Modifiable risk factors in patients with cerebrovascular accident

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MODIFIABLE RISK FACTORS IN PATIENTS WITH CEREBROVASCULAR ACCIDENT

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ABSTRACT

Objectives: To determine the frequency of modifiable risk factors of stroke. **Study Design:** Descriptive Case series. **Place and duration of study:** Ayub Teaching Hospital, Abbottabad from March to December 2012. **Methodology:** 106 cases of cerebrovascular accident (CVA) above 20 years of age and of either sex admitted in medical units of Ayub Teaching Hospital, Abbottabad were included in this study. The patients below 20 years of age, those with recurrent history of CVA, patients not fulfilling the required criteria of risk factors set in operational definitions and patients having intracranial space occupying lesion such as tumors or brain abscess or neurological deficit secondary to head injury were not included in the study. The subjects were taken by non-probability sampling. **Results:** There were 106 patients in this study. Of these 62(58.5%) were male and 44(41.5%) were females. Mean age of the patients was 62.3 years. 66 (62.3%) patients had hypertension, 29 (27.3%) had Diabetes mellitus, 10 (9.4%) were smokers, 8 (7.5%) had dyslipidemia, 3 (2.83%) had atrial fibrillation, 4 (3.77%) were obese and 2 (1.88%) had carotid bruit. **Conclusions:** This study showed that hypertension was the commonest modifiable risk factor of CVA followed by diabetes mellitus, smoking, dyslipidemia, obesity, atrial fibrillation, and carotid bruit. CVA was more common in males as compared to female and mostly occurred in middle and old age patients.

KEY WORDS: stroke, cerebrovascular accident, modifiable risk factors.

INTRODUCTION

Stroke is the most common cause of disability and the second leading cause of death worldwide.[1] According to WHO report 2002, total mortality due to stroke in Pakistan was 78512.[2,3] The consequences of stroke range from physical disability to death to psychological, social and economic consequences which not only affect the individual or his/her family but the whole society.[4] Stroke risk increases with age and is higher in men than in women. Stroke is uncommon in age below 40, when it does occur the main cause is high blood pressure. In Pakistan the mean age of patients with stroke varies from 52-66 years in various studies and the male to female ratio is about 1.5:1.[2,4]. The main pathologic types of stroke are cerebral infarction, primary intracerebral hemorrhage and subarachnoid hemorrhage. In developed countries, about 85-90% of strokes are due to cerebral infarction and 10-15% due to intracranial hemorrhage. Hemorrhagic stroke constitutes a larger percentage in Asians. The hospital based studies conducted in Pakistan revealed 31-40% cases of stroke due to cerebral hemorrhage and 60-69 % due to ischemia in centers where facilities for CT scan were available.[5] Cerebral atherosclerosis with atheroma formation is the basic underlying pathophysiologic mechanism in ischemic stroke.[6] The incidence and mortality of stroke varies greatly in different populations and has decreased considerably in western world probably due to better preventive measures but the burden of the disease in South Asian countries has increased and is expected to rise.[4] The risk factors of stroke are classified as non-modifiable and modifiable. The non-modifiable factors are advanced age, male gender and race. There are various well documented modifiable risk factors of stroke which along with their prevalence in Pakistan are hypertension (43-66%), diabetes mellitus (27-42%), dyslipidemia (19-30%), smoking (11-43%), asymptomatic carotid artery disease (8%), atrial fibrillation (7%), and some less documented ones such as physical inactivity (38%), obesity (11%) and alcohol abuse(9%).[1,3] Treating these modifiable risk factors can prevent the mortality and morbidity of cerebrovascular accident.[7] This study is designed to obtain knowledge of the frequency of modifiable risk factors of stroke in our population so that control of these risk factors in patients presenting to outpatient departments or clinics can be achieved.

MATERIALS AND METHODS

This was a hospital based descriptive cross sectional study of acute stroke cases. 106 cases of any age and either sex, admitted in department of Medicine, Ayub Teaching Hospital, Abbottabad, were included in present study. Informed consent of patient's relatives was taken after explaining the study protocol. Diagnosis of cerebrovascular accident was based on history and clinical examination and confirmed by CT scan brain. Patients with both ischemic and hemorrhagic stroke were included in the study. Patients with previous history of stroke, or with alternate causes of clinical features suggesting stroke like intracranial space occupying lesions, and neurological deficit secondary to head injury, confirmed on CT scan brain were excluded from the study. Once diagnosed, all the patients with CVA were further checked for the risk factors. Detailed history from patient/relatives was taken including the modifiable risk factors of stroke. Hypertension, diabetes mellitus and dyslipidemia were labelled if the patients were previously diagnosed with these conditions since atleast six months or taking antihypertensive, oral hypoglycemics or insulin and lipid lowering drugs at any time before the onset of stroke (whether controlled on medications or not). Dyslipidemia was also confirmed by lipid profile of samples taken within 48 hours of onset of stroke. In our study patients were diagnosed having hyperlipidemia if total cholesterol levels were > 240mg/dl, low density lipoprotein cholesterol (LDL) > 130mg/dl. Patients with hypertension, diabetes mellitus and smoking were divided into three groups in accordance with the duration of these risk factors. Hypertensive and diabetic patients were further divided into compliant and non-compliant patients depending on whether they used their medications regularly or not. Atrial fibrillation was diagnosed by irregularly irregular pulse and ECG evidence of absent P waves and irregularly irregular RR interval. Patients were labeled smokers if they smoked atleast one cigarette per day for preceding three months or more (based on history) and obese if waist to hip ratio of >0.9 in men and >0.85 in women. Carotid arteries were auscultated for bruit in all patients. All the information including name, age, gender, address and risk factors data were recorded on a pre-designed proforma. The data was analysed by using SPSS 20.0. For continuous variables, mean and standard deviation are reported. For categorical variables like sex, hypertension, diabetes mellitus, smoking, dyslipidemia, atrial fibrillation, obesity, and carotid bruit, proportions are reported. Chi-square test was used for statistical analysis. P value and odds ratio were calculated for risk factors. A p value of <0.05 was considered statistically significant.

RESULTS

A total of 106 patients were included in the study. The male population of the patients is higher than the female, 58.5% (n=62) as compared to 41.5% (n=44) respectively. Total 11 patients were between 20-45 years of age (age group-I) and 95 patients were above 46 years of age (age group-II). Mean age of presentation was 62.30 ± 13.69. Mean age for males was 62.64 years and for females was 61.81 years. Male to female ratio is 1.4:1.0. (Figure 1)

Risk factors stratification

Risk factors were studied very critically during data collection. The major risk factor was found to be hypertension (62.3%) and diabetes mellitus (27.3%). Other risk factors were smoking (9.4%), hypercholesterolemia (7.5%), obesity (3.77%), atrial fibrillation (2.83%), and carotid artery stenosis (1.88 %) (Table 1). Sixteen of the patients had more than 1 risk factor e.g. hypertension with diabetes mellitus or hypertension with hypercholesterolemia etc. (Figure 2) Hypertension was the major risk factor (62.3% and p. value 0.220), male were 41 (62.12%) and female were 25 (37.88%) with male to female ratio 1.64:1.0. Most hypertensive patients are from age group-II 60 (91%) compared with age group-I 6 (9%). Most (77.2%) of the patients were not taking any regular medication for the control of hypertension. The mean duration of hypertension was 15.6 years. Among 106 patients there were 29 (27.4%, p.value:0.025) diabetic patients of which male were 12 (41.4%) and female were 17 (58.6%) with male to female ratio 1.0:1.4. Most of the diabetics were from age group II 27 (93%) than in group I 2(7%). There were 24 patients with type II diabetics and 5 patients had type I diabetes. The mean duration of diabetes was 17 years. Most of the Type II diabetics were using oral hypoglycemics and 3 patients were using some Hakimi medicines. Type I diabetics were using insulin but overall 76% (n=22) of diabetic patients were non-compliant with their medications. Among 54 male subjects, 10 male patients (9.4%, p. value: 0.003) were found to be smokers. There was not a single female patient found to have history of smoking among patients included in our study. The mean duration of smoking was 15 years. Most patients were smoking more than 20 cigarettes per day. There were 8 patients (7.5%, P. value: 0.189) with dyslipidemia of which 5 patients (62.5%) were female and 3 (37.5%) were male with male to female ratio of 1:1.66. Four patients (3.77%, P.value: 0.553) were obese of which 2 were male and 2 were female. In addition 3 patients (2.83%, P. value: 0.627) had atrial fibrillation and 2 patients (1.88%, p. value:
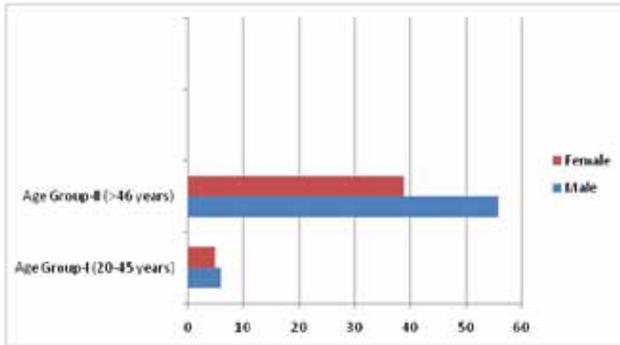
0.660) had carotid bruit. (Table 1)

Figure 1: Frequency of age groups

Table-1: Frequencies of modifiable risk factors of stroke (n=106).

Risk Factors	Frequency (n)	Percent	P. value
Hypertension	66	62.3	0.220
Diabetes	29	27.3	0.025
Smoking	10	9.4	0.003
Dyslipidemia	8	7.5	0.189
Obesity	4	3.77	0.553
Atrial fibrillation	3	2.83	0.627
Carotid bruit	2	1.88	0.660

Table 2: Ages and gender distribution of risk factors (n=106).

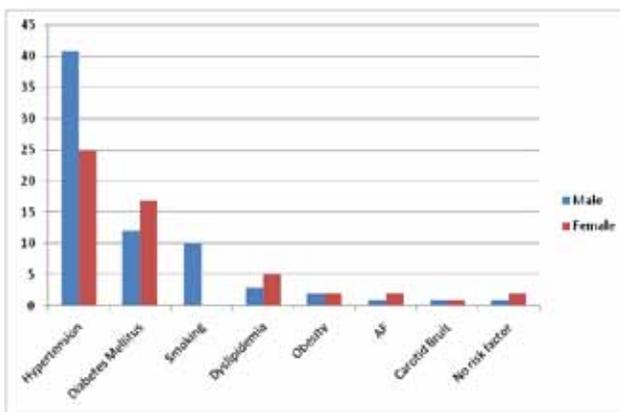| Risk factors	Age group 1 (20-45 years)		Age group 2 (>46 years)		Total		
	M	F	M	F	M	F	M+F
Hypertension	3	3	38	22	41	25	66
Diabetes Mellitus		2	12	15	12	17	29
Smoking	3		7		10	0	10
Dyslipidemia		1	3	4	3	5	8
Obesity			2	2	2	2	4
AF			1	2	1	2	3
Carotid Bruit			1	1	1	1	2
No risk factor			1	2	1	2	3

Figure 2: Frequency of risk factors and gender distribution.

DISCUSSION

This was a hospital based descriptive study conducted on 106 indoor patients at Ayub Teaching Hospital. The mean age of patients with stroke in the present study was 62 years. The mean age varies from 52-66 years in various studies[4] which were comparable to our study. In our study the percentage of patients below 45 years of age was 10.3 % which is similar to that reported by Kaul et al (10-15%) in 2007.[8] The total number of males were 62 and females were 44 with male to female ratio of 1.4 which is similar to that reported by Khealani et al in a study conducted at Aga Khan University Karachi.[4] The most common modifiable risk factor of stroke found in present study was hypertension (62.2%) which is almost similar to that reported by Basharat et al[1] and Alam et al[5] (61 % and 60 %) but is slightly less than that reported by Khan et al (65.8%) in 2007.[9] Similarly in a study at Seikh Zayed Post Graduate Medical Institute Lahore, hypertension was found as the most common risk factor of stroke (82%) which is much more than in our study which may be related to increased frequency of Diabetes Mellitus (19%), Ischemic Heart Disease (14%) and both DM and IHD (6%) in their patients.[7] Framingham study had also shown that hypertension was the most important single risk factor for stroke.[10] The male to female ratio of hypertensive patients in our study was 1.8:1 which is also reported by Raza et al.[11] The duration of hypertension ranged from 3 – 30 years with the mean age of 15.6 years. In a study conducted in Khyber teaching hospital in 2006 by Khan H et al, it was reported that the duration of hypertension in many stroke patients was more than 10 years.[2] Hypertension was present in combination with diabetes mellitus in 8 patients. Out of 66 patients 51 (84.90%) patients were non-compliant with their medications chiefly because of unawareness and poverty.[5] In a study in Sweden it was reported that 45% of all strokes among hypertensive patients were attributed to uncontrolled blood pressure. In treated hypertensive patients, the risk of stroke increases significantly with advancing age, current smoking, high levels of diastolic blood pressure and diabetes.[12] DM is another important modifiable risk factor for stroke. DM was present in 27.3% of stroke patients in the present study similar to that reported by Alam et al (28%)[5] and Safeer et al (26%)[13] but was slightly more than that reported by Hasan et al (25.5%) in a study at Qatar Hospital Karachi.[14] A higher percentage of diabetics was found by Khan et al (41.3%) in Karachi,[9] Khan H et al (32.7%) in Peshawar[2] and Basharat et al (33%) in Lahore[1] which may be due to selection bias as in our study only those diabetics

were included who were diagnosed for six months or more. Moreover in the study by Khan and Zarif et al (30.6%),[3] patients with ischemic stroke only, were included and it is well recognized that ischemic stroke is more prevalent than hemorrhagic stroke in diabetics.[15] In Framingham study the incidence of atherosclerotic infarct was higher among diabetic patients of all ages.[7] The male to female ratio of patients with DM was 1.12:1. The control of diabetes was poor in most patients due to non-compliance with drugs and diet. The duration of diabetes was more than 10 years in many patients which was also observed by Khan in his study.[2] The third most common risk factor of stroke in our study was smoking (10%) similar frequency was by Khan (12.5%).[3] However it is less than that reported by Safeer M et al (30%) which was due to selection bias as patients with ischemic stroke were included.[13] Most of the patients were smoking one pack of cigarette a day for more than 15 years. All the smokers were male as the prevalence of smoking in Pakistani women is less than men.[4] Diet is considered one of the most important environmental variables involved in shaping of the lipid profiles. Excessive high fat and cholesterol intake is associated with increased serum levels of total and LDL cholesterol.[16] The value of dyslipidemia as a risk factor of stroke is highly variable in different studies conducted in various places of Pakistan possibly because of difference in eating habits and life style of people at different places. In the present study dyslipidemia was present in 7.5% which is less than that reported by other studies[2,3,5,7] may be because most of the patients in our study belonged to rural areas and poor socioeconomic status where due to hard labor and more physical activity there is lesser incidence of dyslipidemias as compared to sedentary life style of urban population. AF was present in 2.83% of patients of which 2 were female and 1 was male which correlates with the report on gender differences in the risk of ischemic stroke and peripheral embolism in AF, that women have a higher risk than men for AF related thromboembolism that is independent of the presence of other risk factors for stroke.[17] The similar frequency of AF related stroke was reported by Khan and Zarif (2.72%) in Peshawar.[3] However in Alam et al[5] study, AF related stroke was found in 12% of patients which is much greater than present study. This may be due to high frequency of AF predisposing conditions e.g. hypertension (60%), DM (28%), IHD (18%) in his study. Obesity is categorized as a less well documented or potentially modifiable risk factor of stroke. Abdominal adiposity, as measured by an increased WHR, increases the risk of hypertension and stroke.[18] The association of abdominal adiposity with the risk of stroke is related in part to the association of abdominal adiposity with hypertension and diabetes.[19] In our study obesity was present in 3.77% of the patients of stroke according to Waist Hip Ratio and this is similar to that reported by Khan et al (2.73%)[3] but is much less than that reported by Safeer (15%)[13] which again may be attributed to selection bias in his study where patients were labeled obese on the basis of body weight for age and height which is not as reliable method as waist hip ratio for assessment of stroke risk in obese patients. The Health Professional follow up study showed that the highest quintile of waist hip ratio was associated with an increased risk of stroke.[18] Carotid artery bruit was present in only 1.88% of the patients with stroke which is similar to that reported by Alam et al[5] but much less than that reported by Safeer M et al 22%[13] which may be due to the fact that there was a higher frequency of carotid artery stenosis predisposing conditions e.g. dyslipidemia (30%), hypertension (55%) and smoking (30%) in his study population. Moreover carotid artery imaging was not performed in our patients, carotid arteries were only auscultated for the presence of bruit. More than one risk factor was present in 16% of the patients which is much less than that reported by Hasan SR (61.1%).[14] May be because of the selection bias as in the present study only those hypertensives and diabetics were included with atleast 6 month history of the disease.

CONCLUSION

It is concluded from this study that the most common modifiable risk factor for stroke is hypertension followed by diabetes mellitus, smoking, dyslipidemia, AF, obesity and carotid artery stenosis. Suboptimal control and improper treatment of risk factors contributed in many cases of stroke. Blood glucose and cholesterol levels were also poorly controlled. Furthermore many patients were unaware of their primary diagnosis especially dyslipidemia, atrial fibrillation and carotid stenosis. Many patients were having poor control of risk factors because of unawareness.

RECOMMENDATIONS

Based on the results of this study it is essential that patients should be properly screened for the risk factors and educated about their disease. The benefits of regular treatment in primary prevention of stroke must be conveyed to the patients and their relatives. Patients should also be advised about smoking cessation, weight reduction and dietary control. They should have regular follow-up visits to their doctors for the proper management of risk factors.

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