

Frequency of Hypertension and Diabetes Mellitus in Patients Presenting With Acute Ischemic Stroke

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ABSTRACT

Objective: To find the frequency of hypertension and diabetes mellitus in patients with acute ischemic stroke.

Study Design: Descriptive / cross sectional study.

Place and Duration of Study: This study was conducted at the Medicine, Qazi Hussain Ahmad Medical Complex, Nowshera Medical College, and Nowshera. One year from July 2018 to June 2019.

Materials and Methods: 100 patients of acute ischemic stroke were collected by convenient (non-probability) sampling technique. Patients fulfilling the inclusion criteria were further assessed through a detailed history from patients or from relatives, CT scan brain, random and fasting blood sugar, lipid profile, chest x-ray and ECG was done in all patients.

Results: Hypertension was present in 45% patients. Hypertension and diabetes mellitus was present in 24% cases, 23% patients were not having any of these diseases. Diabetes mellitus was present in only 8% cases.

Conclusion: Hypertension and diabetes collectively are the two main risk factors for ischemic stroke. The frequency of diabetes mellitus alone was very low in this study.

Key Words: Cerebrovascular-Accident, Cerebral-Infarction, Stroke-risk actors; hypertension; diabetes mellitus, Stroke-Diagnosis.

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INTRODUCTION

Stroke is the leading cause of disability and second most common cause of death worldwide.^{1,2,3} Almost 15 million people sustain stroke worldwide on annual basis. Burden of stroke has a greater impact in developing world including Pakistan, causing 350,000 people to suffer from it leading to death or long term disability^{4,5,6}. An increase of 78% mortality mostly in developing world has been estimated by World Health Organization between 1990 to 2020. The main pathological types of stroke are cerebral infarction, Primary intra-cerebral hemorrhage and subarachnoid Hemorrhage.

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In developed countries, about 85-90% of strokes are due to cerebral infarction and 10-15% due to Intracranial hemorrhage. Ischemic stroke can be further subdivided into etiologic subtypes or categories which represent the causes of the stroke: cardio embolic, atherosclerotic, lacunar, other specific causes (dissections, vasculitis, specific genetic disorders, and others), and strokes of unknown cause.⁷ Hypertension, diabetes mellitus, smoking, atrial fibrillation, hyperlipidemia, Homocysteinemia, and alcohol consumption, waist to hip ratio, physical inactivity, diet and apolipoprotein B to A1 are the most significant modifiable risk factors of stroke.⁸ Of these, hypertension, diabetes, smoking, hyperlipidemia, homocysteinemia and alcoholism are obviously affected by lifestyle and nutrition⁹.

Reduction of modifiable risk factors in primary prevention of stroke has core importance.¹⁰ much is known about long-term stroke risk factors, such as hypertension, diabetes mellitus, and atherosclerotic disease as opposed to the short-term risk factors, or triggers which can lead to stroke.¹¹

The relationship between hypertension and cerebrovascular disease is well established. As blood pressure is a dynamic and distributed variable, 24 hours ambulatory blood pressure monitoring may be valuable as a risk stratifying tool in determining the "hypertensive load" as assessed by the presence of dipping or non-dipping status of an individual. Raised

Blood pressure is often seen in those presenting with Strokes, although the precise mechanisms are uncertain¹². Diabetes mellitus is considered an independent risk factor for stroke which can double the risk of stroke for diabetic patients, and stroke accounts for ≈20% of deaths in diabetics. Pre diabetics are also at increased risk of stroke.^{14, 15, 16}. On the other hand hypertension is the only significant factor related with intra-cerebral hemorrhage¹⁷. According to a study hypertension is also a significant independent risk factor for ischemic stroke in the elderly¹⁸. Another study suggests that most of ischemic strokes are attributable to the effects of diabetes alone or in combination with hypertension¹⁹. In Pakistan 18-42% cases of cerebral hemorrhage have been reported. This higher rate of cerebral hemorrhage has been attributed to uncontrolled hypertension. In Pakistan 30-60% prevalence of hypertension has been reported in stroke patients (both ischemic and hemorrhagic). These studies support a strong role of hypertension in ischemic stroke in our population^{20, 21}.

Due to severe morbidity and mortality associated with stroke and limited effective therapies, this research was mainly focused on identification of two common risk factors (hypertension, diabetes) and prevention of stroke by modification of these two in northern Pakistan. Because local studies conducted on frequencies of hypertension and diabetes mellitus in ischemic stroke are limited, so it was beneficial to conduct this study so as to adopt primary preventive measures against ischemic stroke in the light of results of the study.

MATERIALS AND METHODS

The study was conducted at Department of Medicine, Qazi Hussain Ahmad Medical Complex, Nowshera Medical College, and Nowshera. One year from July 2018 to June 2019. All patients of age more than 15 years of either gender admitted with first episode of focal neurological deficit of sudden onset lasting for more than 24 hours or leading to death clinically and radio logically confirmed as ischemic stroke. Patients presented with transient ischemic attack or other stroke mimics like hypoglycemia, seizures or metabolic cause of global or focal deficit. Patients having hemorrhagic stroke. Patients with recurrent stroke in all these patients stroke was initially diagnosed on clinical grounds and confirmed on CT scan brain/MR brain. The patients were declared as hypertensive if systolic blood pressure was more than 140 mmHg, diastolic blood pressure more than 90 mmHg or both on two separate occasions or if the patient gave previous history of hypertension or used antihypertensive medicines. On the other hand patients were declared as diabetic if found to have fasting plasma glucose more than 126 mg/dl, random plasma glucose more than 200 mg/dl on two separate occasions in asymptomatic

patients or on one occasion in symptomatic patients or if the patient gives previous history of diabetes mellitus or use of ant diabetic drugs. After taking formal consent, patients fulfilling the inclusion criteria were further assessed through a detailed history, from patient or from the relatives, including personal particulars, complaints, past history of stroke, TIA, hypertension, diabetes mellitus, and drugs. The information was entered into a proforma. Blood pressure was recorded at arrival and 24 hours after admission. All the patients underwent investigations including CT scan/MR brain without contrast, ECG, X-ray chest, random and fasting blood sugar, lipid profile All the studied variables including demographic features of patients, history of hypertension, diabetes mellitus, family history, drug history, general physical examination findings, systemic examination findings, CT scan brain findings, random/fasting blood sugar, lipid profile, ECG, x-ray chest were analyzed for descriptive statistics. The results of these variables were expressed/presented through frequency tables, and graphs. For age-wise distribution average and \pm standard deviation was calculated. For sex-wise distribution male to female ratio was calculated all the data was analyzed by computer program SPSS for windows version 20. Due to the nature of the study design (descriptive study)

RESULTS

Out of 100 patients with ischemic stroke included 54 (54%) were females and 46 (46%) were males with female to male ratio of 1.17: 1. Mean age of patients was 62.56 ± 13.69 SD years. Age wise stratification of patients is given in table 1.

Only one patient was unmarried, 99 were married, all the female patients 54 (54%) were house wives. Among male patients, majority 23 (23%) were farmers, followed by 6 (6%) laborers, 6 (6%) retired persons from government service, 5 (5%) patients businessmen, and 1 (1%) each cobbler, driver, government servant, shopkeeper, imam-e-masjid, and TV mechanic respectively. Family history of 100 patients of ischemic stroke showed that majority 61 (61%) had no family history of hypertension or diabetes mellitus. 17 (17%) patients had family history of hypertension, 14 (14%) patients had family history of diabetes mellitus, while only 8 (8%) patients had family history of both hypertension and diabetes mellitus.

Table No.1: Age-Wise Distribution of Patients (N=100)

Age Ranges (In Years)	No. of Cases	Percentage
21-30 years	03	03%
31-40 years	05	05%
41-50 years	12	12%
51-60 years	29	29%
61-70 years	23	23%
71-80 years	20	20%

Table No.2: Clinical Presentation of Patients (N=100)

Clinical Finding	No. of Cases	Percentages
Hemiparesis/hemiplegia and sudden decrease in consciousness	34	34%
Hemiparesis/hemiplegia and dysarthria/aphasia	19	19%
Hemiparesis/hemiplegia	14	14%
Hemiparesis/hemiplegia and confusion	14	14%
Hemiparesis/hemiplegia, confusion and dysarthria/aphasia	06	06%
Hemiparesis/hemiplegia, confusion and sudden decrease in consciousness	02	02%
Sudden decrease in consciousness	02	02%
Hemiparesis/hemiplegia and headache	01	01%
Hemiparesis/hemiplegia, headache and confusion	01	01%
Monoplegia, confusion and sudden decrease in consciousness	01	01%

Hypertension alone was the most prevalent risk factor for the development of stroke followed by hypertension and diabetes mellitus in combination. (Table)

Hemiplegia/hemiparesis with sudden decrease in consciousness was the most common presenting feature (34%) followed by hemiparesis/hemiplegia and dysarthria/aphasia (19%), followed by hemiparesis/hemiplegia only (14%). Computed tomography scan showed that cerebral infarction was noted in right parietal lobe in majority 19 (19%) of patients, followed by right temporal lobe in 16 (16%) patients, left temporo-parietal region in 13 (13%) cases, left parietal region in 11 (11%) cases.

Different other routine investigations were also performed in all (100%) patients of stroke which include electrocardiography (ECG) which was normal in 43 (43%) cases, left axis deviation and left ventricle hypertrophy was noted in 27 (27%) cases, left axis deviation was noted in 26 (26%) cases, left axis deviation, left ventricle hypertrophy and left bundle branch block was noted in 01 (1%) case, left bundle branch block was noted in 1 (1%) case, old inferior wall myocardial infarction noted in 1 (1%) case, and ST elevation in leads v2 to v5 was noted in 1 (1%) case.

X-ray chest was normal in 98 (98%) cases. Cardiomegaly was noted in 1 (1%) case, consolidation was noted in 1 (1%) case.

Table No3: Mean and standard deviation of different variables

Finding	Maximum	Minimum	Mean	+ SD
AGE (YEARS)	90	25	62.56	13.69
Blood pressure	240/110 mmHg	100/70 mmHg	148/99 mmHg	24.911
Pulse rate	116/minute	68/minutes	82/minutes	8.48919
Temperature	101 °F	98 °F	99 °F	0.726 °F
Random blood sugar	350 mg/dl	49 mg/dl	152 mg/dl	68.53
Fasting blood sugar	438 mg/dl	45 mg/dl	124.24 mg/dl	66.34
Cholesterol	288 mg/dl	75 mg/dl	183.99 mg/dl	47.036
Triglyceride	376 mg/dl	50 mg/dl	134.39 mg/dl	59.21

Table No4: Frequency of Hypertension and Diabetes Mellitus in Patients with Ischemic Stroke (N=100)

Diagnosis	No. of Patients	Percentage
Hypertension alone	45	45%
Both hypertension and diabetes mellitus	24	24%
Non-diabetic and non-hypertensive	23	23%
Diabetes mellitus alone	08	08%
Total	100	100%

DISCUSSION

Stroke is the second leading cause of death worldwide and the leading cause of long-term disability. Strategies for stroke prevention, including the control of

hypertension, treatment of atrial fibrillation, and smoking cessation, have reduced the disease burden, but stroke still remains an important public health challenge ²².

Modifiable risk factors for stroke include hypertension, diabetes, atrial fibrillation, dyslipidemia, smoking, and alcohol abuse. Among these risk factors, hypertension and diabetes are rapidly growing epidemics leading to a substantial increase in cardiovascular disease and stroke ²³. In a most recent study while a number of conditions and risk factors that increase stroke risk have been identified, arterial hypertension was the most consistent and powerful predictor. Besides hypertension, majority of patients had other co-morbidities, of which most frequent were hypercholesterolemia, diabetes mellitus, coronary heart disease, and left ventricular hypertrophy ²⁴. Our data showed that among the 100 ischemic stroke patients included in this study, hypertension was

one of the most important risk factors in ischemic stroke patients. Similar or higher incidences of stroke in hypertensive patients are also reported by other studies from Pakistan²⁵.

In this study females were in preponderance than males, with female to male ratio of 1.17: 1. Few studies have reported that female were in preponderance than males²⁶. While in contrast to our results, few local studies reported male preponderance²⁷.

Stroke is considered as disease of aging and its incidence doubles for each decade after 55 years of age²⁸. Higher rates of percentage have been reported in the age range of 51-60 years (overall mean age of 60 years)²⁹. These findings are also observed in my study which shows that the majority of patients suffered from ischemic stroke were in the age range of 51-60 years with overall mean age of 62.56 years.

Adequate control of blood pressure is a cornerstone of stroke prevention. It is reported that 10mmHg reduction in systolic blood pressure reduces stroke incidence by 40%³⁰. In a study it was estimated that approximately 45% of all strokes among subjects with treatment for hypertension might be attributed to uncontrolled blood pressure³¹. High and low blood pressure levels are common following acute stroke, with up to 60% of patients being hypertensive (SBP > 160 mmHg) and nearly 20% having relative hypotension (SBP ≤ 140 mmHg), within the first few hours of presentation, both conditions being associated with an adverse prognosis³². An overall mean blood pressure of 148/99 mmHg was observed in my study, while the maximum blood pressure recorded in patients of ischemic stroke, was 240/100 mmHg, and minimum was 100/70 mmHg. These finding are little higher than other studies reported on national level³³.

Diabetes mellitus is a major risk factor for the development of ischemic cerebrovascular disease. Patients with diabetes are at least two times more likely to have a stroke than non-diabetics; they are more likely to suffer increased morbidity and mortality after stroke³⁴. Duration of diabetes has a direct relation with stroke risk. In our study 8% patients were found to be diabetic alone, while diabetes mellitus with hypertension was found in 24% patients. These findings are opposite to some national studies in which 33% to 100% incidence of diabetes mellitus has been reported³⁵.

CONCLUSION

Diabetes and hypertension are the two main modifiable risk factors for ischemic stroke which collectively comprises 77% of the risk factor proportion. Burden of stroke can be reduced significantly if these two risk factors are properly addressed.

Author's Contribution:

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Conflict of Interest: The study has no conflict of interest to declare by any author.

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