

AGE AND GENDER SPECIFIC STROKE RISK FACTORS IN A TEACHING HOSPITAL IN KHYBER PAKHTUNKHWA

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ABSTRACT

Objective: To determine age and gender specific stroke risk factors in a teaching hospital in Khyber Pakhtunkhwa.

Methodology: A hospital based descriptive study was performed in medical units of Lady Reading Hospital, Peshawar, from July 2011 to March 2012. A total of 100 patients of 18 years and above and of both genders were included. Study patients with first-ever acute stroke were divided into three groups; Group A young adult (<40 years), Group B, middle-aged (40-60 years), and Group C elderly (>60 years). In these 03 groups, stroke risk factors were compared. Patients were assessed for hypertension, ischemic heart disease, hyperlipidemia, atrial fibrillation, diabetes mellitus and smoking. SPSS version 18.0 was used for statistical analysis.

Results: A sample of 100 patients was taken comprising 68% males and 32% females. Study patients had a mean age of 63.44 ± 13.849 . There were 08 patients in Group A, 29 in Group B, and 63 patients in Group C. Overall, hypertension was found in (62%), followed by smoking (47%), coronary artery disease (33%), diabetes mellitus (28%), hyperlipidemia (24%) and atrial fibrillation (21%).

Conclusion: Pattern of distribution of stroke risk factors is age and gender specific. Majority were found to have hypertension. Hypertension, diabetes mellitus, atrial fibrillation and hyperlipidemia differ significantly among the 03 age groups. Smoking was significantly different in males and females.

Key words: Stroke, Acute Ischemic Stroke, Cerebral infarction, Cerebral hemorrhage, Stroke risk factors.

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INTRODUCTION

Being a significant health issue worldwide, stroke is a major cause of social incapability, intellectual disability and death. As estimated by World Health Organization, worldwide each year, about 15 million people sustain stroke. Out of these, about 5 million die and an additional 5 million are left handicapped^{1,2}. The incidence of stroke in United States is about 795,000 annually³.

The magnitude of stroke is anticipated to rise in low to middle earnings countries. In contrast the incidence of stroke has decreased in the West⁴.

Stroke is defined as a focal neurological deficit (hemiplegia/ hemiparesis, dysphasia, cranial nerve palsies or hemianopia) of sudden onset that persists beyond 24 hours; and neuroimaging technique indicating the presence of infarction or hemorrhage, with no obvious cause besides vascular origin⁵. About 85% of all strokes are due to ischemia and 15% are due to hemorrhage (intra-cerebral and sub-arachnoid)⁶.

Stroke is a heterogeneous disease and occurs due to a multitude of underlying risk factors. These include hypertension, ischemic heart disease, hyperlipidemia, atrial fibrillation, diabetes mellitus and smoking. Majority of risk factors for stroke are modifiable and preventable through recognition, medication adherence and life style modification. Individuals at risk for sustaining stroke can be recognized and appropriately treated⁷. By controlling modifiable risk factors and adjustments in lifestyle, about 50% of strokes can be prevented⁸.

In patients with different ages and genders, discrepancy is present regarding stroke risk factors, clinical features and improvement⁹⁻¹⁰. Stroke is the major reason of physical handicap in patients above 40 years of age. In the USA, about 32,000 more women died of stroke in 2000 than men, and this number is predicted to be 68,000 in 2050¹¹.

Previously published local studies mainly focused on frequency of different risk factors in stroke patients. The aim of this study was to identify different risk fac-

tors for stroke in patients of different genders and ages. Depending on gender and age of patients, timely recognition and control of stroke risk factors may help in contribution to therapeutic decision making and health improvement by developing better stroke prevention strategies.

METHODOLOGY

This was a hospital based descriptive study. The study was performed in medical units of Lady Reading Hospital, Peshawar, Khyber Pakhtunkhwa, from July 2011 to March 2012. Admission of stroke patients was done through casualty department (A&E) and Out-patient (OPD).

A total of 100 patients with first-ever acute stroke were included. Sample was taken by consecutive method. Patients age 18 years and above and of both genders were included. An informed written consent was taken for their inclusion in the study.

Study patients were divided into three groups; Group A young adult (<40 years), Group B middle-aged (40-60 years) and Group C elderly (>60 years). In these 03 groups, stroke risk factors were compared.

Patients presenting with Transient ischemic attacks (TIA), recurrent stroke, hypertensive encephalopathy and those who were admitted more than 07 days after the onset of symptoms were excluded from the study.

Acute stroke was diagnosed clinically and radiologically as:

A focal neurological deficit (hemiparesis, dysphasia, cranial nerve palsies or hemianopia) of sudden onset that persist beyond 24 hours and documented by a brain CT scan indicating the presence of infarction or hemorrhage.

Evaluation of risk factors for stroke was performed in study patients by complete history and focused clinical examination. History of smoking (including both current and past smoking), stroke in the family members, medications for control of diabetes, anti-hypertensive or cholesterol-lowering medications, coronary artery diseases and atrial fibrillation were recorded. Consciousness level was assessed on Glasgow Coma Scale (GCS).

Appropriate investigations were carried out. Blood Samples from all patients were tested in hospital laboratory for blood complete with ESR, fasting lipid profile, fasting and random blood sugar. Twelve lead ECG (with rhythm strip) and Echocardiography (to look for Structural cardiovascular abnormalities as well) were done. Facilities for measurement of Homocysteine levels are not routinely available locally. To assess for stroke and its sub-type, a CT scan brain was performed on every patient. All the findings were recorded on a standard,

pre-designed proforma.

For the purpose of this study, following definitions were used:

1. Hypertension: blood pressure of ≥ 140 and 90 mm Hg;
2. Diabetes mellitus: fasting blood sugar ≥ 126 mg/dl, and/or random blood sugar of ≥ 200 mg/dl; or use of anti-diabetic therapy.
3. Coronary artery disease: prior myocardial infarction, cardiac intervention or a history of angina pectoris or evidence of ischemia on ECG;
4. Atrial fibrillation: clinical or ECG evidence of AF;
5. Hyperlipidemia: serum cholesterol ≥ 200 mg/dl and/or triglycerides value of ≥ 150 mg/dl;
6. Smoking: daily tobacco use (current or past).

SPSS version 18.0 was used for statistical analysis. Numerical and categorical variables were measured by mean \pm SD, percentages and ratio accordingly. Data were presented in the form of tables.

For outlined attributes of stroke patients, Fisher's exact tests for frequencies were used. Quantitative variables were analyzed by Mann-Whitney test and qualitative variables by chi-square test to perform Uni-variate analyses. Level of significance was taken at p value ≤ 0.05 .

RESULTS

A sample of 100 patients was taken comprising 68% males and 32% females. Overall male to female ratio was 2.125: 1.

Age of the study patients were from 25–90 years (mean 63.44 ± 13.85 years). Males were from 26–90 years (mean 64.37 ± 13.66 years). Females were from 25–85 years (mean 61.44 ± 14.26 years).

There were 08 patients in group A, 29 in group B and 63 patients in group C (Table 1).

Blood sugar level of the patients ranged from 65–345 mg/dl (mean 135.07 ± 66.23). Serum Cholesterol of the patients ranged from 100–397 mg/dl (mean 158.35 ± 56.95). Serum Triglycerides of the patients ranged from 89–1100 mg/dl (mean 153.11 ± 118.66).

Electrocardiography and echocardiography were abnormal in 34 (34%) and 35 (35%) of patients respectively.

Cerebral infarction constituted 76% and intra-cerebral hemorrhage 24% of the cases (Table 2).

Hemiplegia alone was present in 17%, speech disturbance alone in 08%, hemiplegia and dysphasia in 32%. Consciousness was impaired in 43% of patients.

Hypertension was found in (62%), Coronary artery

Table 1: Gender and Age group cross-tabulation (n=100).

Gender	Age groups			Total
	Group A (Less than 40 years)	Group B (40-60 years)	Group C (Above 60 years)	
Male	5	19	44	68
Female	3	10	19	32
Total	8	29	63	100

Table 2: Stroke types among the Gender and Age groups (n=100)

Stroke type	Age groups						Total
	Group A (Less than 40 years)		Group B (40-60 years)		Group C (Above 60 years)		
Infarct	5	2	12	09	37	11	76
Intra-Cerebral Bleed	0	01	07	01	07	08	24
Total	05	03	19	10	44	19	100

Table 3: Gender wise comparison of risk factors

Risk factors	Total	Male	Female	p value	95% C.I.	
					Lower	Upper
Hypertension	62	40	22	0.981	.296	3.486
Smoking	47	46	01	0.000	8.604	650.268
Coronary artery disease	33	26	07	0.842	.271	4.966
Diabetes mellitus	28	14	14	0.288	.125	1.850
Hyper-lipidemia	24	13	11	0.170	.074	1.582
Atrial fibrillation	21	19	02	0.157	.577	30.627

Table 4: Age group wise comparison of risk factors

Risk factors	Total	Group A (Less than 40 years)	Group B (40-60 years)	Group C (Above 60 years)	Significance
Hypertension	62	0	18	44	0.001
Coronary artery disease	33	04	07	22	0.357
Diabetes mellitus	28	0	07	21	0.017
Hyper-lipidemia	24	02	09	13	0.030
Atrial fibrillation	21	01	03	17	0.054
Smoking	47	02	14	31	0.206

disease (33%), DM (28%), hyperlipidemia (24%), atrial fibrillation (21%) and smoking (47%).

Gender-wise distribution of risk factors, as shown in Table 3, revealed that Hypertension, CAD, AF and smok-

ing was more prevalent in male patients; whereas Age group wise distribution of risk factors showed that Hypertension, DM, CAD, AF, Hyperlipidemia and smoking were more common in Group C patients, as shown in Table 4.

DISCUSSION

Risk factors for stroke are influenced by age and gender. The complicated relationship of stroke risk factors with gender and age is shown by studies conducted in western countries and China⁹⁻¹⁴.

Both genders (male and females) have similar conventional risk factors for stroke. However, AF and hypertension are more prevalent in women at stroke onset in most studies. Prevalence of smoking, drinking alcohol, coronary artery disease and diabetes is shown to be higher in men¹⁰.

Similarly, prevalence of stroke risk factors may vary with age. Advancing age is shown to be related with increased incidence and prevalence of stroke^{9,15}.

In the 'Global Burden of Disease Study' by Feigin et al, it was found that age-standardized incidence of stroke increased by 12% in the low- and middle-income countries⁴.

Although there is deficient publication of research data, the magnitude of stroke looks to be substantial in Pakistan. Contrary to the mean age of stroke patients in the developed world, our patients suffered stroke at a younger age. About 20% of our patients are below the age of 45 years at stroke onset¹⁶. A similar rise in stroke incidence in most Asian countries and an earlier age at onset compared with the West was observed by [Mehndiratta et al](#)¹⁷.

In our study, 68% of stroke patients were males and 32% were females. These findings are comparable to a Chinese study by Yao et al, in which 60.5% of the patients were male¹⁸.

In the meta-analysis regarding stroke in Pakistan by Khan et al, it was observed in different studies, that there is an obvious increased prevalence in males (as high as 59.2 % to 71.42%)¹⁹. A higher prevalence of stroke was found in men as compared to women in WHO Eastern Mediterranean countries as shown by Boutayeb et al²⁰.

In the present study, male patients had mean age of 64.37 ± 13.662 years and female patients had mean age of 61.44 ± 14.256 years. In several studies from Pakistan, the mean age was reported from 57 to 62 years. Males had a mean age of 58.2 years and females had about 60 years. Different studies from Pakistan showed that stroke patients had a mean age of about 60 ± 10 years. Consequently Pakistani population suffers stroke at a younger age (minimum 10 years sooner)¹⁹.

In our study the frequency of acute stroke was more (63%) in the elderly patients of age 60 years or above. The proportion of stroke comprised by elderly population is about 17%²¹. They have a greater risk-adjusted mortality and morbidity as well as extended stay in hospital^{22,23}.

There is a greater risk of stroke with growing age in both the gender, especially in women^{10,18,24}. Ischemic stroke was more prevalent in patients below 80 years in males as compared to females. Age may influence risk of stroke in different genders¹⁰, as women have reduced stroke incidence than men when corrections for age applied.

Lofmark et al showed that at younger age (55 to 64 years), stroke was found less frequently in females as compared to males. But as the age advanced to 75 to 85 years, females were found to have a higher incidence than males²⁵.

Yao et al showed that at stroke onset, female patients were significantly more aged as compared to males. Moreover, females had a considerably increased prevalence of AF, heart diseases and diabetes. In contrast, smoking (presently or in the past) and alcohol consumption were greatly prevalent in male patients. Both genders showed similar prevalence of hypertension¹⁸. These findings suggest that in young males a healthy lifestyle is of paramount significance to reduce incidence of stroke.

In the current study, the major risk factor was hypertension (62%), (males 40% vs. females 22%). Other studies from Pakistan showed the frequency of hypertension in stroke patients of about 50 to 82%¹⁹. Boutayeb et al showed that hypertension was found greater than 50% in 38 studies, DM greater than 25% in 36 studies, smoking greater than 15% in 26 studies and dyslipidemia greater than 25% in 19 studies²⁰.

In both gender groups, no significant difference was observed for hypertension. However its frequency differ significantly among the different age groups ($p = 0.001$). Hypertension is considered key essential factor in the development of stroke. Hypertension was the commonest risk factor (66.2%) in an Iraqi study²⁶.

Coronary Artery disease is particularly associated with a higher risk of stroke¹⁵. In our study, CAD was present in 33% of patients (males 26% vs. females 07%). In a study from Quetta, 12.2% of stroke patients were having CAD²⁷; whereas in Karachi, 19.57% of stroke patients were having CAD²⁸. Similarly, in Islamabad, 28.8% of stroke patients were found to have CAD²⁹. Yao et al reported more prevalent heart disease in females from China¹⁸.

Diabetes is another significant contributor to stroke. Both the magnitude of ischemic infarct and the clinical outcome are considerably affected by hyperglycemia³⁰. Several mechanisms (both direct and indirect) may result in advanced atherosclerosis and help explain the harmful effects of hyperglycemia on cardiovascular system³¹. Duration of diabetes is also considered to be related with higher stroke risk. A rise of about 3% of

stroke risk is observed by every year of diabetes duration³².

In our study, DM was present in 28% of patients (males 14% vs. females 14%). In a meta-analysis by Khan et al, DM was found in 18-41.5% of patients with stroke¹⁹. In admitted stroke patients, diabetes as a risk factor was observed as 22.4% in men and 24.7% in women in the Minnesota Heart Survey³³.

Female patients were found to have increased frequency of diabetes in studies conducted on Chinese and African American subjects^{18,34,35}. But many scientific studies involving the European and White Americans showed the opposite results^{10,36}. This disparity may be multi-factorial (genetic and life styles factors) but true explanation is unknown.

In the present study, hyperlipidemia was present in 24% of patients (males 13% vs. females 11%). In other studies, the prevalence of hyperlipidemia is shown to be 9.9% to 32%¹⁹. Dyslipidemias were found to be associated with a severe stroke and poor outcome in northern Pakistani population³⁷.

Varbo et al showed that hypertriglyceridemia is significantly associated with stroke in both genders. Such high risk was not associated with hypercholesterolemia in females. However males with hypercholesterolemia were found to have elevated stroke risk³⁸.

Atrial Fibrillation is strongly associated with stroke³⁹. Prevalence of AF related stroke unduly rises in advanced age to about 23.5%⁴⁰. In the present study, AF was present in 21% of patients (males 19% vs. females 02 %,) and increased significantly with increasing age ($p=0.054$). This is in conformity with the results of another study done in Karachi where AF was found in 41.48% of patients > 50 years with ischemic stroke (males 58.95% vs. females 41.05%)⁴¹.

On the other hand, some studies observed an increased incidence of AF in females as compared to males^{10,36}. However, these studies also showed that AF was considerably more frequent in patients above 60years of age. High incidence of AF in the elderly may be due to the gradual loss of conduction tissue, proliferation of myofibroblasts and atrial fibrosis⁴².

In our study smoking was present in 47% of patients (males 46% vs. females 01%, $p =0.000$). This is in conformity with other studies from Pakistan, where smoking was found in 22-53% of patients. Similar results were obtained by Palm et al where smoking was more common in men⁴³. In contrast to non-smokers or those who stopped smoking for more than 10 years, current smokers sustain stroke more frequently^{44,45}.

CONCLUSION

This study showed that pattern of distribution of stroke risk factors is gender and age specific. Stroke risk factor profiles are different for male and female as well as for young and old patients. The most frequent modifiable risk factor for stroke was hypertension. Hypertension, diabetes mellitus and hyperlipidemia differ significantly among the three age groups. Smoking was significantly different in males and females. Depending on patient's gender and age, better stroke prevention strategies need to be developed.

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CONTRIBUTORS

MARA conceived the idea, planned the study and drafted and reviewed the manuscript. ZA helped acquisition of data, did statistical analysis and interpretation of data, drafted and critically revised the manuscript. RM and AA drafted the manuscript. IA supervised the study. All authors contributed significantly to the submitted manuscript.