



ORIGINAL RESEARCH PAPER

Neurology

A STUDY ON RISK FACTORS ASSESSMENT AMONG PATIENTS WITH STROKE ATTENDING A TERTIARY CARE HOSPITAL

KEY WORDS: Stroke, Risk Factors, Hypertension, Smoking

Naveen P

Final Year Resident, Department of Neurology, Meenakshi Medical College Hospital and Research Institute, Kanchipuram.

Ramakrishnan*

Assistant professor, Department of Neurology, Meenakshi Medical College Hospital and Research Institute, Kanchipuram. *Corresponding Author

Sailaja Y

Second Year Resident, Department of Neurology, Meenakshi Medical College Hospital and Research Institute, Kanchipuram

ABSTRACT

Background: Stroke is a leading cause of death and disability in developing countries. The risk factors of stroke were known to all for several decades but still the proportion of stroke patients presenting with common risk factors, remains a challenge to health care professionals. Thus this study was planned to assess the proportion of each risk factors among the patients presenting with stroke.

Methods: Prospective study was conducted among patients admitted in department of Neurology and general medicine in Meenakshi Medical College Hospital and Research Institute, Kanchipuram during the period of November 2016 to November 2017. All patients above the age of 15 years, who presented with clinical features suggestive of stroke, were subjected to CT scan of brain and patients with evidence of acute ischemic infarct were included. Patients with hemorrhagic stroke and CT imaging showing venous infarcts were excluded. 490 patients were included and data was collected and analyzed using SPSS version 16.

Results: Majority of patients (55.9%) were males. 51-60 years was the common age of presentation with stroke. Smoking and alcohol consumption were reported among 44.28% and 40.4% of patients, respectively. Hypertension was reported in 65.71% and diabetes mellitus was reported in 44.08% of patients. TGL was found to be more than 150 mg/dl in 85.44% of patients. 64.285 of patients had abnormal ECG findings and among them 77.14% had abnormal ECHO findings.

Conclusion: Proportion of risk factors of stroke still remains high and also showing increasing trend in the recent times. Thus, it is very important to act promptly in order to reduce the occurrence of modifiable risk factors like smoking, hypertension, diabetes and dyslipidemia not only among the vulnerable people but also in the general population.

Introduction

Stroke is one of the most common cause of death and leading cause of long-term disability. The World Health Organization defines the Stroke in an adult as "rapidly developing clinical symptoms and signs of focal (at times global) disturbance of cerebral function, lasting for more than 24 hours or leading to death with no apparent cause other than that of vascular origin" [1] It places great demands on family members and caregivers. Stroke is an enormous financial burden not only for the families of patients but also for society as a whole.[2] Improved control of stroke risk factors and early presentation at a hospital will provide greater opportunity for effective stroke treatment and prevention.[3]

More than two-thirds of the global burden of stroke is borne by developing countries, where the average age of patients with stroke is 15 years younger than in developed countries [4]. The available limited data indicate that stroke occurring in young people is more often atherothrombotic in origin in developing countries,[5] in contrast with developed countries where arterial dissection and cardioembolic a etiologies predominate. [6]

Epidemiological studies have identified several risk factors for ischemic stroke, including hypertension, smoking, diabetes mellitus, and hemostatic factors [7]. However, few prospective studies have characterized risk factors for specific subtypes of ischemic stroke [8].

Majority of the risk factors of stroke were scientifically proven several decades ago and still the stroke cases present with the common and known risk factors. Thus this study was planned to assess the proportion of stroke patients presenting with common risk factors like hypertension, diabetes mellitus, dyslipidemia and cardiac dysfunction.

Materials and methods

This prospective observational study was conducted among the patients admitted in department of Neurology and general medicine in Meenakshi Medical College Hospital and Research Institute, Kanchipuram during the period of November 2016 to November 2017.

All the patients above the age of 15 years, who presented with clinical features suggestive of stroke, were subjected to CT scan of

brain and patients with evidence of acute ischemic infarct were included in this study. Patients with hemorrhagic stroke and CT imaging showing venous infarcts were excluded from the study. In total, 490 patients were included in this study. This study was approved by Institutional Ethical Committee of Meenakshi Medical College Hospital and Research Institute, Kanchipuram.

All patients with history and clinical features of stroke were investigated with CT brain plain and among them patients with evidence of acute ischemic infarct were contacted and after getting an informed and written consent from the patients or their relatives, patients were included in this study. Clinical history of the patients including age, sex, and history related to risk factors like hypertension, diabetes mellitus, hypercholesterolemia, valvular heart disease, smoking and alcoholism were collected using a proforma. Each patient was examined thoroughly and they underwent serum lipid profile, blood glucose and cardiac evaluation with ECG and ECHO, if needed.

The data was entered using Microsoft excel and the analysis was done using Statistical Package for Social Sciences (SPSS) version 16.

Results:

Majority of males (36.2%) were in the age group between 51 and 60 years followed by 41 to 50 years (28.5%). Whereas majority of females (38%) were in the age group between 51 and 60 years followed by 61 to 70 years (29.7%). Around two thirds of males (64.7%) were in the age group between 41 and 60 years and two-third of females (65.7%) were in the age group between 51 and 70 years. The mean age of patients in this study was 54.6 + 11.4 years and in males it was 52.4 + 12.2 years and in females it was 56.8 + 10.6 years. (Table 1)

Table 1: Age and sex distribution of patients with stroke

Age Group in Years	No. of Males (%)	No. of Females (%)
15 – 40 years	28 (10.2%)	18 (8.3%)
41 – 50 years	78 (28.5%)	42 (19.4%)
51 – 60 years	99 (36.2%)	82 (38.0%)
61 – 70 years	55 (20.1%)	64 (29.7%)
> 70 years	14 (5.0%)	10 (4.6%)
Total	274 (100%)	216 (100%)

Among the 490 patients with stroke, there were 217 (44.28%) patients who gave history of smoking and 198 (40.4%) patients who gave history of alcohol consumption. Among the patients with habit of smoking, only 3.67% of patients were smoking for less than five years and 8.78% and 31.83% of patients gave history of smoking for 5-10 years and more than 10 years, respectively. Among the patients with habit of alcohol consumption, only 4.08% of patients were consuming alcohol for less than five years and 9.39% and 26.93% of patients gave history of alcohol consumption for 5-10 years and more than 10 years, respectively. (Table 2)

Table 2: Proportion of patients with habit of smoking and alcohol consumption

Variables	No. of patients	Percentage
Duration of Smoking		
< 5 years	18	3.67
5- 10 years	43	8.78
> 10 years	156	31.83
Total	217	44.28
Duration of Alcohol consumption		
< 5 years	20	4.08
5- 10 years	46	9.39
> 10 years	132	26.93
Total	198	40.4

Prevalence of hypertension among the stroke patients was reported as 65.71%. Also newly diagnosed cases of hypertension were reported as 9.79%. Among the already known hypertensive patients there were 11.03%, 20% and 24.89% of patients were on treatment for hypertension for less than one year, 1-5 years and more than 5 years, respectively.

Prevalence of diabetes mellitus among the stroke patients was reported as 44.08%. Also newly diagnosed cases of diabetes mellitus were reported as 4.89%. Among the already known diabetes mellitus patients there were 6.94%, 14.69% and 17.56% of patients were on treatment for diabetes mellitus for less than one year, 1-5 years and more than 5 years, respectively. (Table 3)

Table 3: Proportion of Hypertension and Diabetes mellitus among patients with stroke

Variables	No. of patients	Percentage
Duration of Hypertension		
Detected now	48	9.79
0 - 1 years	54	11.03
1 - 5 years	98	20.00
> 5 years	122	24.89
Total	322	65.71
Duration of diabetes mellitus		
Detected now	24	4.89
0 - 1 years	34	6.94
1 - 5 years	72	14.69
> 5 years	86	17.56
Total	216	44.08

Fasting lipid profile was done for 426 patients. Among them 37.79% of patients were reported to have LDL less than 160 mg/dl and the 62.21% of patients were having LDL more than or equal to 160 mg/dl. TGL was found to be more than 200 mg/dl in 50.47% of patients and no patients were found with TGL more than 400 mg/dl. HDL, less than 40 mg/dl were reported in 59.62% of patients and the rest 40.38% of patients were reported to have HDL more than 40 mg/dl. (Table 4)

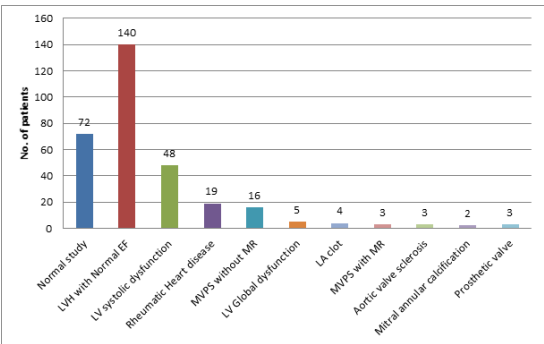
Table 4: Proportion of Dyslipidemia among patients with stroke

Variables	No. of patients	Percentage
Fasting lipid profile (N=426)		
LDL range		
< 100 mg/dl	22	5.16
100 – 129 mg/dl	38	8.92

130 – 159 mg/dl	101	23.71
160 – 189 mg/dl	187	43.90
> 190 mg/dl	78	18.31
TGL range		
< 150 mg/dl	62	14.56
150 – 199 mg/dl	149	34.97
200-399 mg/dl	215	50.47
HDL range		
> 40 mg/dl	172	40.38
< 40 mg/dl	254	59.62

ECG was done for all the patients and reported to be abnormal in 315 (64.28%) patients. ECHO was done to all the patients in whom abnormal ECG was reported. Among them ECHO reports were normal in 72(22.86%) patients. Left ventricular hypertrophy with normal ejection fraction, Left ventricular systolic dysfunction, Rheumatic heart disease and Mitral valve prolapsed syndrome without mitral regurgitation was noted in 140(44.44%), 48(15.25%), 19(6.03%) and 16(5.08%) patients with stroke. (Figure 1)

Figure 1: proportion of patients with various findings in ECHO



Discussion

Age distribution based on sex

Age distribution based on the sex in our study showed that among the males, 64.7% of cases were in the age group between 41 and 60 years. But 67.7% females were in the age group between 51 and 70 years. The mean age in our study was 52.4 ± 12.2 for men, 56.8 ± 10.6 for women.

This was concordant with Lausanne stroke registry [9] which confirmed the general male predominance in stroke with female preponderance in extreme age groups like less than 30 years and more than 70 years. Barcelona Stroke Registry [10] reported the mean age of men and women as 64.80±11.97 years and 68.54±13.92 years, respectively.

Women were more affected due to stroke beyond 50 to 60 years, one decade later than that of men. It may be related to protective benefits of reproductive age group before 50 years of age, longer life expectancy in females and earlier death in men with vascular risk factors.

Smoking

It raises the blood fibrinogen, enhances platelet aggregation and increases the hematocrit level and blood viscosity. Smoking cessation substantially decreases the risk for subsequent stroke. In this study, 217(44.6%) patients gave history of smoking currently. 71.8% of these patients were smokers for more than 10 years duration. Among 217 patients, these 217 patients, 212 were males and 5 were females.

According to Bogousslavsky et al, cigarette smoking was found in 45.6% of patients in his stroke series [9]. Hamburg stroke data bank reported 44% of smoking among ischemic stroke patients [11]. Our study showed similar results to these studies. 36.2% of ischemic stroke patients were smokers in Barcelona stroke registry [12] and Emre Kumral et al reported that 28% of patients gave history of smoking in their study [13]

Alcohol consumption

Chronic heavy alcohol consumption and binge drinking may exert their harmful effects through changes in Blood Pressure, platelet aggregation, blood coagulation and the level of triglycerides.

In this study, 198 patients were alcoholic (40.4%) among the total 490 patients. Of these 198 patients, 186 cases were males and 12 cases were females. Around 70% of these patients were alcoholic for more than 10 years duration.

Hypertension

Arterial hypertension is defined as systolic BP greater than 140 mm Hg or diastolic BP greater than 90 mm Hg. It is one of the most important and effective modifiable risk factors. But unfortunately it remains untreated or under treated [14]. It predisposes to ischemic stroke by aggravating atherosclerosis and increases the relative risk for stroke three to four fold. Blood pressure treatment, resulting in modest reduction in SBP of 10 to 12 mm Hg and 5 to 6 mm Hg Diastolic BP is associated with a 38% reduction in stroke incidence [15].

In our study, hypertension was reported among 65.71% of patients and around 25% of these patients had hypertension of more than five years duration. Marti-Vilalta et al in 1998 reported that 53% of patients with ischemic stroke had hypertension [10]. According to Lausanne stroke registry, hypertension was seen in 45.5% of patients [9]. The increased incidence of hypertension in our study could be due to general increase in HT population in Southeast Asia.

According to Trivandrum Stroke Registry, hypertension was seen in 80% of stroke patients, which was slightly higher than our study [16] and Emre Kumral et al [13] reported hypertension in 62% of patients with ischemic stroke, which was almost similar to our study.

Diabetes mellitus

DM is associated with stroke, independently of the various cardiovascular risk factors which usually accompany this disease. Indeed, the relative risk of stroke of all ages was 1.8 for diabetic men and 3.0 for diabetic women [17]

In our study, diabetes mellitus was reported in 44.08% of patients. 39% of these patients had diabetes for more than five years duration. 11% of these patients were diagnosed to have DM during this present admission, after having ruled out the possibility of stress induced hyperglycemia with the help of HbA1C and follow up blood glucose testing after one week to ten days.

Barcelona stroke registry documented 21% of patients with diabetes among the ischemic strokes [10] and Emre Kumral et al reported 26% of diabetes among ischemic stroke patient. [13] The increase in diabetic population in our study reflected the general increase in the incidence of diabetes in the Southeast Asia.

Hyperlipidemia

In this study, 62.21% patients had LDL value of more than 160 mg/dl, 50.47% of patients had TGL level of more than 200 mg/dl and 59.62% of patients had low HDL volume of less than 40 mg/dl.

Tribolet et al [18] reported that 70% of patients had hyperlipidemia in their study, which is consistent with our findings. Also hypercholesterolemia was found in 14.5% of patients with ischemic stroke patients in Lausanne stroke registry[9] The more number of patients with hyperlipidemia in our study could be due to increase in the prevalence of metabolic syndrome and the changing life style among the Indian population.

Echocardiography

Echocardiography showed LVH with normal EF in more than 40% of patients. LV systolic dysfunction was seen in 15.2% of patients. MVPS and rheumatic heart disease were found in 6% of patients each. ECHO was normal in 22.8% of patients. LA clot was seen in 1.27% of patients.

According to Lausanne stroke registry, LVH was found in 26.3%, left ventricular dysfunction was seen in 17.08%, MVPS was demonstrated in 20.2% of patients and ECHO was normal in 41%. [9] Tribolet et al reported that out of the 853 patients admitted with ischemic stroke, dilated cardiomyopathy was seen in 19.1%, previous anterior wall myocardial infarction in 6.2%, left ventricular systolic dysfunction in 3.7%, mitral valve stenosis with enlarged left atria in 1.6%, intra cardiac masses in 0.5% and valvular prosthesis in 0.2%. [18]

Conclusion

Even though the risk factors of stroke were widely known for a long time, still the prevalence of risk factors has not yet brought down and it remains a challenge to health care professionals. As a result of it, the burden of stroke still remains high and also showing increasing trend in the recent times. Thus, it is very important to act promptly in order to reduce the occurrence of modifiable risk factors like smoking, hypertension, diabetes and dyslipidemia not only among the vulnerable people but also in the general population.

Acknowledgements

I would like to thank all, who has guided me by extending their knowledge and experience right from the inception to the completion of the work. Also, I would like to acknowledge the medical superintendent and all the staffs, for their support during the study period. Last but not least I am thankful to my study participants, without whom, this study would not have been possible.

Declarations

Funding: No funding source

Conflict of interest: None declared

Ethical approval: This study was registered with Institutional Human Ethical Committee

References

1. World Health Organization, International Task Force for Prevention of Coronary Heart Disease and Stroke, Etiology and Epidemiology of Stroke,1980; WHO; Geneva;Switzerland
2. National Heart Foundation of Australia. Heart, Stroke and Vascular Disease-Australian Facts 1999 Report. Canberra, Australia: Australian Institute of Health and Welfare; 1999.
3. The National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group. Tissue plasminogen activator for acute ischemic stroke. N Engl J Med. 1995;333:1581-1587.
4. 2 Truelsen T, Bonita R, Jamrozik K. Surveillance of stroke: a global perspective. Int J Epidemiol 2001;30:S11-16.
5. 3 Nayak SD, Nair M, Radhakrishnan K, et al. Ischaemic stroke in the young adult: clinical features, risk factors and outcome. Natl Med J India 1997;10:107-12.
6. Adams HP Jr, Kappelle LJ, Biller J, et al. Ischemic stroke in young adults. Experience in 329 patients enrolled in the Iowa Registry of stroke in young adults. Arch Neurol 1995;52:491-5.
7. Folsom AR, Rosamond WD, Shahar E, Cooper LS, Aleksic N, Nieto FJ, Rasmussen ML, Wu KK. Prospective study of markers of hemostatic function with risk of ischemic stroke. The Atherosclerosis Risk in Communities (ARIC) Study Investigators. Circulation. 1999;100:736-742.
8. Davis BR, Vogt T, Frost PH, Burlando A, Cohen J, Wilson A, Brass LM, Frishman W, Price T, Stamler J. Risk factors for stroke and type of stroke in persons with isolated systolic hypertension. Systolic Hypertension in the Elderly Program Cooperative Research Group. Stroke. 1998;29:1333-1340.
9. Bogousslavsky J, Van Melle G, Regli F: The Lausanne Stroke Registry: Analysis of 1,000 consecutive patients with first stroke. Stroke 1988;19:1083-1092
10. Marti - Vilalta J L. Arboix A. The Barcelona Stroke Registry: Eur Neurol 1999; 41; 135- 142.
11. Spitzer K, Becker V, Thie A, Kunze K. The Hamburg Stroke Data Bank: goals, design and preliminary results. Journal of neurology. 1989 Mar 1;236(3):139-44.
12. Das SK, Banerjee TK, Biswas A et al. A prospective community-based study of stroke in Kolkata, India. Stroke 2007;38:906-10
13. Kumral E, Bayulkem G. Spectrum of single and multiple corona radiata infarcts: Clinical/MRI correlations. Journal of Stroke and Cerebrovascular Diseases. 2003 Mar 1;12(2):66-73.
14. Hajjar I, Kotchen T. Trends in the prevalence, awareness, treatment and control of hypertension in the United States, JAMA; 2003; Vol 290; 199-206.
15. MacMahon S. Rodgers . Primary and secondary prevention of stroke, Clin Exp Hypertens, 1996; Vol 18: 537-546.
16. Sapna E. Sridharan, MD; J.P. Unnikrishnan, MPhil; Sajith Sukumaran, MD; P.N. Sylaja, MD; S. Dinesh Nayak, MD; P. Sankara Sarma, PhD Kurupath Radhakrishnan, MD, Incidence, Types, Risk Factors, and Outcome of Stroke in a Developing Country, The Trivandrum Stroke Registry, Stroke. 2009;40:1212
17. Shinton R. Beevers G: Meta-analysis of relation between cigarette smoking and stroke. BMJ 1989;298:789-94.
18. Tiago Tribolet de Abreu, Sónia Mateus and José Correia, Therapy Implications of Transthoracic Echocardiography in Acute Ischemic Stroke patients, Stroke 2005;36;1565-1566