student's t-test. A p value of <0.05 was considered statistically significant.

Results

A total of 100 patients admitted with stroke were included in the study during the study duration. The mean age of patients was 54.2 (11.7) years with a minimum of 31 years and maximum 80 years

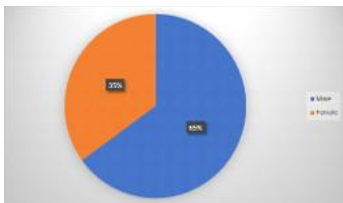


Figure 1. Gender distribution of the study participants (N=100)
Nearly 65% patients were males.

Table 1. Age distribution of the study participants (N=100)

Age (years)	Frequency (n)	Percentage
< 40	11	11.0
41-50	32	32.0
51-60	30	30.0
61-70	15	15.0
>70	12	12.0
Total	100	100.0

Most common age group is 41-60 years.

Table 2. Distribution of participants by physical status (N=100)

	Frequency (n)	Percentage
BMI category		
Underweight	2	2.0
Normal	42	42.0
Overweight	22	22.0
Obese	34	34.0
Waist circumference (Central obesity)		
Yes	32	32.0
No	68	68.0

Obesity was present in 34% of the patients and overweight was present in 22.0% of the patients. Central obesity was present in 32% of the patients.

Table 3. Behavioural characteristics of the study participants (N=100)

	Frequency (n)	Percentage
Alcohol consumption		
Yes	57	57.0
No	43	43.0
Smoking		
Yes	62	62.0
No	38	38.0
Type of diet		
Non vegetarian	82	82.0
vegetarian	18	18.0

Consumption of alcohol and smoking was present in 57% and 62% respectively, only 12% of patients were consuming vegetarian diet.

Table 4. Chronic diseases among the study participants (N=100)

	Frequency	Percentage
Hypertension		
Yes	62	62.0
No	38	38.0
Diabetes mellitus		
Yes	27	27.0
No	73	73.0
Coronary artery disease		
Yes	14	14.0
No	86	86.0

Hypertension was present in 62.0% of the patients and diabetes mellitus was present in 27.0% of the patients. Coronary artery disease was present in 14.0% of the patients.

Table 5. Clinical features among the study participants (N=100)

Clinical features	Frequency	Percentage
Hemiplegia/Hemiparesis	95	95.0
Loss of consciousness	56	56.0
Headache	41	41.0
Vomiting	38	38.0
Blurred vision	29	29.0
Seizures	17	17.0
Atrial fibrillation	3	3.0
Migraine	2	2.0

Hemiplegia/Hemiparesis was present on all (95/100) patients, followed by loss of consciousness and headache which was present in 56.0% and 41.0% of the patients. Atrial fibrillation was observed in 3 patients.

Table 6. Laboratory features among the study participants.

Clinical features	Frequency	Percentage
Dyslipidaemia	54	54.0
Abnormal ECG	35	35.0
Abnormal X-ray	14	14.0
Abnormal RFT	13	13.0
Abnormal LFT	8	8.0

Dyslipidaemia was present in 54.0% of the patients and abnormal ECG

was present in 34 patients. Abnormal Xray, RFT, LFT was noted in 14.0%, 13.0%, and 8.0% of the patients respectively.

Table 7. Summary of the risk factors of stroke among the study participants (N=100)

Non-modifiable risk factors	Modifiable risk factors	
	Risk factors	% (95% CI)
Gender (Male>Females)	Non vegetarian diet	82.0 (73.5-88.6)
Age (41-60 years)	Hypertension	62.0 (52.2-72.1)
Family H/O stroke: 28% (95% CI: 19.9%- 37.4%)	Smoking	62.0 (52.2-71.1)
	Alcohol	57.0 (47.2-66.4)
	Dyslipidaemia	54.0 (44.2-63.6)
	Obesity	34.0 (25.2-43.7)
	Diabetes mellitus	27.0 (19.0-36.3)
	CAD	14.0 (8.2-21.9)

Hypertension (62.0%) and smoking (62.0%) were the most common risk factors followed by alcohol consumption (57.0%).

Table 8. Association of socio-demographic characteristics with the type of stroke (N=100)

Characteristics	Type of stroke		p value
	Haemorrhagic n (%)	Ischaemic n (%)	
Gender			
Male	40 (69.0)	25 (59.5)	0.329
Female	18 (31.0)	17 (40.5)	
Age in years [mean (SD)]	52.8 (11.0)	55.8 (12.5)	0.212
BMI category			
Underweight	0	2 (4.8)	0.420
Normal	25 (43.1)	17 (40.5)	
Overweight	13 (22.4)	9 (21.4)	
Obese	20 (34.5)	14 (33.3)	
Socio economic status			
Class I	24 (41.4)	19 (45.2)	0.143
Class II	22 (37.9)	21 (50.0)	
Class III	4 (6.9)	1 (2.4)	
Class IV	8 (13.8)	1 (2.4)	

There was no significant association between sociodemographic status and the type stroke ($p>0.05$).

Table 9. Association of behavioural characteristics with the type of stroke (N=100)

Characteristics	Type of stroke		p value
	Haemorrhagic n (%)	Ischaemic n (%)	
Smoking status			
Yes	37 (63.8)	25 (59.5)	0.664
No	21 (36.2)	17 (40.5)	
Alcohol consumption			
Yes	35 (60.3)	22 (52.4)	0.427
No	23 (39.7)	20 (47.6)	

Smoking and alcohol were not statistically associated with the type of stroke. ($p>0.05$)

Table 10. Association of chronic disease with the type of stroke (N=100).

Characteristics	Type of stroke		p value
	Haemorrhagic n (%)	Ischaemic n (%)	
Hypertension			
Yes	42 (72.4)	20 (47.6)	0.012
No	16 (27.6)	22 (52.4)	
Diabetes mellitus			
Yes	19 (32.8)	8 (19.0)	0.127
No	39 (67.2)	34 (81.0)	
Coronary artery disease			

Yes	10 (17.2)	4 (9.5)	0.272
No	48 (82.8)	38 (90.5)	

Hypertension was more in haemorrhagic stroke patients 72.4% vs 47.6% comparing with ischaemic stroke. It was found to be statistically significant ($p=0.012$). However no significant association was observed for diabetes mellitus and coronary artery disease ($p>0.05$)

DISCUSSION

There is a paucity of studies on types of stroke and the risk factors associated with it in northeast part of country. Our study provides an important resource to progress our understanding of the causes of stroke, both in estimating the contribution of known modifiable risk factors for the stroke and in identifying the commonest type of stroke in this part of country.

Our study showed that prevalence of stroke was predominant among males (65.0%) which gives a M:F ratio of 1.9:1. The result is consistent with the studies conducted by Bidya OP et al⁶, Kumar HHN et al⁸, Kumar A et al and Manorenj S et al⁷ in different parts of country. This might be due to the fact that females are neglected usually and seek care only when terminally ill. Moreover, smoking which is one of the modifiable risk factors for stroke is higher among the males, which may be a contributing factor. This might well explain the reason behind male predominance among other studies conducted across the globe^{9,10}.

The mean age of presentation was 54.1 (11.7) years in our study with most of stroke occurring between 41-60 years. The results correlate with other studies where the commonest age group was fifth + sixth decade⁷.

According to world stroke statistics, the risk of having a stroke more than doubles each decade after 55 years of age³. The Framingham study showed that as a person ages, his or her risk of stroke increases from 22% to 32% to 83% in the age group 45 to 55, 55 to 64, and 65 to 74 years respectively¹¹.

The prevalence of young stroke in our study population was 11.0% which is slightly lower than the studies conducted by Abdu sallam et al¹², Gauri et al¹³ which reported of young stroke to be 16.26%, 13.6% respectively. The younger age stroke is on increase in recent years and is largely due to the risk in obesity related lifestyle risk factors among younger people, including hypertension, diabetes and high cholesterol. Haemorrhagic stroke was present in 58% of patients in our study and this result is contrasting to the results of various other studies where ischaemic stroke is the commonest type. The only correlation was found with a study from Nepal by Maskey A et al¹⁴ and Marak P¹⁵ where haemorrhagic stroke was the commonest type. The reason for this is debatable.

The common risk factors in our study were hypertension and smoking which was present in 62.0% of the participants. Majority of the studies have reported hypertension to be the most common risk factors for stroke. The interesting finding in our study was that smoking was also found to be the most common risk factor and it can be argued that prevalence of smoking is higher in this region hence the reason for the stroke, V.M Bhat et al¹⁶ and Md Jalal uddin et al¹⁷ also suggested a strong relationship between cigarette smoking and acute ischaemic stroke. Similarly, alcoholism was noted in 57% of the participants which is well explained by many other studies and it is also significantly associated with hypertension and hence the stroke. Diabetes mellitus was present in 27% of the study participants. Diabetes has long been recognized as a risk factor for various vascular disease and it doubles the risk of stroke compared with non diabetics¹⁸. In this study diabetes (27.0%) appears to be associated with stroke, which correlates with the Framingham study¹¹.

Hypertension was significantly associated with haemorrhagic stroke and is consistent with the study conducted by Subburaj T et al. Similarly, seizures and Atrial fibrillation were more common in haemorrhagic stroke patients in our study which correlates with his study findings¹⁹.

Strengths + Limitations

The study was conducted with a representative sample who were admitted with stroke and hence it makes the study generalized to the similar setting. As it goes with all cross-sectional studies, there might be problem with ascertaining certain risk factor with the disease condition, which might be a limitation of study.

CONCLUSION

Males constituted nearly 2/3rd of patients with stroke and the most common age group was 41-60 years. Young stroke was present in 11.0% of participants. Haemorrhagic stroke (58.0%) was the most common type of stroke. Hypertension (62.0%) and smoking (62.0%) were the most common risk factors followed by alcohol consumption (57.0%). The other modifiable risk factors were non-vegetarian diet, dyslipidaemia, obesity, diabetes mellitus and coronary artery disease. Hypertension, seizure and atrial fibrillation were associated with haemorrhagic stroke. More such studies are required at multicentric settings for better understanding of the risk factors for the occurrence of stroke and for exploring the ways of preventing it.

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