

Hypertension as Independent Risk Factors for Acute Stroke

1. Javed Akhter Rathore 2. Mohammad Saleem 3. Bashir Ahmed Trumbu

1. Asst. Prof. of Medicine, AJKMC, Muzaffarabad 2. Consultant Physician, DHQ Hospital Kotli AJK
3. Consultant Physician, AKCMH/SKBZ Muzaffarabad

ABSTRACT

Objective: The stroke is leading cause of death in world and many patients die of an acute stroke. This study was conducted to determine whether the hypertension is independent risk factor for acute stroke.

Study Design: Prospective cross sectional

Place and Duration of study: This study was carried out at AK CMH/SKBZ Muzaffarabad from May 2012 to May 2013.

Materials and Methods: In this study 220 patients having first ever acute stroke. Many clinical variables have been investigated as risks factors for stroke. The hypertension was investigated as a risk factor for stroke. The evaluation of patients included structured questionnaire, clinical, neurological examinations, laboratory tests, and computed tomogram scan (CT) brain. The follow-up at 14 days was done for all patients.

Results: Out of 220 cases of acute stroke, 171 (77.73%) were hypertensive, and 49(22.27) % were normotensive. The statistical significant risk factors for stroke were: hypertension ($p=0.04$) and Hypercholesterolemia ($p=0.05$); for cerebral infarction (CI): ($p<0.001$) and hypertension ($p = 0.05$) and Hypercholesterolemia ($p=0.001$); for intracerebral hemorrhagic (ICH) stroke ($p = <0.001$). The low Glasgow coma scale (GCS) score ($p=0.05$) on admission was associated with high mortality and worst outcome in hypertensive patients. Thus hypertension has statistical significant association for both CI and ICH stroke patients.

Conclusion: This study confirms the statistical significant association of hypertension with acute stroke and emphasizes the need in preventing and controlling of hypertension in order to avoid stroke and its mortality.

Key Words: acute stroke; hypertension, outcome

INTRODUCTION

The stroke is third leading cause of death worldwide and 10% of patients with an acute ischemic stroke die within 30 day¹⁻³ It has major impact on mortality and morbidity . Various risk factors have been associated with stroke. The hypertension has important association with stroke. The identification of hypertension and other risk factors have therapeutic implications.⁴ Various studies show hypertension as major risk factor for hemorrhagic stroke.⁴⁻⁶

MATERIALS AND METHODS

The patients who presented with a first-ever acute stroke were prospectively studied. The WHO definition was used to define stroke.⁷The ethics committee approved this study. The stroke was diagnosed when neurological deficits were confirmed on CT scan brain. Patients with transient ischemic attack (TIAs) and subarachnoid hemorrhage (SAH) were excluded. A 12-lead ECG and echocardiography were done. Stroke severity on admission was assessed with Glasgow coma scale (GCS) ⁸The history of preexisting stroke risk factors specifically hypertension were assessed. The hypertension was defined as history of hypertension or if the patient had antihypertensive treatment or had two measurement of blood pressure BP >160/95 mm Hg or single measurement of BP>180/110 Hg during admission⁹, diabetes mellitus was defined as by

preadmission history of diabetes mellitus and venous plasma glucose concentration of 7.0mmol/l after an overnight fast on at least two separate measurement and or 11.1 mmol/l two hour post prandially¹⁰, current cigarette smoking was defined as who smoked at least one cigarette/tobacco per day for preceding three months or more, Hypercholesterolemia defined as by preadmission history with cholesterol >5 mmol/l, and LDL-cholesterol >3 mmol/l¹¹ and history of coronary artery disease. The death due to stroke was measured as outcome in all hypertensive patients. Our approach to assess hypertension as independent factors in stroke patients were consistent with international studies.¹² Data based on structured questionnaires was prepared and neurological examinations were performed. Blood pressure levels were recorded on admission and after hospitalization. The data entry and analyses were done on software statistical package SPSS 20. Chi square test was used to get p value. Hypertension was cross tabulated as independent variable to stroke as dependent variables to get p value. P value <0.05 was considered significant.

RESULTS

During the May 2012 to May 2013, 220 patients (mean age $\pm$ SD, 63.82 $\pm$ 9.87) range 45 to 85 years were admitted with acute stroke. There were 119 males and 101 women (54.1% vs. 45.9%). The maximum frequency of stroke was seen between ages 55-74.

Mean systolic blood pressure was 163.85 ± 28.53 and mean diastolic blood pressure 102.46 ± 18.8 . The GCS was shown in table.

Out of 171 hypertensive patients 119(54.1%) had cerebral infarctions (CI) and 50(22.9%) had hemorrhagic stroke.

Table shows the characteristics of the 220 patients with acute stroke. Hypertension was the most common risk factor for stroke 171(77.72) followed by hypercholesterolemia 145 (70.7 %). Others risk factors are

also shown in table. The mean fasting blood sugar was 6.49 ± 1.31 mmol/l, mean random blood sugar 8.43 ± 4.74 and mean cholesterol was 6.49 ± 1.16 mmol/l. Out of 220 patients with acute stroke 35(15.9%) died. Mortality was common between ages 55-74 years. GCS score <1-8 significant association with mortality. Our analysis revealed hypertension ($p = <0.001$) is major and independent risk factor for both systolic blood pressure (SBP) and diastolic blood pressure (DBP).

Table No.1: Characteristics of stroke according to hypertension and other risk factors, demographics and GCS score

	Total	Hypertensive	P-value	Normotensive	P-Value
N (%)	220	171(77.72)		49(22.7)	
Age (year) mean age $\pm$ SD		64.21 $\pm$ 9.61	.941	62.29 $\pm$ 110.75	.278
Age category 45-54	43 (19.5)				
55-64	66 (30.0)				
65-74	72 (32.7)		.272		.488
75-84	36 (16.4)				
>85	03 (1.4)				
Male	119(54.1)	87 (73.1)	.062	30 (25.2)	<0.001
Female	101 (45.9)	86 (67.3)		15 (14.9)	
<i>Stroke subtype</i>					
Ischemic Infarct Brain		119(54.1)	.041	40(18.1)	<0.001
Hemorrhagic Stroke		50(22.9)	.052	11(5)	<0.001
Risk factors					
SBP		171 (77.72)	<0.001	49 (22.27)	.056
DBP			<0.001		<0.001
Hypercholesterolemia	159 (72.3)	130 (81.8)	.053	29 (18.2)	.180
Smoking	132 (60.0)	104 (78.8)	.949	28 (21.2)	.964
Cardiac Disease	99 (45.0)	82 (82.8)	.412	17 (17.2)	.001
Diabetes	36 (16.3)	26 (72.2)	.963	10 (27.8)	.033
Atrial Fibrillation	23 (10.5)	15 (65.2)	.159	08 (34.8)	.001
Outcome					
GCS 1-8	64 (29.1)		.059		.962
9-12	103 (46.8)				
13-15	53 (24.1)				
Died in Hospital	35(15.9)	30(13.6)	.003	5(2.27)	

P-value asym. 2-sided

DISCUSSION

Out of 220 patients of stroke 171(77.72%) were hypertensive. Our results showed that hypertension is

commonest risk factor for both ischemic and intracerebral hemorrhagic stroke. The statistical significant association of hypertension for stroke subtype was: hypertension (CI; $p = 0.041$ vs. ICH; $p =$

0.052) followed by Hypercholesterolemia (CI; $p = 0.002$ vs. ICH; $p = 0.002$). The low GCS score ($p < 0.001$) on admission in hypertensive was associated with worst outcome. Hypertension and hypercholesterolemia have statistical significant association with stroke in our study and are interrelated each other as reported earlier.

^{4 6 12} Both SBP and DBP has significant association with stroke and its subtypes. The other risks factors like ischemic heart disease (IHD), smoking, diabetes mellitus, are common modifiable vascular risk factors for stroke as shown in previous epidemiological studies¹³⁻¹⁵

Our study showed that hypertension and its level was the most important independent potential risk factor for all stroke subtype, particularly for intracerebral hemorrhagic stroke as observed previously¹⁶ Although hypertension is statistical significant in stroke in our study but the hypertension is underestimated as risk factor for stroke, because we used high cutoff point for blood pressure of 160/90 mm Hg. Estimated actual blood pressure is also problematic during study as it might be raised in acute stroke phase. Subsequently blood pressure might be lowered than usual because of use of antihypertensive drugs and poor food and salts intake. We used two means reading in order to avoid these biases to minimum levels. Smoking has significant association with ischemic stroke¹⁷ but was insignificant in our study. The cholesterol has significant association with stroke in our study as have been shown in another study.¹⁸

Limitation of our study is using high cutoff point for blood pressure estimation. In order to avoid bias in our study for hypertension, history that relied on past medical history was substantiated on examination and investigations to establish its relationship to stroke. In our study 16% died of stroke which is consistent with previous studies in Pakistan¹⁹⁻²⁰ and developed countries.²¹ Our study confirms that hypertension is statistical significant risk factor for acute stroke as shown in previous studies.²²⁻²⁴

CONCLUSION

Stroke causes great morbidity and mortality. We reports 16 % mortality rate after acute stroke. Our findings suggest that hypertension was statistical significant and independent risk factor of ischemic and intracerebral hemorrhagic stroke. The modifications of hypertension as modifiable risk factor for primary prevention and interventions that reduce blood pressure optimally can play a beneficial role in secondary prevention of stroke.

REFERENCES

1. Rothwell PM, Coull AJ, Giles MF, Howard SC, Silver LE, Buller LM, et al. Change in stroke incidence, mortality, case-fatality, severity, and risk factors in Oxfordshire, UK from 1981 to 2004 (Oxford Vascular Study). *Lancet* 2004;363:1925.
2. Feigin VL. Stroke in developing countries: can the epidemic be stopped and outcomes improved? *Lancet Neurol* 2007; 6: 94–97.
3. Strong K, Mathers C, Bonita R. Preventing stroke: saving lives around the world. *Lancet Neurol* 2007; 6:182–87.
4. Ariesen MJ, Claus SP, Rinkel GJ, Algra A. Risk factors for intracerebral hemorrhage in the general population: a systematic review. *Stroke* 2003; 34:2060–65.
5. Donnan GA, Hankey GJ, Davis SM. Intracerebral haemorrhage: a need for more data and new research directions. *Lancet Neurol* 2010;9:133–34.
6. O'Donnell M, Xavier D, Diener C, et al. Rationale and design of Interstroke: a global case-control study of risk factors for stroke. *Neuroepidemiol* 2010;35: 36–44.
7. Hatano S. Control of stroke in the community, Methodological consideration and protocol of WHO stroke register. Geneva WHO 1973;98. document no. CVD/S/73
8. Sandercock PAG, Warlow CP, Starky IR. Predisposing factors for cerebral infarction: the Oxfordshire community stroke project. *Br Med J* 1989;298:75-81.
9. Caroline TM, Mackerback JP. Socioeconomic difference in stroke among Dutch elderly women. *Stroke* 1999;30:357-62.
10. Hamidon BB, Raymond AA. The Impact of Diabetes mellitus on in-hospital strokes Stroke mortality. *J Postgraduate Med* 2003;49:307-10
11. Togha M, Bakhtavar K. Factors associated with in-hospital mortality following intracerebral hemorrhage: a three-year study in Tehran, Iran. *BMC Neurol* 2004;4:9.
12. McQueen MJ, Hawken S, Wang X, et al. For the Interheart study investigators. Lipids, lipoproteins, and apolipoproteins as risk markers of myocardial infarction in 52 countries (the Interheart study): a case-control study. *Lancet* 2008;372:224–33.
13. Sacco RL, Khatri M, Rundek T, et al. Improving global vascular riskprediction with behavioral and anthropometric factors. The multiethnic NOMAS (Northern Manhattan Cohort Study). *J Am Coll Cardiol* 2009; 54: 2303–11.
14. Hankey GJ. Potential new risk factors for ischemic stroke: what is their potential? *Stroke* 2006;37: 2181–88.
15. Johnston SC, Mendis S, Mathers CD. Global variation in stroke burden and mortality: estimates from monitoring, surveillance, and modelling. *Lancet Neurol* 2009; 8: 345–54.
16. Woo D, Haverbusch M, Sekar P. et al. Effect of untreated hypertension on haemorrhagic stroke. *Stroke* 2004;35:1703–1708.
17. Teo KK, Ounpuu S, Hawken S, et al. On behalf of the Interheart Study Investigators. Tobacco use and

- risk of myocardial infarction in 52 countries in the Interheart study: a case-control study. *Lancet* 2006; 368: 647–58.
18. Prospective Studies Collaboration. Blood cholesterol and vascular mortality by age, sex, and blood pressure: a meta-analysis of individual data from 61 prospective studies with 55 000 vascular deaths. *Lancet* 2007; 370: 1829–39.
 19. Razzak AA, Khan BA, Baig SM. Ischemic strokes in young adults of South Asia. *J Pak Med Assoc* 2002; 52:417–22.
 20. Fayyaz M, Hassan MA, Atique MH. Risk factors and early prognosis in stroke. *Ann King Edward Med Coll* 1999; 5:12–5.
 21. Ezzati M, Hoorn SV, Rodgers A, Lopez AD, Mathers CD, Murray CJL. The Comparative Risk Assessment Collaborating Group. Estimates of global and regional potential health gains from reducing multiple major risk factors. *Lancet* 2003; 362: 271–80.
 22. Tatu L, Moulin T, El Mohamad R, et al. Primary intracerebral hemorrhages in the Besancon stroke registry. Initial clinical and CT findings, early course and 30 day outcome in 350 patients. *Eur Neurol* 2000;43:209–214.
 23. Inagawa T, Ohbayashi N, Takechi A, et al. Primary intracerebral hemorrhage in Izumo City, Japan: incidence rates and outcome in relation to the site of hemorrhage. *Neurosurgery* 2003;53:1283–1297.
 24. Song YM, Sung J, Lawlor D, et al. Blood pressure, haemorrhagic stroke, and ischaemic stroke: the Korean national prospective occupational cohort study. *BMJ* 2004;328:324–325.

Address for Corresponding Author:**Dr. Javed Akhtar Rathore,**

Assistant Professor of Medicine AJK Medical College
Muzaffarabad A.K

Consultant Physician & Head of Department of
Medicine & Supervisor FCPS Part-II

Trainee Medicine-Combined Military Hospital /Sheik
Khalifa Bin Ziyad Hospital Muzaffarabad, A.K

Cell+92-355-8106847, 0300-5377451

Email: drjavedrathore111@yahoo.com