Original Article

MULTICENTRE BASED STUDY ON STRATIFICATION OF MODIFIABLE RISK FACTORS IN STROKE

Arif Herekar[1], Saima Hilal[2]

ABSTRACT

***Objective*:** To study the frequency of modifiable risk factors in ischaemic and haemorrhagic strokes.

Methodology: It is a prospective descriptive multicentre based study conducted in the neurology ward of Civil Hospital and Neuro Diagnostic Centre, Karachi from July 2007 to February 2008. A questionnaire was prepared in accordance with the objective of the study. It contained detailed history, neurological examination and investigations. Every patient enrolled in the study underwent either a CT Scan, an MRI or an MRA to establish the diagnosis of a stroke and establishing the cause of the stroke whether it was ischaemic or haemorrhagic. Risk factors for these patients and their age of onset was also studied.

***Results*:** Fifty patients with established diagnosis of stroke were selected; forty-three suffered from ischaemic stroke (86%) while seven fell into the category of haemorrhagic stroke (14%). Thirty-two (64%) patients had more than one risk factor. The age range of patients was from 17 to 80 years. Out of 50 patients twenty-nine (58%) were males and twenty-one (42%) were females. The commonest risk factor of ischemic stroke was hypertension (32.61%) followed by diabetes (23.91%), hyperlipidaemia (23.91%) & ischaemic heart disease (19.57%) where as in haemorrhagic stroke it was also high blood pressure (71.4%) and aneurysm (28.57%).

Conclusion: Majority of the patients studied had one or more modifiable risk factors. The commonest risk factor was hypertension 32.61% followed by diabetes 23.91%.

KEYWORDS: Risk factors, Strokes, Hypertension, Diabetes Mellitus.

Pak J Med Sci October - December 2008 (Part-II) Vol. 24 No. 6 853-856

How to cite this article:

Herekar A, Hilal S. Multicentre Based Study on Stratification of Modifiable Risk Factors in Stroke. Pak J Med Sci 2008;24(6):853-56.

1. Arif Herekar,
2. Saima Hilal, M.B.B.S.,
Medical Officer,
1-2: Dow University of Health Sciences,
Karachi, Pakistan.

Correspondence

Dr. Saima Hilal,
House No. 365,
Block-14,
Gulistan-e-Jauhar,
Karachi - Pakistan.
Email: saima.hilal@gmail.com

* Received for Publication: July 4, 2008

* Revision Received: September 25, 2008

* 2nd Revision Received: September 30, 2008

* Final Revision Accepted: October 10, 2008

INTRODUCTION

Stroke is a clinical syndrome describing a range of disorders which result in focal cerebral ischaemia. A uniform definition of stroke is vital for epidemiological studies. The traditional definition of stroke, devised by the World Health Organisation in the 1970s,[1] is a "neurological deficit of cerebrovascular cause that persists beyond 24 hours or is interrupted by death within 24 hours". This definition includes stroke due to either cerebral infarction or intracerebral and subarachnoid haemorrhage. An arbitrary time window of 24 hour distinguishes stroke from transient ischaemic attack (TIA), which has the same definition but is

defined as a neurological deficit lasting less than 24 hours. The two are best thought of as a continuum, and in fact neuroimaging studies show that many cases of TIA are accompanied by cerebral infarction.

The term cerebrovascular disease covers all vascular disease affecting the brain including stroke, vascular dementia, and asymptomatic cerebrovascular disease. Usually the risk factors can be divided into modifiable and non-modifiable types. The major modifiable types include high blood pressure, abnormal blood lipids,[2] tobacco use, heart diseases,[3] physical inactivity, obesity, unhealthy diets, and diabetes mellitus.[4,5] The other modifiable types are low socioeconomic status, mental ill health, psycho social stress, use of alcohol and certain medications, etc. On the other hand, the non modifiable risk factors include age, sex, ethnicity,[6] family history and previous stroke, TIA, and heart attack.

The purpose of this study was to establish the frequency of various modifiable risk factors in ischaemic and haermorrhagic strokes in Karachi.[7,8] This is an initial report of a study which is still continuing.

METHODOLOGY

This prospective observational study was carried out at the department of neurology at DOW University of Health Sciences and the Neuro Diagnostic Centre (private) between July 2007 to February 2008.

Stroke was defined as focal neurological deficit due to vascular lesions that may be cerebral infarction or haemorrhage, confirmed on C.T. scan, resulting in partial or complete loss of motor and sensory activities.[9] Patients meeting the criteria for stroke, irrespective of sex were included. Only those patients with abnormal blood lipids, high blood pressure, coronary heart disease and diabetes were included in the study. Patients were labeled hypertensive, if there were three or more readings of systolic BP >140 or diastolic BP >95mm of Hg. either before or at arrival.[10-13]

Diabetes mellitus was diagnosed using WHO criteria and dyslipidaemia according to NCEP III guidelines.[6,14] Patients were labeled as hyperlipidaemic if total serum LDL-cholesterol was more than 240mg/dl and triglycerides level was more than 200 iu/dl.[11,15,16] Patients with past history of coronary artery disease, diagnosed and confirmed by the consultants were also recorded.[17,18]

Investigation reports regarding blood pressure, fasting blood sugars and random blood sugars, cholesterol and triglyceride levels were also considered. Association of risk factors with stroke were studied. The duration from the onset to the date of reporting of risk factor was also recorded (Table-I).

Socioeconomic contribution to stroke: Patients were categorized in four classes; i.e., lower class, middle class, upper middle class and upper class. Lower social class had income up to PKR five thousand per month; middle class income was between six thousand to ten thousand per month, while upper middle class had income between eleven thousand to twenty thousand per month. All those whose monthly income was more than twenty thousand per month were included in upper class.

RESULTS

Fifty patients with established diagnosis of stroke were selected; 43 suffered from ischaemic stroke (86%) while seven fell into the category of haemorrhagic stroke (14%). The ischaemic strokes were incidentally all arterial. Out of 50 patients twenty-nine (58%) were males and twenty-one (42%) were females. Forty-five (90%) patients had one or more modifiable risk factor. Age ranged from 17 to 80 years. Thirty-two (64%) patients had more than one risk factor (Table-II). The commonest risk factor was

Table-I: Duration of Risk Factors (n=50)

Years	*Hyper-tension*	*Diabetes Mellitus*	*Hyperli-pidaemia*	*Total*
>15	4	3	1	8
10-15	4	6	4	14
5-10	7	4	7	18
< 5	15	9	10	34
Total	30	22	22	74

Table-II: Risk factors for stroke (n=50 patients)

Risk factors	*No. of Patients (%)*
None	5 (10)
HTN + DM	6 (12)
HTN + Hl	6 (12)
HTN	5 (10)
DM + Hl	4 (8)
Hl	4 (8)
HTN + DM + Hl + IHD	3 (6)
HTN + DM + IHD	3 (6)
HT + IHD	3 (6)
IHD	3 (6)
DM + IHD	2 (4)
HTN + Hl + IHD	2 (4)
All	1 (2)
DM + Hl + IHD	1 (2)
DM	1 (2)
HTN + DM + Hl	1 (2)

Abbreviations: HTN = Hypertension
Hl = Hyperlipidaemia, DM = Diabetes Mellitus
IHD = Ischaemic Heart Disease.

hypertension (32.61%) followed by diabetes (23.91%), hyperlipidaemia (23.91%) and ischemic heart disease (19.57%) (Table-III). Co-existing risk factors included hyperlipidaemia, hypertension, diabetes, addiction and ischaemic heart disease (Table II). The common risk factors in different socioeconomic group are given in (Table IV).

DISCUSSION

Stroke is a major cause of morbidity and mortality with disability and social dependence.[19] In western world, stroke is the third commonest cause of death after heart disease and all cancers.[20] According to WHO report 2003, the DALY's (disability adjusted life years) lost due to stroke per 1000 population of standardized age is 5-9 years for Pakistan, 10-14 for India, 15-19 for Russia and 20 or above for Mongolia.

Table-III: Distribution of Risk Factors

Risk Factor	*Total (%)*
Hypertension	30(32.61)
Diabetes	22(23.91)
Hyperlipidaemia	22(23.91)
Ischaemic Heart Disease	18(19.57)
Total	92(100.00)

* Some patients had more than one risk factor.

The risk of death depends on type of stroke. Transient Ischaemic Attack (TIA) has the best outcome followed by stroke caused by carotid stenosis. The blockage of any artery with rupture of cerebral blood vessel is the most dangerous of all. Hypertension in this hospital based study was the most common risk factor for stroke which was present in 32.61% of the whole sampling.[21-23] The findings are similar to that reported by Lickner H (40.06%).[24] Diabetes was the second most important risk factor present in 23.91% of patients.[25,26] These findings correlate with findings of Basharat RA[27] (21%) and Liaquat A (27%).[28] Hyperlipidaemia was found in twenty-two (23.91%) of patients and was the 3rd most common risk factor for stroke in this study which is similar to those reported by Tanveer A (16%).[29] Ischaemic heart disease was fourth most common risk factor of stroke in 19.57% of patients.[30-32]

Several factors have been implicated for coexistence of diabetes and hypertension. The possible reasons are the diabetogenic[33] effect of antihypertensive drugs and insulin induced retention of sodium by Kidneys.

Limitation of the study: As per this hospital based study, the prevalence of stroke was more in lower class 64.86%. This may not be a true reflection of the prevalence in the community because people from the affluent and upper middle class seldom visit the public health care facility but seek care in the private sectors.

Table-IV: Stroke patients with risk factors in different socio-economic group (n = 50)

Socio economic status	*Hypertension (%)*	*Diabetes Mellitus (%)*	*Hyperlipidaemia (%)*
Lower class	21 (28.38)	15 (20.27)	12 (16.22)
Middle class	1 (1.35)	1 (1.35)	2 (2.70)
Upper middle class	7 (9.46)	6 (8.11)	7 (9.46)
Upper class	1 (1.35)	0 (0)	1 (1.35)

*Some patients had more than one risk factor.

However, this study reconfirms that hypertension, diabetes and hyperlipidaemias are the most common risk factors. If we need to reduce the prevalence of stroke, we need to control hypertension and diabetes besides taking care of hyperlipidaemia.

CONCLUSION

Hypertension, diabetes, hyperlipidaemia and ischaemic heart disease are the major modifiable risk factors as shown in this study. This will continue to challenge the clinicians. It requires proper management and counseling of patients. All major risk factors are modifiable but need awareness, education, elimination of poverty, regular use of medication and changes in life style.

REFERENCES

1. World Health Organisation. Cerebrovascular Disorders (Offset Publications). Geneva: World Health Organization. ISBN 9241700432 1978.
2. Hebert PR, Gaziano JM, Chan KS. Cholesterol lowering with statins drugs. Risk of stroke, and total mortality. An overview of randomized trials. JAMA 1997;278(4):313-21.
3. Goldstein LB, Adams R, Becker K. Primary prevention of Ischaemic Stroke. AHA Scientific Statement. Circulation 2001;103:163-82.
4. Clark CM, Perry RC. Type II diabetes and macrovascular disease. Epidemiology and etiology. Am Heart J 1999;138:930-3.
5. Elkind MS, Sacco RL. Stroke risk factors and stroke prevention. Semi Neurol 1998;18:429-39.
6. Hu FB, Manson JE, Stampfer MJ. Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. N Engl J Med 2001;345:790-797.
7. Hasan SR, Ghouri ASK. Frequency of known risk factors of stroke and its outcome in patients admitted in Sindh Government Qatar Hospital Karachi. Pak J Med Sci 2007;23(4):634-6.
8. Rafique BA, Yousuf M, Iqbal J, Khan MM. Frequency of known risk factors for stroke in poor patients admitted to Lahore General Hospital in 2000. Pak J Med Sci 2002;18:280-3.
9. Khan J. Frequency of hypertension in stroke patients presenting at Ayub Teaching Hospital. J Ayub Med Coll Abbottabad 2006;18(1):36-9.
10. Iqbal F, Hussain S, Hassan M. Hypertension, diabetes mellitus and hypercholesterolaemia as risk factors for stroke. Pak J Med Res 2003;42(1):17-22.
11. Westin S. Thresholds for normal blood pressure and serum cholesterol. BMJ 2005;330:1461-62.
12. He J, Whelton PK. Epidemiology and prevention of hypertension. Med Clin North Am 1997;81:1077.
13. The sixth report of the joint National Committee on Prevention, Detection, Evaluation and treatment of high blood pressure. Arch Intern Med 1997;157:2413-45.
14. Expert panel on Detection, Evaluation and Treatment of high Blood Cholesterol in Adults. Executive summary of the third report of the National **C**holesterol Education program (NCEP) Expert panel on Detection, Evaluation and Treatment of high Blood Cholesterol in Adults (Adults treatment panel III) JAMA 2001;285:2486-96.
15. Meyer JS, Rogers RL, Mortel KF, Judd BW. Hyperlipidemia is a risk factor for decreased cerebral perfusion and stroke. Arch Neurol 1987;44(4):418-22.
16. Iso HJ Jr, Wentworth D. Serum cholesterol levels and six year mortality from stroke in 360,977 men screened for the multiple risk factors intervention trial. N Engl J Med 1989;320:904-10.
17. Schwartz SM, Reidy MA. Factors important in arterial narrowing. J Hyperten Suppl 1996;14(5):S71-81.
18. Stampfer MJ, Hu FB, Manson JE, Rimm EB, Willett WC. Primary prevention of coronary heart disease in women through diet and lifestyle. N Engl J Med 2000;343:16-22.
19. Safeer M, Tariq M, Rehman U. Frequency of risk factors of cerebral infarction in stroke patients. A study of 100 cases in Naseer Teaching Hospital, Peshawar. Pak J Med Sci 2008;24(1):109-13.
20. Aho K, Harmsen P, Hateno S, Maarqyardsen T, Smirnov VE, Strasser T. On behalf of the participants in the W.H.O collaborative study on control of stroke in the community. Cerebrovascular diseases in the community. Results of the W.H.O collaborative study. Bulletin of W.H.O 1998;58:113-30.
21. Basharat RA, Yousuf M, Iqbal J, Khan MM. Frequency of known risk factors for Stroke in poor patients admitted to Lahore General Hospital in 2000. Pak J Med Sci 2002;18(4):280-3.
22. Khan H, Afridi AK, Ashraf S. A hospital based study on stratification of risk factors of stroke in Peshawar. Pak J Med Sci 2006;22(3):304-7.
23. Khan SN, Vohra EA. Risk factors for stroke: A hospital based study. Pak J Med Sci 2007;23(1):17-22.
24. Lickener H, Eiswarth CC, Hachinski VC. Risk factors for stroke in Australian population. Wien Klin Wochensher 1993;105(14):393-403.
25. Kuller LH, Dorman JS, Wolf PA. Cerebrovascular disease and diabetes. Chapter XVIII in Diabetes in America, Harris MI, Hamman RF, eds. NIH publ 1985;85-1468.
26. Abbott RD, Donahue RP, MacMahon SW, Reed DM, Yano K. Diabetes and the risk of stroke. The Honolulu Heart Program. JAMA 1987;257:949-52.
27. Basharat RA, Elahi A, Tariq M, Saeed A. One month audit of stroke at PIMS. Pak J Neurol 1999;56(1):12-5.
28. Liaqat A, Jamil H, Alam MS. Risk factors in stroke. J Coll Physician Surg Pak 1996;7:7-10.
29. Tanveer A. Localization and management in Cerebrovascular accident: A comparison of clinical assessment versus C.T Scan (Dissertation). J Coll Physician Surg Pak 1996;5-6.
30. Ali L, Jameel H, Shah MA. Risk factors in stroke. J Coll Physicians Surg Pak 1997;7:7-10.
31. Javed MA, Ahmed M, Sial MSH, Naheed T. Risk factors in stroke. Pak J Neurol 1998;4:55-8.
32. Alam I, Haider I, Wahab F, Khan W, Taqweem MA, Nowsherwan. Risk factors stratification in 100 patients of acute stroke. J Postgrad Med Ins 2004;18(4):583-91.
33. Skafor ET, Lethell HO, Salinin KT, Aberg H. Doantihypertensive drugs precipitate diabetes inpredisposed men? BMJ 1989;298:1147-52.