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Frequency of Hypertension in Ischemic and Hemorrhagic Strokes: A Cross-sectional Study at a Tertiary Care Hospital of Multan, South-Punjab Pakistan

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Abstract

Background: Stroke is a global health problem. Stroke is responsible for major disabilities in adult population, and is 2nd leading cause of deaths all over the world. Estimated 15 million people all over the world become victim of stroke every year all over the world, of which 5 million die and other 5 million are left permanently disabled and thus major burden on the sufferer and families as well. Different studies have reported hypertension as major cause of stroke in different populations.

Objective: To determine the frequency of hypertension among ischemic stroke and hemorrhagic stroke at a tertiary care hospital.

Subjects and Methods: Our study included 246 stroke patients which were recruited from Department of Medicine Nishtar Medical University Hospital Multan. Specific history concerning hypertension was inquired from all patients. Blood pressure of all the patients was measured. Blood pressure levels were measured by researcher using random-zero sphygmomanometers with the subject seated quietly. Two readings of blood pressure were taken and average of the two readings was noted in the proforma. ECG of all the patients was done and checked for the fulfillness of criteria of left ventricular hypertrophy i.e. Sokolow-Lyon Index, Cornell Voltage Criteria.

Results: Our study included 246 stroke patients, 160 (65%) were male patients and 86 (35%) were female patients. Mean age of our study cases was 59.63 $\pm$ 11.24 years. Ischemic stroke was observed in 133 (54.1%) of our study cases, while hemorrhagic stroke was noted in 113 (45.9%) of our study cases and 13 (5.3%) had previous history of stroke as well. Smoking was observed in 110 (44.7%) of our study cases and all the smokers were male patients. Alcohol consumption and family history of stroke was zero in our study cases. Of these 246 stroke patients, 148 (60.2%) were known hypertensive and all of them were taking anti-hypertensive medication. Frequency of hypertension in our study was 168 (68.3%) at presentation.

Conclusion: Higher frequencies of modifiable risk factors was seen with Hypertension was the leading risk factor of stroke in our study. These findings point towards well directed efforts regarding conventional interventions in our population. Hemorrhagic stroke was significantly associated with elevated blood pressure. Hypertension was significantly associated with increasing age, diabetes, previous history of stroke, hemorrhagic stroke and smoking in stroke patients.

Keywords: Stroke, Hypertension, Ischemic, hemorrhagic.

Introduction

Stroke is an global health issue and one of the leading causes of disabilities in adults. It is also regarded as 2nd leading cause of deaths all over the world[1]. Worldwide, around 20 million persons suffer stroke every year while half of these die due to its related complications and others are left with life-long disabilities which exerts significant impact on the suffering families, community and society [2]. WHO estimates have reported that after ischemic heart diseases stroke will retain its position as 2nd leading cause of death by the year 2020. These death rates have been equally distributed in both developed and developing countries [3] however strikingly data have shown stroke prevalence in developing countries is more common in younger individuals when compared with western populations. It means greater proportions of long term disabilities among survivors of stroke from low and middle income countries which contribute towards extra burden of sustained disability and lack of productivity of main work force of those nations [4].

Stroke, a clinical syndrome, is typically exhibited by "quickly developing symptoms and/ or signs of focal and at times global (for patients in coma), loss of cerebral functions, with no obvious cause other than that vascular origin with symptoms lasting more than 24 hours or leading to death". Ischemic stroke is the result of obstruction of a blood vessel that carries blood to the brain tissues and is responsible for more than 70 % cases of stroke in Pakistan while hemorrhagic stroke occurs as a results of rupturing of a weak blood vessel. Hypertension, specifically uncontrolled, remains the major cause of hemorrhagic stroke accounting for around 30% of all stroke patients in Pakistan [5]. A WHO report published in 2002 has revealed more than 75000 deaths occurring in Pakistan due to stroke, with high burden of patients coming to the emergency departments of hospitals. Some of them die in hospital while others who survive have to face certain level of disabilities which leads to financial, social and psychological stress on the patients and their families [6].

Hypertension represents certain degree of disturbances in the collective physiological processes and is not discrete disease. Pathogenesis and underlying causes of hypertension are multifaceted and in case it is not treated; it may lead to the impairments in the functions of kidneys, eyes, narrowing of blood vessels, heart, brain and resulting in cardiovascular diseases. It has been reported as most common cause of stroke and majority of other heart diseases. All over the world, 66% of stroke and 50 of ischemic heart diseases (IHD) occur due to elevated blood pressures and also is a major risk factor for stroke in Pakistan[7].

The risk factors for stroke are classified as non-modifiable; "age, family history, prior stroke, gender and ethnicity) and modifiable risk factors (hypertension, diabetes mellitus, coronary artery disease, arterial fibrillation, dyslipidemia, smoking, obesity, alcohol abuse and physical inactivity"[2].

High frequencies of hypertension have been reported from Pakistan as well as other countries among patients of stroke[1,2,7-13]. Hypertension was observed to be in 85.9% of stroke patients in Nigeria[8] and 70% in India[9]. Hypertension was a major risk factor (86.8%) in a study published from Karachi[2], 78% [13] among all stroke patients and 65% in ischemic strokes in another studies from Karachi[1]. A study from Abbotabad reported frequency of hypertension 13% among stroke patients and it was 9 % in ischemic strokes while 4% in Hemorrhagic strokes[7] and another study from Abbottabad reported 56 % of the stroke patients were suffering from hypertension[6]. Hypertension was present in 40 % ischemic stroke patients while it was 20% among sufferers of hemorrhagic strokes[10]. Durrani reported 79% frequency of hypertension among patients of ischemic stroke[11]. A study from Peshawar reported hypertension in 52.9% ischemic stroke patients while 74.2% among hemorrhagic stroke patients[12].

It has been observed that frequency of hypertension among targeted population varies with population. Different results have been reported in different parts of Pakistan and even in same population as well. This proposed study has been planned to be conducted in our local population of southern Punjab to document frequency of hypertension in our population.

Material and Methods

Our study included 246 stroke patients meeting inclusion and exclusion criteria of this study. All the cases of stroke (aged 28 – 80 years) were recruited from Department of Medicine Nishtar Medical University Hospital Multan, Pakistan from June 2016 to May 2017. Specific history concerning hypertension was inquired from all patients. Patients having CAD, Coagulopathy & bleeding disorders, brain tumors, tuberculous meningitis, viral or bacterial encephalitis and multiple sclerosis and patients having CT brain plain findings suggestive of SOL were excluded. Blood pressure of all the patients was measured. Blood pressure levels were measured by researcher using random-zero sphygmomanometers with the subject seated quietly. Two readings of blood pressure were taken and average of the two readings was noted in the proforma. ECG of all the patients was done and checked for the fulfillness of criteria of left ventricular hypertrophy i.e. Sokolow-Lyon Index, Cornell Voltage Criteria. Baseline laboratory investigations like hemoglobin, CRP, ESR, lipid profile and HbA 1C were done. Stroke was defined as per CT scan brain's findings suggestive for ischemic stroke and hemorrhagic stroke. Hypertension was defined as "systolic blood pressure $\geq$ 140mm Hg and diastolic blood pressure is $\geq$ 95 mm Hg (both raised) on two separate occasions or patients on antihypertensive medication at any time before the onset of stroke". Data were entered and analyzed by computer program SPSS-16.

Results

Of these 246 study cases, 160 (65%) were male patients and 86 (35%) were female patients. Mean age of our study cases was 59.63 $\pm$ 11.24 years (range;28 to 80 years) while 152 (61.8%) cases were in the age range of 41–

60 years. Majority of our study cases were Saraiki 86 (35 %), followed by urdu speaking 80 (32.5%) and Punjabi speaking 74 (30.1%). Of these 246 stroke patients, ischemic stroke was observed in 133 (54.1%) of our study cases, while hemorrhagic stroke was noted in 113 (45.9%) of our study cases. Of these 246 stroke patients, 13 (5.3%) had previous history of stroke as well. Smoking was observed in 110 (44.7%) of our study cases and all the smokers were male patients. Alcohol consumption and family history of stroke was zero in our study cases. Of these 246 stroke patients, 148 (60.2%) were known hypertensive and all of them were taking anti-hypertensive medication. Mean systolic blood pressure of our study cases was 158.58 ± 36.83 mm/Hg (minimum systolic blood pressure was 100 mm/Hg while maximum was 240 mm/Hg) while mean diastolic blood pressure was 92.72 ± 16.80 mm/Hg (minimum diastolic blood pressure was 60mm/Hg while maximum diastolic blood pressure was 120 mm/Hg). Frequency of hypertension in our study was 168 (68.3%) at presentation.

Table No. 1 Stratification of Hypertension with regards to Type of stroke.

Type of stroke	**Hypertension**		**P – value**
	Yes (n=168)	**No** (n=78)	
Ischemic stroke (n=133)	67	66	0.000
Hemorrhagic stroke (n=113)	101	12	
Total	**246**		

Table No. 2 Stratification of Hypertension with regards to diabetes mellitus.

Diabetes	**Hypertension**		**P – value**
	Yes (n=168)	**No** (n=78)	
Yes (n=46)	39	07	0.008
No (n=200)	129	71	
Total	**246**		

Table No. 3 Stratification of Hypertension with regards to Smoking.

Smoking	**Hypertension**		**P – value**
	Yes (n=168)	**No** (n=78)	
Yes (n=110)	86	24	0.004
No (n=136)	82	54	
Total	**246**		

Table No. 4 Stratification of Type of stroke with regards to gender.

Gender	**Type of stroke**		**P – value**
	Ischemic stroke (n=133)	**Hemorrhagic stroke** (n=113)	
Male (n=160)	84	76	0.592
Female (n=86)	49	37	
Total	**246**		

Table No. 5 Distribution of blood pressure with regards to type of stroke. (n=246)

Blood pressure	**Type of stroke**		**P – value**
	Ischemic stroke Mean (SD)	**Hemorrhagic stroke** Mean (SD)	
Systolic blood pressure	136.54 + 23.30	184.51 + 32.73	0.000
Diastolic blood pressure	84.44 + 15.08	102.48+ 13.12	0.000

Discussion

Stroke is a global health problem. Stroke is responsible for major disabilities in adult population, and is 2nd leading cause of deaths all over the world. Estimated 15 million people all over the world become victim of stroke every year all over the world, of which 5 million die and other 5 million are left permanently disabled and thus major burden on the sufferer and families as well. Different studies have reported hypertension as major cause of stroke in different populations. Different studies have reported that Male patients account for a large proportion in both ischemic and hemorrhagic groups. Our study included 246 stroke patients of which 160 (65%) were male patients and 86 (35%) were female patients. Zhang et al [18] reported 61.85 % male gender with stroke and 38.15 % females having stroke. The results of Zhang et al [18] are similar to that of our study results. Shah et al [17] reported 70 % male patients and 30 % female patients, which is also close to our study results. Similar results have been reported in many other studies as well[1,2,12,13].

It is well documented that the risk of stroke increases with increasing age, especially in hypertensive patients. Mean age of our study cases was 59.63 $\pm$ 11.24 years. Zhang et al [18] reported 62.16±12.59 mean age of stroke patients from China which is close to our results. Shah et al [17] reported 60 $\pm$ 18 years mean age of stroke patients. Similar results have been reported in many other studies [1-3,7,12, 13].

Of these 246 stroke patients, 13 (5.3%) had previous history of stroke as well. Shah et al [17] reported 6 % previous history of stroke in stoke patients, these findings are in compliance with that of our study results. Smoking was observed in 110 (44.7%) of our study cases and all the smokers were male patients. Shah et al [17] reported only 16 % smoking in stroke patients, which is quite less than that of our study findings. A study conducted by Khan et al [19] reported 43 % smoking from Karachi, which is close to our study results. Similar results have been reported in other studies as well[12, 13].

Many studies have reported Ischemic stroke being more common than hemorrhagic stroke.[17-19] Similar findings are made in our study. Ischemic stroke was seen in 133 (54.1%) of our study case, while hemorrhagic stroke was noted in 113(45.9%) of our study cases. Zhang et al [18] reported higher frequencies of ischemic stroke (78%) and lower frequencies of hemorrhagic stroke (22%). Shah et al [17] reported 72 % ischemic stroke while 28 % hemorrhagic stroke. Taj et al[13] also reported 67% ischemic stroke and 33% hemorrhagic stroke in stroke patients from Karachi.

Diabetes was seen in 46 (18.7%) of our study cases with stroke. Khan et al [19] reported 41.3% stroke patients were having diabetes mellitus, which is quite higher than our finding. Taj et al[13] reported 40.3% stroke patients as having diabetes mellitus, which is again higher than our frequencies of diabetes. Higher frequencies of diabetes have been in other studies as well[2, 7, 11].

Of these 246 stroke patients, 148 (60.2%) were known hypertensive and all of them were taking anti-hypertensive medication. Shah et al [17] reported 100 % known hypertensive patients having stroke and all of them were on antihypertensive therapy, which is same as our finding. Hypertension has been documented as major risk factor for stroke in many different studies[1, 2-5, 12, 13, 17-20]. Frequency of hypertension at presentation in our study was 168 (68.3%). Basharat et al[2] reported 86 % hypertension in patients with stroke. Taj et al[13] reported 78 % hypertension in stroke patients. Khan et al[6] reported 56 % stroke patients were having hypertension. Our study results are in compliance with that of other studies reported from Pakistan as well as from other countries. Hypertension, smoking, increasing age and diabetes mellitus were major risk factors for the stroke.

Conclusion

A higher frequency of modifiable risk factors was seen with Hypertension was the leading risk factor of stroke in our study. These findings point towards well directed efforts regarding conventional interventions in our population. Hemorrhagic stroke was significantly associated with elevated blood pressure. Hypertension was significantly associated with increasing age, diabetes, previous history of stroke, hemorrhagic stroke and smoking in stroke patients.

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