

Original Article

Frequency of Risk Factors in Patients with Acute Stroke at Tertiary Care Hospital Bahawalpur

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Objective: To determine the frequency of risk factors in patients with acute stroke at tertiary care hospital Bahawalpur.

Study design: Cross sectional/observational study

Place and duration: This study was done in medical wards of Bahawal Victoria Hospital Bahawalpur from June 2012 to December 2012.

Materials and Methods: Patients having age 18 years or above, presenting with history of stroke and admitted in medical wards were included in this study. CT scan brain was done at the time of admission. For identification of risk factors, a detail history and relevant investigations were done in same hospital. All findings were entered in individual proforma.

Results: A total of 142 patients were included in the study. The mean age of patients was 56.79 ± 13.943 years. 79 (55.63%) patients were male and 63 (44.37%) patients were female. In risk factors, 88 (62%) patients had hypertension, 30 (21.1%) patients had diabetes mellitus, 26 (18.3%) patients had history of smoking, 9 (6.3%) patients had ischemic heart disease, 14 (9.9%) patients had previous stroke and 19 (13.4%) patients had high cholesterol level.

Conclusion: We found that hypertension, diabetes mellitus, smoking and high cholesterol level were major modifiable risk factors in the development of stroke. Controlling of these risk factors might reduce the risk of stroke.

Key words: Risk factors in stroke, Stroke, Ischemic stroke, Hemorrhagic stroke.

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Introduction

Stroke is the second largest contributor to mortality worldwide and the primary cause of disability among the elderly in Western Europe and the United States.¹ Among the various types of stroke, ischemic stroke is the most prominent and accounts for the most long-term disability.² A stroke is caused by a portion of the brain being starved of oxygen. This can be due to a burst blood vessel or a clot blocking a blood vessel. The lack of oxygen causes damage to the brain. The long-term effects of a stroke depend on what part of the brain and how much tissue is affected.³

In the past several decades, case series, case-control studies, and prospective cohort studies have successfully identified non-modifiable risk markers for stroke, such as age, gender, race, ethnicity, heredity and several well-established modifiable risk factors for stroke.⁴ Hypertension, atrial fibrillation, other cardiac diseases, hyperlipidemia, diabetes, cigarette smoking, physical inactivity, carotid stenosis, and transient ischemic attack (TIA) are all potentially treatable conditions that predispose to stroke.⁵ Stroke in young

adults has been related to mechanisms different to those found in older individuals.⁶ Cardio-embolism, arteritis, atherosclerosis, fibro-muscular dysplasia, and pregnancy related angiopathy, migrainous arteriopathy, anemia, antiphospholipid syndrome, arterial dissection, arterio-venous malformations, the consumption of toxic substances, elevated homocysteine level, inflammation, deficiency of clotting factors and head trauma have been described.⁷ Age represents the strongest non-modifiable risk factor associated with ischemic stroke, while hypertension constitutes the most important modifiable cerebrovascular risk factor.⁸

The likelihood of a poor outcome after stroke increases with increasing age, with the coexistence of diseases such as ischemic heart disease and diabetes mellitus, and with increasing size of the infarct.⁹ Mortality in the first month after stroke has been reported to range from 2.5% in patients with lacunar infarcts to 78% in patients with space-occupying hemispheric infarction and hemorrhage.¹⁰

Stroke risk can be reduced by blood pressure control, lipid lowering agents, surgery for carotid stenosis, warfarin for atrial fibrillation, and antiplatelet agents.¹¹

The aim of this study was to determine the frequency of various risk factors for both ischemic and hemorrhage stroke and to compare these risk factors among male and female patients hospitalized at Bahawal Victoria Hospital Bahawalpur.

Materials and Methods

This was a cross sectional/observational study in patients presenting with clinical picture of stroke (sudden loss of consciousness and/or focal neurological deficit), having age of 18 years or above and admitted to medical wards of Bahawal Victoria Hospital Bahawalpur during the period of June 2012 to December 2012. Approval from the Hospital Ethics Committee was taken prior to conducting the study. CT scan of brain was done in all patients and MRI brain was obtained where it was needed. Patients having pathology other than stroke like brain tumors, meningitis, viral or bacterial encephalitis, multiple sclerosis, brain abscess, subdural/extradural hematoma and metabolic derangements that could explain focal neurologic deficit e.g. hypoglycemia were excluded from the study. Already designed proforma was used to record the detailed medical history, risk factors for stroke, stroke type (ischemic/hemorrhage), pre-existing medical problems, laboratory and radiological investigations as reported by concerned department. The results were analyzed by using SPSS software 14.0. Hypertension was defined as already diagnosed case of hypertension (based on two blood pressure readings of $>140/90$ mmHg) or electrocardiographic or echocardiographic evidence of hypertension. Abnormal cholesterol elevation was defined as documentation of elevated cholesterol (>200 mg/dL) during hospital stay. A smoker was defined as a person who smoked at least one cigarette per day for the preceding three months or more or had tobacco in any form. Diabetes mellitus was defined as already diagnosed case of diabetes mellitus or sustained blood sugar elevation (fasting blood sugar >110 mg/dL or random blood sugar >150 mg/dL after 2 hours of meal) throughout hospitalization. Cardiac diseases were defined as ischemic heart disease, cardiac arrhythmia, valvular heart disease, infective endocarditis or congestive cardiac failure present on past medical history or diagnosed during hospitalization. Recurrent stroke was considered if a patient had history of previous stroke/TIA.

Results

142 patients were included in the study. The mean age of patients was 56.79 years with standard deviation of 13.943 years as shown in table no: I.

Out of 142 patients, 79 (55.63%) patients were male and 63 (44.37%) patients were female. Frequency of different risk factors among male and female is shown in table no: II.

Out of 142 patients, 64 (45.07%) patients had cerebral infarction, 68 (47.89%) patients had intracerebral hemorrhage and 10 (7.04%) patients had subarachnoid hemorrhage. The frequency of risk factors in different kinds of stroke is shown in table no: III.

Table I: Mean age of patients in years

Total no of patients (n)	Valid	142
	Missing	0
Mean age of patients in years		56.79
Std. Deviation		13.943
Median age of patients in years		59.00
Mode age of patients in years		60
Range of age of patients in years		68
Minimum age of patients in years		22
Maximum age of patients in years		90

Table No II: Frequency of risk factors among male and female

Risk factors	no & (%) within male gender	no & (%) within female gender	no & (%) within total
Total no of cases	n=79 (55.63%)	n=63 (44.37%)	n=142 (100%)
Hypertension	48(60.8%)	40(63.5%)	88(62%)
Diabetes mellitus	15(19%)	15(23.8%)	30(21.1%)
Smoking	22(27.8%)	4(6.3%)	26(18.3%)
Ischemic heart disease	4(5.1%)	5(7.9%)	9(6.3%)
Previous stroke	7(8.9%)	7(11.1%)	14(9.9%)
High cholesterol	13(16.5%)	6(9.5%)	19(13.4%)

Table no III: Risk factors in different types of stroke

Risk factors	no & (%) within cerebral infarction	no & (%) within cerebral hemorrhage	no & (%) within subarachnoid hemorrhage
Total no of cases	n=64 (45.07%)	n=68 (47.89%)	n=10 (7.04%)
Hypertension	36(56.3%)	48(70.6%)	4(40%)
Diabetes mellitus	14(21.9%)	14(20.6%)	2(20%)

Smoking	14(21.9%)	11(16.2%)	1(10%)
Ischemic heart disease	5(7.8%)	4(5.9%)	0(0%)
Previous stroke	11(17.2%)	3(4.4%)	0(0%)
High cholesterol	7(10.9%)	12(17.6%)	0(0%)

Discussion

Despite new post-stroke management strategies, the stroke remains a serious disease affecting not only the patient but also his family as well. Although, identifying the risk factors and modifying them remain the most important means of reducing stroke incidence. Increasing age is clearly the strongest determinant of the number of new cases of stroke each year.

The mean age of patients in our study was 56.79 ± 13.94 years. This mean age was comparable to the mean age in other studies in our region. A study done by Zahir Shah¹² at Peshawar noticed that mean presenting age of stroke patients was 55 years. The mean age in our study was lower than the studies conducted in west where the mean age was between 76 to 80 years.^{13,14} A study conducted by al Rajeh S et al¹⁵ in Saudi Arabia showed that the mean age of the patients was 63 ± 17 years that was slightly higher than the mean age in our study.

In our study, the male predominated than female and the frequency of male was 55.63% and frequency of female was 44.37%. A study conducted by Awada A et al¹⁶ showed that males (68%) outnumbered females. Similar results were found in another study conducted by al Rajeh S et al¹⁵ showed that males predominated in all types of stroke.

In our study the proportion of cerebral infarction was 45%, the proportion of cerebral hemorrhage was 48% and proportion of subarachnoid hemorrhage was 7.04%. In the local studies, the proportion of cerebral infarction varied between 55% to 70.1% and 60% to 84% in the western studies while most of the local, South Asian and the eastern studies have suggested that the intracerebral hemorrhage was 21% to 45% as compared in the west i.e. 10% to 20%.¹⁷⁻¹⁹ Our results were comparable to the South Asian and other eastern countries.

HTN is the most prevalent and powerful modifiable risk factor for both ischemic and hemorrhagic stroke, irrespective of geographic region and ethnic group. Persons with HTN are about 3 or 4 times more likely to have a stroke. Risk of stroke can be reduced by at least 38% with control of hypertension. Stroke risk mainly depends on the quality of blood pressure control as evidenced by studies from UK and Netherlands.^{20,21} The

frequency of hypertension in our patients was 62% and it was equally prevalent both in female gender (63.5%) and male gender (60.8%).

The proportion of diabetes mellitus in our patients was 21.1% which is slightly more predominant in female than male. The results in our study were comparable to the results of some studies while other studies showed high frequency of diabetes mellitus. Jorgensen et al²² reported the frequency of diabetes mellitus equal to 20%. We found that diabetes mellitus in patients increase the likelihood of ischemic stroke by more than 3-folds. DM was an independent predictor of ischemic stroke in both woman and men.

A study conducted by Awada A et al¹⁶ showed that ischemic strokes accounted for 76% of the cases and one third of them were lacunar infarcts. Most of the hemorrhagic strokes were intracerebral hemorrhages (ICHs) and only 2% of all strokes were subarachnoid hemorrhages (SAHs). Hypertension (52%), diabetes mellitus (41%) and cardiac disorders were common risk factors. In another study conducted by al Rajeh S et al¹⁵ showed that ischemic strokes accounted for 76.2%, and these included 52% with large and 24.2% with lacunar infarctions. Intracerebral hemorrhage was detected in 21.4%, whereas subarachnoid hemorrhage was rare (2.4%). Hypertension (56%), diabetes mellitus (42%), and cardiomyopathy (33%) were common risk factors. A study conducted by Haheim LL et al²³ showed that diastolic blood pressure was a stronger predictor for stroke incidence and mortality than systolic blood pressure. Smoking was a stronger predictor of mortality than of incidence. However, there was no dose-response relation among smokers by increased cigarette consumption. Total serum cholesterol was a significant risk factor for stroke mortality and of borderline significance for stroke incidence.

The estimated risk for stroke among smokers in our study patients was 18.3%, and was an independent risk factor among males (94.7%), whereas local studies showed somewhat similar pattern of smoking as those in the west.²⁴ The frequency of IHD found in our population was 6.3%, while western series had much higher frequency (35% to 72%).²⁵ High cholesterol level ($>200\text{mg/dL}$) was found to be an independent predictor for both ischemic (10.9%) and hemorrhagic (17.6%) strokes in our study. It is logical to assume that presence of high cholesterol would increase the likelihood of hemorrhagic and ischemic stroke as this is an important risk factor for atherosclerosis. History of previous stroke/TIA was shown to be associated with increased recurrent ischemic strokes in hypertensive patients and we found history of previous stroke in 9.9% of patients.

Conclusion

Frequency of various risk factors was high in this study which is similar to that observed in both developing and developed countries and we found that hypertension, diabetes mellitus, smoking and high cholesterol level were major modifiable risk factors in the development of stroke. Reduction of blood pressure, cessation of smoking, lowering cholesterol, and increased physical activity at leisure time might reduce the risk of both ischemic and hemorrhagic stroke.

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