Original Research Article

Stroke Registry - A Tool for Establishment of Stroke Unit in a Tertiary Care Hospital, India

Sonia Puri[1], Anupama Dhiman[2], Naveen Krishan Goel[3], Ram Singh[3], Ravleen Bakshi[2]

[1]Associate Professor, [2]Demonstrator, [3]Professor & Head,
Department of Community Medicine, Government Medical College & Hospital, Chandigarh.

Corresponding Author: Anupama Dhiman

ABSTRACT

Background and purpose: Stroke registry data is lacking in India. This study was conceptualized to have a data of stroke cases, which in turn could be utilized for establishment along with up gradation of therapeutic along with rehabilitative services for stroke cases.

Material and Methods: The study was done in Government Medical College and Hospital, Chandigarh over the period of one year. In total, 198 stroke cases visited during study period and all cases were included in the study after taking consent from patient or family member.

Results: Females outnumbered males. Hypertension followed by chronic obstructive pulmonary disease (COPD) was the main risk factors. Among the modifiable risk factors, smoking (51.5%), obesity (29.8%) dominated the list.

Conclusion: In India, stroke is a major health problem and needs urgent attention of its policy makers. The due attention can be paid to stroke if we have the database of stroke cases in our country. And by stroke registry epidemiologic, etiologic and clinical data of all cases can be collected.

Key Words: stroke registry, risk factors, India.

INTRODUCTION

Stroke is a one of the leading cause of death and disability across the world and is also an important cause for premature death and disability in low-income and middle-income countries like India.

India has attained the stroke epidemic with estimated figure of about 7.8 million stroke-related deaths by the year 2030. And majority of these deaths will occur in low-income and middle-income countries (LMICs). [1] Over the past decade, although the annual incidence rates of stroke have shown a decline from 221.19/100,000 (2005) to 217.26/100,000 (2010) in high-income countries, but the incidence rates have marginally increased in the LMICs from 277.48/100,000 (2005) to 281.12/100,000 (2010). [2]

As a result developing countries like India are exposed to a double burden of both communicable and non-communicable diseases. People below poverty line are increasingly affected by stroke, mainly because of two factors one is exposure to risk factors and secondly not being able to afford the high cost for stroke care. Majority of stroke survivors continue to live with disabilities and the costs of their ongoing rehabilitation and long term-care are largely undertaken by their family members which impoverish the families. [3,4]

Acute stroke services framework (2015) recommends all hospitals admitting

75 or more patients per year with stroke should have stroke units. Stroke care needs an assessment of the burden and the interdisciplinary approach for management. Active participation by clinician as well other personnel like nursing staff, paramedical workers, physiotherapists etc is the need of hour for which requires the establishment of stroke unit. Stroke unit is a hospital unit that cares for stroke patients exclusively with specially trained staff and a multidisciplinary approach to treatment and care. [5] Analysis on Cochrane data base involving 23 trials showed significant reduction of death (OR;0.88), death or dependency (OR;0.75) and death or institutionalization (OR;0.77) when patients were treated in a stroke unit compared with those treated in general wards. [6]

In India, stroke units are mainly available in urban areas that too in private hospitals and commonly stroke patients are managed by giving them intravenous (IV) and intra-arterial thrombolysis (IA). In the on-going Indo USA National stroke registry the rate of IV thrombolysis is 11%. Stroke rehabilitation is not well developed in India due to lack of personnel. Organized rehabilitation services are available in the country but they are mainly in private hospitals of the cities. Even though India is a leading producer of generic drugs still many people can't afford the commonly used secondary prevention drugs. As a first step the Government of India has started the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases & Stroke (NPCDCS). The government is focusing on early diagnosis, management, infrastructure, public awareness and capacity building at different levels of health care for all the non-communicable diseases including stroke. An organized effort from both the government and the private sector is needed to tackle the stroke epidemic in India.

The need of hour is reliable and good quality data on epidemiological characteristics of stroke to plan implement and evaluate stroke prevention and control programmes. But there is dearth of data pertaining to determinants of stroke as well as causes of disparities along with changes in stroke burden. Comprehensive information on stroke mortality, morbidity, risk factors and disability are required for planning and implementing programmes in prevention, management and rehabilitation. One of the efforts in this direction is to establish stroke registry and establish a data base for stroke patients. This would help in providing a continuum of care as well as follow up of patients. Stroke registries can provide information on evidence-based practices and interventions, which are critical for us to understand how stroke care is delivered and how outcomes are achieved.

Hence, an effort was made to start stroke registry in Government Medical College and Hospital, Chandigarh to create a database of stroke cases that in turn can be utilized for upgrading of services and assessing the need for stroke unit with the following objectives: (i) To generate reliable database on the magnitude of stroke. (ii) To assess the need for establishment of stroke unit. (iii) To assess the survival after 28 days of discharge in the stroke cases.

MATERIALS AND METHODS
Study area: Government Medical College and Hospital (GMCH), Chandigarh.
Study period: Jan 2015 to Dec 2015.
Sample size: All the patients suffering/suspected of having a stroke that reported in GMCH were considered for the study.
Eligibility Criteria: All the patients who reported in the hospital with stroke either for the first time with stroke (FTS) or a recurrent episode were included in the study. The criteria for considering patients with stroke was as per the definition of WHO--'a focal (or at times global) neurological impairment of sudden onset, and lasting >24 h (or leading to death), and of presumed vascular origin with or without confirmation of imaging'.

- First-ever (also called 'first in a lifetime'): it refers to people who have never had a stroke before and who have had first stroke during the study period.

Data collection: All the patients of stroke were screened by emergency medicine department and were evaluated using a computed tomography (CT). After assessing the patient, appropriate medical care was given to them. After the confirmation of diagnosis, the patients were assigned a stroke registry number. Each case was coded prospectively into a computerized registry. The detailed information of patients was gathered on the questionnaire adopted by National Center for Disease Informatics and Research (NCDIR), Bangalore, India, Safe Implementation of treatment in stroke (SITS). All the relevant data was collected by interviewing the patient/ patient's relatives and laboratory reports, if needed.

Ethical consideration: Subjects were explained the purpose of study and those who gave consent were enrolled for the study. In case the respondents were below 18 yrs or not in state to respond, then consent was taken from the parents/relatives. Confidentiality of responses was assured as per the guidelines of Helsinki.

Statistical analysis: Data was entered into Microsoft Office Excel 2007. Descriptive analysis was done using percentages and proportions.

RESULTS

A total of 198 patients were hospitalized with stroke in medicine emergency and ward of GMCH during study period and on an average we can consider around 15-16 patients had reported on monthly basis to GMCH. Males outnumbered females (113, 57.1%). Majority were in age group of 45-65 years (55.6%) followed by that in 65-85 years (29.8%). Females and males were also maximum in same age group. Out of 198 patients, mortality at discharge and after 28 days was seen in 61 (30.8%) patients among whom 38 were males and 23 were females.

Female patients were mainly housewives (32.3%) while majority of the male patients were labourers (24.7%). Maximum cases were reported from Punjab (47.0%) followed by that from Haryana (34.8%). (Table 1)

Table 1: Demographic profile of the patients

Demographic Characters	Males N=113(%)	Females N=85 (%)	Total N=198 (%)
Age group (in Years)			
25-45	19 (16.8)	00 (0.0)	19(09.6)
45-65	57 (50.4)	53 (62.4)	110(55.6)
65-85	30 (26.5)	29 (34.1)	59(29.8)
85& above	07 (06.2)	03 (03.5)	10(05.1)
Occupation			
House Wife	00 (0.0)	64 (75.3)	64(32.3)
Labourer	28 (24.8)	21 (24.7)	49(24.7)
Farmer	26 (23.0)	00 (0.0)	26(13.1)
Business	21 (18.6)	00 (0.0)	21(10.6)
Service	13 (11.5)	00 (0.0)	13(06.6)
Shopkeeper	13 (11.5)	00 (0.0)	13(06.6)
Retired personnel	12 (10.6)	00 (0.0)	13(06.1)
States of Residence			
Punjab	57 (50.4)	36 (42.4)	93(47.0)
Haryana	33 (29.2)	36 (42.4)	69(34.8)
Chandigarh	10 (08.8)	05 (05.9)	15(07.6)
Himachal Pradesh	08 (07.1)	05 (05.9)	13(06.6)
Uttar Pradesh	05 (04.4)	00 (0.0)	05(02.5)
Uttaranchal	00 (0.0)	03 (03.5)	03(01.5)
Mode of arrival of patients in Hospital			
Own Vehicle	41 (36.3)	46 (54.1)	87(43.9)
Ambulance	52 (46.0)	31 (36.5)	82(41.9)
Public transport	15 (13.3)	08 (09.4)	23(11.6)
Others	05 (04.4)	00 (0.0)	05(02.5)

Majority of the patients reported to hospital either by own vehicle (43.9%) or ambulance (41.9%). Maximum patients presented with apraxia of acute onset (49.0%) followed by unilateral/bilateral sensory impairment (32.3%) and perception deficit of acute onset (19.2%). Dizziness (37.9%) was the main additional presenting symptom followed by dysarthria (32.3%) and dysphagia (27.3%) (Table 2)

In majority of patients, hypertension was the main risk factor (36.4%) followed by chronic obstructive pulmonary disease (COPD) (24.7%), coronary artery disease (CAD) (23.2%). Hypertension and CAD were main risk factors in males while hypertension and COPD were main risk factors among females (Table 3)

Among the modifiable risk factors, smoking (51.5%), obesity (29.8%) and usage of oral contraceptive pills (23.2%)

dominated the list. In males smoking and alcohol were the common modifiable risk factors in contrast to females, in whom obesity and smoking were most common (Table 4)

Table 2: Distribution of the patients as per presenting symptomatology

Presenting Symptoms*	Males N (%)	Females N (%)	Total N (%)
Apraxia of acute onset	46 (40.7)	51 (60.0)	97(49.0)
Unilateral/bilateral sensory impairment	46 (40.7)	18 (21.2)	64(32.3)
Perception deficit of acute onset	23 (20.4)	15 (17.6)	38(19.2)
Forced Gaze	13 (11.5)	10 (11.8)	23(11.6)
Hemianopia	13 (11.5)	05 (05.9)	18(09.1)
Aphasia/Dysphasia	13 (11.5)	05 (05.9)	18(09.1)
Unilateral or bilateral motor impairment	13 (11.5)	03 (03.5)	16(08.1)
Ataxia Of acute onset	10 (08.8)	05 (05.9)	15(07.6)
Other presenting symptoms*			
Dizziness	31 (27.4)	44 (51.8)	75(37.9)
Dysarthria	31 (27.4)	33 (38.8)	64(32.3)
Dysphagia	28 (24.8)	26 (30.6)	54(27.3)
Seizures	23 (20.4)	13 (15.3)	36(18.2)
Diplopia	18 (15.9)	08 (09.4)	26(13.1)
Localised Headache	23 (20.4)	00 (0.0)	23(11.6)
Impaired Consciousness	05 (04.4)	15 (17.6)	20(10.1)
Impaired Cognitive Function	05 (04.4)	15 (17.6)	20(10.1)
Blurred Vision	13 (11.5)	05 (05.9)	18(09.1)

*Total of percentage is more than 100% because more than one presenting symptoms

Table 3: Distribution of patients as per past medical history

Past Medical History*	Males N (%)	Females N (%)	Total N (%)
Hypertension	41 (36.3)	31 (36.5)	72(36.4)
Chronic Obstructive Pulmonary Disease	26 (23.0)	23 (27.1)	49(24.7)
Coronary artery Disease	28 (24.8)	18 (21.2)	46(23.2)
Prior CVA/Transient Iscahemic Attack	13 (11.5)	13 (15.3)	26(13.1)
Rheumatic Heart Disease/CMP	08 (07.1)	08 (09.4)	16(08.1)
Atrial Fibrillation	05 (04.4)	05 (05.9)	10(05.1)
Renal Failure	05 (04.4)	05 (05.9)	10(05.1)

* Total of percentage is more than 100% because more than one past medical history

Table 4: Distribution of the modifiable risk factors in patients

Modifiable Risk factors	Males N (%)	Females N (%)	Total N (%)
Smoking	74 (65.5)	28 (32.9)	102(51.5)
Obesity	23 (20.4)	36 (42.4)	59(29.8)
History of Oral contraceptive pills use	00 (0.0)	46 (54.1)	46(23.2)
Alcohol	28 (24.8)	05 (05.9)	33(16.7)
Drug abuse	03 (02.7)	00 (0.0)	03(01.5)

* Total of percentage is more than 100% because more than one modifiable risk factor

DISCUSSION

Stroke is a complex and multifactorial disease caused by the combination of vascular risk factors, environment and genetic factors. It's a focal cerebral insult that often results in neurologic and medical sequelae with long term implications for quality of life, morbidity, mortality. Ischaemic stroke (IS) caused by embolic events linked to atherosclerosis represents majority of stroke (87%) and haemorrhagic stroke accounts for the rest. [7]

Stroke registry helps in providing data by which stroke treatment can be made comprehensive, involving patient, community/ medical personnel education, evaluation of individual risk factors and overall stroke risk assessment. [8]

Approximate cost spent on management and rehabilitation of patient is around US $8,020. In our study on an average 15-16 patients reported monthly to our institute. Hence there arises a need for stroke unit establishment, so that management can be economized and rendered timely.

Cerebral stroke continues to be a major cause of death and the leading cause of long-term disability in developed

countries. We found in our study around 30.8% of mortality over one year. In elderly females ischemic stroke is an emerging major health problem. [9] The incidence of stroke is lower in women than men until an advanced age, when the epidemiology of ischemic stroke shifts and incidence rises dramatically in women. Women appear to have a higher overall lifetime risk of stroke in addition to higher rates of post stroke mortality, disability, depression and dementia compared with men. [10-11] For many years, the shift in ischemic risk in women has been attributed to the loss of hormones, especially estrogen, at the time of menopause. Earlier menopause (natural or surgical) leads to accelerated atherosclerosis, which is a risk factor for stroke. Such gender differences have largely been attributed to the longer life expectancy of women, consistent with the fact that age is the strongest independent risk factor for stroke and also a negative predictor for clinical outcome. But in our study more men (57.1%) had reported with stroke in all age groups.

Symptoms of ischemic stroke can be separated into classic symptoms which include hemibody numbness, hemiparesis, aphasia, dysarthria, visual disturbance, diplopia, facial weakness, disco-ordination/ataxia, vertigo and non-specific to stroke symptoms including pain, light headedness, mental status change, headache and other neurologic or non-neurologic symptoms. In one of the few population-based studies, men were found to be more likely to present with classic focal neurologic symptoms such as sensory abnormalities, ataxia, and diplopia whereas women tended to present with diffuse symptoms such as disorientation, generalized weakness, fatigue, and mental status change [11] while we found apraxia of acute onset (49.0%) most commonly presenting symptom among both sexes followed by unilateral/bilateral sensory impairment (32.3%) which was more common presenting symptom among males (40.7%) than females (21.2%).

If women do clinically present differently with ischemic stroke than men, then there may be significant public health implications. [12] Recognition of potential gender differences in stroke symptoms through education aimed at both the public and health care professionals could result in decreased out-of-hospital and in-hospital delays, thus increasing access to acute stroke therapy in women. [13] While among additional symptoms dizziness (37.9%) was the main additional presenting symptom in patients reporting with stroke in present study followed by dysarthria (32.3%) and dysphagia (27.3%).

Important modifiable risk factors for ischemic stroke include hypertension, high blood cholesterol, arrhythmias, diabetes, cigarette smoking, obesity, and lack of physical activity. [14] Men report a higher prevalence of current smoking, history of smoking, coronary artery disease, and peripheral artery disease. In another study done by Michael smoking was found to be independent predictor of stroke. [15] But many studies have found the association of smoking with final manifestations (CVD mortality) or on one or two non-fatal diseases, usually acute myocardial infarction (MI) and stroke. In our study too smoking (51.5%) followed by obesity (29.8%) were found to be important predictors of stroke.

Hypertension (HT) is considered the main classic vascular risk factor for stroke and the importance of lowering blood pressure (BP) is well established. [16-17] Many evidences have been outlined that the risk of stroke associated with high BP values is not irreversible, as the risk of stroke incidence could be strongly reduced if BP values were controlled by and optimal antihypertensive treatment. It has been well cited in studies that early discontinuation of the anti-hypertensive treatment is associated with a 30% increase in risk of stroke. [18-19] Approximately 54% of strokes can be attributed worldwide to high BP values in both gender and in all ages. As a consequence, hypertensive subjects are

three to four times more likely to have a stroke than the normotensives. In particular, it was established that a two mmHg rise in systolic BP in middle life is associated with 10% increase in risk of stroke. [20-21] We also found hypertension (36.4%) followed by COPD and CAD (24.7% and 23.2% respectively) as main causes of stroke and more so found in males.

An effective therapeutic option for ischemic stroke is thrombolysis, achieved by administering recombinant tissue plasminogen activator within 4.5 h. [22-23] But evidence based studies show that less than 2-12% of patients receive this treatment as majority of them reach the hospital too late. Hence, several time-saving measures should be implemented. Similarly in our study also majority of patients reached late than the golden window time and only 5% reported in time. Though those who reported in time were also not thrombolysed as there is no stroke unit in our institute to manage patients timely and these patients are further referred to PGI, Chandigarh for further management. So, there is need to establish stroke unit along with optimized and continual public awareness campaigns for patients should be initiated to reduce delays in notifying the emergency medical service. Also, emergency medical service personnel should develop protocols for pre notification of the receiving hospital. Other suggested measures involve educating emergency medical service personnel to systematically use scales for recognizing the symptoms of stroke and to triage patients to experienced stroke centers. [24]

In future, administering treatment at the emergency site (mobile stroke unit concept) may allow more than a small minority of patients to benefit from available recanalization treatment options. However, mainly because of prehospital delay, patients often arrive too late for treatment and no more than 1-8% of patients with stroke obtain this treatment.

CONCLUSIONS

In India, stroke is a major health problem and needs urgent attention of its policy makers. The due attention can be paid to stroke if we have the database of stroke cases in our country. And by stroke registry epidemiologic, etiologic and clinical data of all cases can be collected.

REFERENCES

1. Strong K, Mathers C, Bonita R: Preventing stroke: saving lives around the world. Lancet Neurol 2007; 6: 182–187.
2. Feigin VL, Forouzanfar MH, Krishnamurthi R, Mensah GA, Connor M, Bennett DA, Moran AE, Sacco RL, Anderson L, Truelsen T, O'Donnell M, Venketasubramanian N, Barker-Collo S, Lawes CM, Wang W, Shinohara Y, Witt E, Ezzati M, Naghavi M, Murray C; Global Burden of Diseases, Injuries, and Risk Factors Study 2010 (GBD 2010) and the GBD Stroke Experts Group: Global and regional burden of stroke during 1990–2010: findings from the Global Burden of Disease Study 2010. Lancet 2014; 383:245–254.
3. Bonita R, Beaglehole R. Stroke prevention in poor countries. Time for action. Stroke 2007; 38:2871–2872.
4. Pandian JD, Srikanth V, Read SJ, Thrift AG. Poverty and stroke in India. A time to act. Stroke.2007; 38:3063–3069.
5. Aboderin I, Venables G. The Pan European Consensus Meeting on Stroke Management. J Int Med 1996; 240:173-180.
6. Stroke Unit Trialists' Collaboration. Organised inpatient (stroke unit) care for stroke. Cochrane Database Syst Rev 2007; 17(4): CD000197.
7. The Iwate Cancer and Stroke Registry. Secondary Iwate Cancer and Stroke Registry. Available from: http://www.iwate.med.or.jp/gan_nou/index.html. Accessed 28 Feb 2013.
8. The Tochigi Stroke Registry. Secondary Tochigi Stroke Registry. Available from: http://www.pref.tochigi.lg.jp/e04/welfare/kenkoudukuri/kenkoudukuri/1173225926699.html. Accessed 28 Feb 2013.

9. Shigematsu K, Watanabe Y, Nakano H. Kyoto Stroke Registry Committee. Lower hazard ratio for death in women with cerebral hemorrhage. Acta Neurol Scand 2015 Jul; 132(1):59-64.

10. O'Donnell MJ, Xavier D, Liu L et al. Risk factors for ischaemic and intracerebral haemorrhagic stroke in 22 countries (the INTERSTROKE study): a case-control study. Lancet 2010 Jul 10; 376(9735):112-23.

11. Manwani B, Mc Culloug LD. Sexual dimorphism in ischemic stroke: lessons from the laboratory.Womens Health 2011 May; 7(3): 319–339.

12. Kawle AP, Nayak AR, Lande NH et al. Comparative evaluation of risk factors, outcome and biomarker levels in young and old acute ischemic stroke patients. Ann Neurosci 2015 April; 22(2): 70–77.

13. Moreno JMR, González RA, Pacheco DP, Núñez MVM, Sánchez JJA. Knowledge of stroke a study from a sex perspective. BMC Res Notes 2015; 8: 604. BMJ Open. 2015; 5(3): e006294.

14. Subha PP, Geethakumari SMP et al. Pattern and Risk factors of stroke in the young among stroke patients admitted in medical college hospital. Ann Indian Acad Neurology 2015 ;18(1): 20-23.

15. McCarthy MJ, Huguet N, Newsom JT, Kaplan MS, McFarland BH. Predictors of Smoking Patterns after First Stroke. Soc Work Health Care 2013; 52(5): 467–482.

16. Wang Y, Xu J, Zhao X, Wang D, Wang C, Liu L. Association of hypertension with stroke recurrence depends on ischemic stroke subtype. Stroke 2013; 44:1232–1237.

17. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. JAMA 2003; 289:2560–2572.

18. Towfighi A, Markovic D, Ovbiagele B. Consistency of blood pressure control after ischemic stroke: prevalence and prognosis. Stroke 2014; 45:1313–1317.

19. Boan AD, Lackland DT, Ovbiagele B. Lowering of Blood Pressure for Recurrent Stroke Prevention: Topical Review. Stroke 2014 Aug; 45(8): 2506–2513.

20. Kim J, Gall SL, Nelson MR, Sharman JE, Thrift AG. Lower systolic blood pressure is associated with poorer survival in long-term survivors of stroke. J Hypertens 2014; 32:904–911.

21. Saver JL. Blood pressure management in early ischemic stroke. JAMA 2014; 311:469–470.

22. Sim J, Shin CN, An K, Todd M. Factors Associated With the Hospital Arrival Time in Patients With Ischemic Stroke in Korea. J Cardiovasc Nurs 2015 Dec 7 DOI:10.1097/JCN.0000000000000313.

23. Rodríguez-Rivera IV, Santiago F, Estapé ES, González-Sepúlveda L, Brau R. Impact of Day of the Week and Time of Arrival on ischemic Stroke Management. P R Health Sci J 2015 Sep; 34(3):164-9.

24. Nishijima H, Kon T, Ueno T et al. Effect of educational television commercial on pre-hospital delay in patients with ischemic stroke. Neurol Sci. 2016; 37(1);105-9.

****