

Assessment of association of demographic characteristics, diet and disease with haemorrhagic stroke and factors causing stroke leading to cerebral haemorrhage in male patients in Quetta, Balochistan, Pakistan

Anila Alam¹, Musa Bin Bashir², Mirwais Khan³, Asad Khan⁴, Safiullah Khan Achakzai⁵, Abdul Wahid⁶

¹Sardar Bahadur Khan Women University, Balochistan, Pakistan

²Xi'an Jiaotong University College of Medicine, China

³Balochistan Institute of Psychiatry and Behavioural Sciences, Quetta, Pakistan

⁴Quaid I Azam University, Islamabad, Pakistan

⁵Center for Advanced Studies in Vaccinology and Biotechnology, University of Balochistan, Pakistan

⁶Faculty of Pharmacy and Health Sciences, University of Balochistan, Pakistan

ABSTRACT

Objectives. This study aimed to assess and make a pattern of factors causing stroke leading to cerebral haemorrhage in male patients as well as to assess association of demographic characteristics, diet and disease with haemorrhagic stroke in Quetta, Balochistan, Pakistan.

Methods. In a cross sectional questionnaire based interviewing study, a questionnaire was designed to access the pattern of factors causing stroke leading to cerebral haemorrhage in male patients. Total 339 cases (adult male who had haemorrhagic stroke) were identified from two government and four private hospitals in Quetta City, Province Balochistan, Pakistan. The study was conducted within the time period of 9 months, from March to November, 2015. The data was piloted and then final data was analysed by using IBM SPSS 22.

Results. In demographic characteristic study of patients, majority 219 (64.6%) were among the age group between 51 years and above, 330 (97.3%) were married, majority 186 (54.9%) were having urban residence and 277 (81.7%) were having own residence ownership, 127 (37.5%) were having addiction to smoking and 120 (35.4%) were addicted to tobacco and snuff. 124 (36.6%) were reluctant to mention whether their patients were either smokers or not. Among total 339 patients, majority 284 (83.8%) were not doing physical exercise routinely or if they were recommended by the physician. Among the 339 patients, all 339 (100%) of patients selected the multiple options among all given options (headache, unconscious/loss of consciousness, pain in neck).

Conclusions. Demographic characteristics, low level of education, low income, urban residence in combined family setup, married, increased number of children are associated with hemorrhagic stroke. Smoking, tobacco and snuffing may also cause stroke. Lack of physical exercise, past history of stroke, diabetes mellitus, cardiovascular disease, hypertension (personal or family) of any type does not significantly cause stroke but may increase the risk of stroke.

The order of events suddenly happened to the hemorrhagic patients are headache, pain in neck, vomiting and finally state of unconsciousness.

Keywords: stroke, cerebral haemorrhage, hypertension, diabetes mellitus, cardiovascular disease

INTRODUCTION

The term stroke means the abrupt death of brain cells in a confined area due to inadequate blood flow (1). WHO defined the stroke as a clinical syndrome characterized by rapidly developing clinical

symptoms and / or signs of focal, and at times global (applied to patients in deep coma and those with subarachnoid haemorrhage), loss of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin (2). This defini-

Corresponding authors:

Asad Khan

E-mail: assad.pharmacist@gmail.com

Article History:

Received: 19 April 2021

Accepted: 19 June 2021

tion includes stroke due to cerebral infarction, primary intra cerebral haemorrhage (PICH), intra ventricular haemorrhage, and most cases of subarachnoid haemorrhage (SAH); it excludes subdural haemorrhage, epidural haemorrhage, or intracerebral haemorrhage (ICH) or infarction caused by infection or tumour (2).

The National Stroke Association defines the stroke as a brain attack that can be happened at any time that can occurs when blood flow to an area of brain is cut off. When this happens, brain cells are deprived of oxygen and begin to die. When brain cells die during a stroke, abilities controlled by that area of the brain are lost (2).

As per an estimate of WHO, every year about 15 million of world population suffers from stroke out of which around 33% (5 million) die and 33% become disabled permanently. Globally on every 10th second, a life is taken by stroke and on every ½ second an incident of stroke occurs. High blood pressure is the major risk factor in stroke which causes more than 80% of stroke cases (12.7 million) worldwide. Other risk factors of stroke are smoking, atrial fibrillation, heart failure and heart attack (3,4).

Generally, stroke has three major types, i.e. infarction, haemorrhage and ischemic. Infarction occurs due to formation of blood clot along the wall of a blood vessel (i.e. thrombosis) (5). In developing countries burden of stroke is increasing rapidly. They borne about 66% of total stroke burden and rate of stroke in these countries has exceeded the rate of developed countries by 20% during the period from 2000 to 2008 (6). In terms of mortality and morbidity caused by the stroke globally, stroke found to be the leading cause of death in people of age group of 60 years and above and is the 5th leading cause of death among people of age group 15-59 years (7). In terms of disability, stroke is found to be the leading cause worldwide and in developing countries it is the 2nd leading cause of disability. Around four fifth (> 80%) of stroke cases are caused by ischemic brain infarction (8). Ischemic stroke is caused by obstruction in a blood vessel supplying blood to brain. This blockage in blood vessel could be caused due to blood clot in the vessel or due to hardening of blood vessel supplying blood to the brain because of accumulation of fat in vessel walls. Remaining one fifth (13%) of stroke cases are caused by hemorrhagic stroke,

which is less frequent and occur due to rupture or burst of a blood vessel which leads to the bleeding. Accumulation of blood compresses surrounding brain tissues causing deprivation of oxygen and nutrients to the surrounding tissues. This type carries higher risk of death (9).

In first month after stroke about 80 to 90% ischemic stroke patients survive while survival rate drops to 67-80% in one year after stroke (10). Rate of stroke mortality is greater than that of other chronic diseases if all put together (AIDS, TB and malaria) worldwide (9). Major recovery occurs within first three months after stroke while long term disability often remains for a longer than 3 months (11,12). Stroke has major effects on the quality of life of its survivors and of their caregivers of long term durations which require more targeted rehabilitation to avoid further complications in terms of depression and other allied disabilities (12).

Incidences of stroke are decreasing in the west but are increasing in case of South Asia. Specifically, in case of Pakistan fewer studies have been conducted on prevalence of stroke and very limited data on the subject is available. However, prevalence of stroke risk factors in the country is very high which could be translated into high prevalence of stroke in the country. The incidence of stroke varies among various countries. In United States, it is about 200 patients per 100,000 population (13). During the last decade, the age-adjusted prevalence rate of stroke in India was between 250 and 350/100,000 (14). In Pakistan the estimated incidence of stroke is close to 250 per 100,000 populations projecting to 350,000 new cases of stroke patients per year. Due to sub-optimal medical care, about 40% die within 6 months while the remaining 60% are added to the pool of disabled people (15).

RESULTS

Demographic characteristics

339 questionnaires were filled from the attendants of the male patients suffered through Haemorrhagic stroke with the response rate of 100% as shown in table 1.

In demographic characteristic study of patients, majority 219 (64.6%) were among the age group

between 51 years and above, 330 (97.3%) were married. Majority in the category of qualification level were others ranging (16.2%) that contained the ones having religious education and the individuals having ability to read and write. 88 (26.0%) were farmers and labours, 76 (22.4%) having income less than 5,000, as shown in table 4.1 respectively.

TABLE 1. Demographic characteristics of haemorrhagic stroke patients

Age group	Frequency (N = 339)	Percent
20 to 35 years	17	5.0
36 to 50 years	103	30.4
51 years and above	219	64.6
Marital status		
Married	330	97.3
Single	9	2.7
Qualification		
Primary	40	11.8
Middle	18	5.3
Metric	18	5.3
Intermediate	10	2.9
Graduation	15	4.4
Post-graduation	8	2.4
Others	55	16.2
Don't want to mention	3	.9
Occupation		
Unemployed	33	9.7
Self-employed/ Business owner	67	19.8
Govt. employee	49	14.5
Private employee	34	10.0
Professional	11	3.2
Labour/Farmer	88	26.0
Retired	57	16.8
Income		
Less than 5,000	76	22.4
5,000-10,000/ month	64	18.9
10,001-15,000/ month	60	17.7
15,001-20,000/ month	63	18.6
More than 20,000/ month	74	21.8
Don't want to mention	2	.6

Note*: Income: Pk. Rs (Pakistani Rupee) = 102.04 US Dollar (Pakistan Exchange Rate: 04th October, 2015)

Disease characteristics (family)

Table 2 shows the past disease history of patient's family. Among 339 patients, majority 198 (58.4%) were having the family history of diseases more than one in given options of headache, vom-

iting, hypertension, diabetes mellitus, liver, cardiovascular diseases and renal diseases.

TABLE 2. Family history of disease(s) of patients

Anyone in family who had either of disease(s) mentioned as	Frequency	Percent
Headache	35	10.3
Vomiting	2	.6
Hypertension	9	2.7
Diabetes mellitus	4	1.2
Cardiovascular disease	7	2.1
Renal	2	.6
More than one option	198	58.4
None of all options	65	19.2
Other than one the given options	17	5.0

Disease history characteristics (personal)

Table 3 shows the disease history pattern of the patients. Among 339 patients, majority 249 (73.5%) were having multiple number of diseases selected in given options of headache, vomiting, hypertension, diabetes mellitus, liver, cardiovascular diseases and renal diseases (more than one options).

TABLE 3. Disease history pattern (personal)

Tick the disease(s) first suffered through himself	Frequency	Percent
Headache	64	18.9
Vomiting	1	.3
Hypertension	7	2.1
Diabetes mellitus	3	.9
Cardiovascular disease	2	.6
Renal	1	.3
More than one option	249	73.5
None of all options	11	3.2
Other than the given options	1	.3
Past history of stroke/cerebral haemorrhage		
Yes	55	16.2
No	278	82.0
Recovered	6	1.8
If yes then mention the specific stroke		
Ischemic stroke	46	13.6
Haemorrhagic stroke	13	3.8
Not applicable	280	82.6
Any past history of headache		
Yes	192	56.6
No	22	6.5
Recovered	25	7.4
Existing	98	28.9
Don't know/Don't want to mention	2	.6

Majority 278 (82.0%) were not having any past history of stroke/cerebral haemorrhage while 55

(16.2%) were the patients having known past history of stroke/cerebral haemorrhage.

The option was not applicable to majority 280 (82.6%) of the patients, where among the patients having known history of stroke, majority 46 (13.6%) gone through Ischemic stroke. Majority 192 (56.6%) were having past history of headache.

Consultancy and follow up characteristics

Table 4 shows the consultancy of the patient along with his treatment and follow up record features. Among 339 of all patients, majority 217 (64.0%) patients were those who visited the consultant for specified disease. 182 (53.7%) had taken the treatment/ medication. 150 (44.2%) were not advised regarding any dietary change by consultant.

TABLE 4. History, consultancy and treatment pattern of patients

If yes to any disease, has he visited the consultant for specified disease	Frequency	Percent
Yes	217	64.0
No	47	13.9
Self-treated	16	4.7
Ignored	59	17.4
Has he taken the treatment/medication		
Yes	182	53.7
No	115	33.9
Not taken as recommended	24	7.1
Taken but was not effective	18	5.3
Did he follow the advice of consultant regarding any dietary change		
Yes	130	38.3
No	150	44.2
Not followed as recommended	57	16.8
Don't know/Don't want to mention	2	.6

Hypertension, its history and its treatment pattern

Table 5 shows the pattern of history and treatment of patients having hypertension.

Among 339 patients, majority 108 (31.9%) was not applicable to the option of having past history of hypertension, where 105 (31.0%) patients were having known history of hypertension (HTN) from a time period of 1 to 10 years. Majority 125 (36.9%) were those who visited the consultant when they needed to go for HTN. 130 (38.3%) had

used the medication for HTN and 98 (28.9%) were newly diagnosed as patient of HTN.

TABLE 5. History and treatment pattern of patients having hypertension

Total time period of hypertension	Frequency	Percent
Below one year	98	28.9
1 to 10 years	105	31.0
11 years and more	28	8.3
Not applicable	108	31.9
No. of visits to consultant		
Weekly	30	8.8
Monthly	76	22.4
When needed	125	36.9
Not applicable	108	31.9
Medication used Yes/No		
Yes	130	38.3
No	101	29.8
Not applicable	108	31.9
Time period for treatment		
Short-time treatment	37	10.9
Long-time treatment	96	28.3
Newly diagnosed	98	28.9
Not applicable	108	31.9
Don't know/Don't want to mention		
Newly diagnosed	104	30.7
Don't Know	2	.6
Not applicable	233	68.7

Diabetes mellitus, its history and its treatment pattern

Table 6 shows the pattern of history and treatment of patients having diabetes mellitus. Among 339 patients, majority 281 (82.9%) were not associated to any past history of diabetes mellitus (DM) where 34 (10.0%) were having DM from past 1 to 10 years. 26 (7.7%) visited the consultant on monthly basis. 40 (11.8%) patients used the medication. 38 (11.2%) had taking the treatment from last few years (Long-term treatment) and the option was not applicable on majority 320 (94.4%) of the patients.

TABLE 6. History and treatment pattern of patients having diabetes mellitus

Total time period of diabetes mellitus	Frequency	Percent
Below one year	16	4.7
1 to 10 years	34	10.0
11 years and more	8	2.4
Not applicable	281	82.9
No. of visits to consultant		
Weekly	11	3.2
Monthly	26	7.7
When needed	21	6.2
Not applicable	281	82.9

Total time period of diabetes mellitus	Frequency	Percent
Medication used Yes/No		
Yes	40	11.8
No	18	5.3
Not applicable	281	82.9
Time period for treatment		
Short-time treatment	2	.6
Long-time treatment	38	11.2
Newly diagnosed	18	5.3
Not applicable	281	82.9
Don't know/Don't want to mention		
Newly diagnosed	19	5.6
Not applicable	320	94.4

Cardiovascular disease, history and its treatment pattern description

Table 7 shows the pattern of history and treatment of patients having any type of cardiovascular diseases. Among 339 haemorrhagic stroke patients, majority 301 (88.8%) were not applicable to the option of mentioning the specific cardiovascular (CVS) disease, where 31 (9.1%) were diagnosed CVS patients. 18 (5.3%) visited the consultant on monthly basis. 32 (9.4%) patients used the medication. 23 (6.8%) had taking the treatment from last few years (Long-term treatment) and the option was not applicable on majority 333 (98.2%) of the patients.

TABLE 7. History and treatment pattern of patients having cardiovascular disease

Mention the specific disorder	Frequency	Percent
Diagnosed	31	9.1
Undiagnosed	7	2.1
Not applicable	301	88.8
No. of visits to consultant		
Weekly	11	3.2
Monthly	18	5.3
When needed	9	2.7
Not applicable	301	88.8
Medication used Yes/No		
Yes	32	9.4
No	6	1.8
Not applicable	301	88.8
Time period for treatment		
Short-time treatment	11	3.2
Long-time treatment	23	6.8
Newly diagnosed	4	1.2
Not applicable	301	88.8
Don't know/Don't want to mention		
Newly diagnosed	6	1.8
Not applicable	333	98.2

Suddenly happened factors

Factors that have been happened suddenly to patients before unconsciousness state, among total patients, all 339 (100%) of patients selected the multiple options between the given options (headache, unconscious/ loss of consciousness, pain in neck).

DISCUSSION

Demographic characteristics are the main determinants of stroke. Results of the present study shows that people older than the age of 50 are mostly affected from the hemorrhagic stroke. Align to the studies conducted in other parts of the world (16-19), it is also supported by some local studies conducted in Pakistan (20-23). The age is the main factor in causing stroke it may be because of the reason that in older age the elasticity of the blood vessels increases and as a result the blood flow towards brain also increases, this increase in volume of blood puts pressure on the cerebral arteries as a result it ruptures.

Another associated factor is low qualification level. The patients mostly suffered through stroke are less qualified or it may be because they had not been through any academic session, similar to the results evaluated in a study (24). Another study (25) also supports our results. This may be due to the people having lower level of education they may not be able to read or write and thus they are unable to understand the risk factors of their particular disease or they may have less knowledge.

Lower income/lower socioeconomic status is associated to stroke. In the current study the patients suffered through the hemorrhagic stroke were mainly labours and farmers having the income level of less than 5000 PK Rs. This represents that lower the income high will be the risk of stroke. Similarly, to the study conducted worldwide (24,25) It may be because, having low income they may not be able to take the balanced diet required for their body needs. Another possibility is; they may not be able to visit the physician or take the medications that further causing stress leading to haemorrhage.

The study concludes the significant association of stroke with the past history of diseases like headache, HTN, DM, CCD and other diseases.

The incidence of haemorrhage can be caused in patients having past history of mentioned diseases. But, it is not necessary that every stroke patient must have the past history of any of disease. It is also supported by some studies (26,27).

There are many studies (17-28) representing one of the risk factor of stroke but they also show an association with those particular diseases to stroke. Similarly, in this study it is observed that many of the risk factors were the cause of stroke. It may be due to some stress, alcohol consumption, smoking and some have socioeconomic problems but it can't be said that diseases like CVS, DM and HTN are the only risk factor of stroke of any type.

There are certain factors that specifically happened to all the patients included in this study. The patients suffered with headache, migrated towards neck and then abruptly gone to unconscious state of health.

CONCLUSIONS

It is concluded that stroke is one of the major diseases that have a high rate of morbidity and mortality. Other factors are demographic characteristics are associated with hemorrhagic stroke. Those who usually have low level of education, low income, urban residence in combined family setup, married, increased number of children, stayed mostly at home were having polite attitude towards their family, friends and relatives were mostly suffered through hemorrhagic stroke. Past history of stroke, diabetes mellitus, cardiovascular disease, hypertension (personal or family) of any type does not significantly cause stroke but it may increase the risk of stroke. The order of events suddenly happened to the hemorrhagic patients are headache, pain in neck, vomiting and finally state of unconsciousness.

Conflict of interest: none declared

Financial support: none declared

REFERENCES

- Gale Encyclopedia of Medicine.: 2008 [cited 2015 October]; Available at: medical-dictionary.thefreedictionary.com/stroke.
- Association NS. [cited 2015 October]; Available at: <http://www.stroke.org/understand-stroke/what-stroke>.
- World health report. WHO Geneva 2007. Available at: (http://www.who.int/whr/2007/whr07_en.pdf); http://www.who.int/topics/cerebrovascular_accident/en.
- Rosamond W, Flegal K, Friday G, Furie K, Go A, et al.; American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics--2007 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation*. 2007 Feb 6;115(5):e69-171.
- MM Ahmed MN. Study of clinical presentation versus CT findings regarding the type of liaison in stroke. *Pak J Neurol*. 2004;10.
- Truelsen T, Heuschmann PU, Bonita R, Arjundas G, Dalal P, et al. Standard method for developing stroke registers in low-income and middle-income countries: experiences from a feasibility study of a stepwise approach to stroke surveillance (STEPS Stroke). *Lancet Neurol*. 2007 Feb;6(2):134-9.
- World Health Organization (2004). The atlas of heart disease and stroke / Judith Mackay and George Mensah; with Shanthy Mendis and Kurt Greenland. World Health Organization. Available at: <https://apps.who.int/iris/handle/10665/43007>.
- Feigin VL, Lawes CM, Bennett DA, Anderson CS. Stroke epidemiology: a review of population-based studies of incidence, prevalence, and case-fatality in the late 20th century. *Lancet Neurol*. 2003 Jan;2(1):43-53.
- Campaign WSO. World Stroke Organization. Available at: <http://www.worldstrokecampaign.org/learn.html>.
- Kaste M, Fogelholm R, Rissanen A. Economic burden of stroke and the evaluation of new therapies. *Public Health*. 1998 Mar; 112(2):103-12.
- Cramer SC. Repairing the human brain after stroke: I. Mechanisms of spontaneous recovery. *Ann Neurol*. 2008 Mar;63(3):272-87.
- Hackett ML, Duncan JR, Anderson CS, Broad JB, Bonita R. Health-related quality of life among long-term survivors of stroke : results from the Auckland Stroke Study, 1991-1992. *Stroke*. 2000 Feb;31(2):440-7.
- Barnett HJ. Forty years of progress in stroke. *Stroke*. 2010 Jun; 41(6):1068-72.
- Pandian JD, Sudhan P. Stroke epidemiology and stroke care services in India. *J Stroke*. 2013 Sep;15(3):128-34.
- Khealani BA, Hameed B, Mapari UU. Stroke in Pakistan. *J Pak Med Assoc*. 2008 Jul;58(7):400-3.
- Awad I, Spetzler R, Hodak J, Awad C, Carey R. Incidental subcortical lesions identified on magnetic resonance imaging in the elderly. I. Correlation with age and cerebrovascular risk factors. *Stroke*. 1986;17(6):1084-9.
- Bacon CG, Mittleman MA, Kawachi I, Giovannucci E, Glasser DB, Rimm EB. Sexual function in men older than 50 years of age: results from the health professionals follow-up study. *Annals of Internal Medicine*. 2003;139(3):161-8.
- Truelsen T, Begg S, Mathers C. The global burden of cerebrovascular disease. Available at: https://www.who.int/healthinfo/statistics/bod_cerebrovascular_diseases_stroke.pdf.
- Shimamoto T, Komachi Y, Inada H, Doi M, Iso H, Sato S, et al. Trends for coronary heart disease and stroke and their risk factors in Japan. *Circulation*. 1989;79(3):503-15.
- Kamal AK, Itrat A, Murtaza M, Khan M, Rasheed A, et al. The burden of stroke and transient ischemic attack in Pakistan: a community-based prevalence study. *BMC Neurol*. 2009 Dec 1;9:58.
- Tassaduqe K, Ali M, Salam A, Latif M, Afroze N, Masood S, et al. Hypertension in relation to obesity, smoking, stress, family history, age and marital status among human population of Multan, Pakistan. I. *Medical Sci*. 2004;4(8):30-5.
- Khealani BA, Hameed B, Mapari UU. Stroke in Pakistan. *Journal of the Pakistan Medical Association*. 2008;58(7):400.
- Qamar Zaman AG. Incidence of Stroke in North West Frontier Province of Pakistan. *Journal of Contemporary Medicine*. 2011; 1(2):35-41.
- Chang CL, Marmot MG, Farley TM, Poulter NR. The influence of economic development on the association between education and the risk of acute myocardial infarction and stroke. *Journal of Clinical Epidemiology*. 2002;55(8):741-7.
- Laaksonen M, Talala K, Martelin T, Rahkonen O, Roos E, Helakorpi S, et al. Health behaviours as explanations for educational level differences in cardiovascular and all-cause mortality: a follow-up of

- 60 000 men and women over 23 years. *The European Journal of Public Health*. 2008;18(1):38-43.
26. Goldstein LB, Bushnell CD, Adams RJ, Appel LJ, Braun LT, Chaturvedi S, et al. Guidelines for the primary prevention of stroke a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2011; 42(2):517-84.
27. Chu V, Sackda P, Sombandith X, Thongsna S, Sisamouth B, Vidhamaly S. Tobacco-related socio-economic cost of stroke, lung cancer and COPD in Laos. Available at: https://untobaccocontrol.org/impldb/wp-content/uploads/reports/lao_pdr_annex4_healthcare_costs_of_smoking.pdf.
28. Agashe A, Gawde N. Stroke and the use of smokeless tobacco - A case-control study. *Healthline Journal*. 2013;4(2):13-18.