Retrospective analysis of stork and its risk factors at Nepal Medical College Teaching Hospital

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ABSTRACT

Stroke is a major public health burden worldwide and is responsible for a large proportion of disability; and ranks third in the causation of morbidity and mortality. This disease although regarded as a disease of old age, it is not uncommon in younger population in developing countries.. A retrospective study of cerebro-vascular accidents (stroke) managed at Department of Medicine, Nepal Medical College Teaching Hospital during the period of 1st April 2000 to 31st March 2005 was done to study demographics and risk factors. Cases of TIA were not included in the final analysis of the data due to uncertainty of diagnosis and lack of imaging (CT scan). The collected data was analyzed using data analysis software SPSS® (version 12). We identified 72 cases of stroke excluding TIA**.** The mean age at which patients in this study experienced their first ever stroke was 61.7 yrs (SD 14.9 yrs). The commonest presenting complaints in our study population were weakness of limbs (90.3%), slurring of speech (33.3%), altered mental status (29.8%), deviation of angle of mouth and headache (22.2%) each and urinary incontinence (13.9%). Vomiting, dizziness, fever, personality changes, seizure, tingling sensation of limbs were uncommon clinical presentation and were present in 15.28% of cases. Risk factors were smoking (58.3%), hypertension (47.2%), alcohol (41.4%), atrial fibrillation (12.5%) and diabetes mellitus (11.1%). To conclude, stroke in countries like Nepal is a public health problem. The clinical presentations and risk factors are in agreement with other studies. The low mean age of stroke patient reflects demographic feature of this region.

Keywords: CVA, Stroke, Hemorrhagic stroke, Ischemic stroke, TIA.

INTRODUCTION

Stroke is a major public health burden worldwide and is responsible for a large proportion of disability. It ranks third in the causation of morbidity and mortality after ischemic heart disease and all kinds of cancers combined.[1] This disorder predominantly occurs in elderly individuals. However, if developing countries are taken in account, it is not uncommon in population below 45 yrs of age.[2,3] Also, 2/3rd of stroke death occurs in less developed countries.[1]

Stroke is defined by WHO as the clinical syndrome of rapid onset of focal (or global, as in subarachnoid hemorrhage) cerebral deficit, lasting more than 24 hrs or leading to death, with no apparent cause other than a vascular one. It can be subdivided into three pathological types: Ischaemic stroke – 80.0%, Primary intracranial haemorrhage – 15.0% and Subarachnoid haemorrhage – 5.0%.[4]

TIA differs from stroke in duration (less than 24 hrs), differential diagnosis (eg, focal seizures more like to mimic TIA than stroke) and ease of diagnosis (TIA can not be diagnosed with certainty due to lack of differentiating feature by brain imaging and diagnosis mainly depends on history).[5] Due to these uncertainties, TIA will be included in our study but will not be discussed in detail. Transient ischemic attacks (TIAs) precede nearly 30% of ischemic strokes. If left untreated, one third of TIAs lead to ischemic stroke: 20% within the first month, and 50% within the first year. Therefore, it is worthy to mention about TIA even if it will not be included in the final analysis of data.

In the most recent estimates made in 1999, the number of deaths due to stroke reached 5.54 millions worldwide,[6] two third of these deaths occurred in less developed courtiers.[7] In 1990 the stroke caused 3.0% of world's disability. This figure is expected to be doubled by 2020 primarily due to increase in the proportion of elderly people and the fixture of current smoking pattern in developing countries. By the year 2020, stroke and coronary-artery disease together are expected to be leading causes of lost healthy life-years.[8]

Increasing age is an important non-modifiable risk factor for stroke. With the improving health status of least developed countries like Nepal, the life expectancy has improved greatly resulting in more elderly

population. Also, the population is adopting lifestyle of more developed countries very rapidly. With increase in risk factors like increasing age and sedentary lifestyles as well as lack of proper management and prevention of this disease in all stages, the epidemic of stroke will hit the least developed countries like ours very hard.

There are quite a number of population based studies done in stroke population but almost exclusively in white population in Europe, Australia and the USA.[9] Well controlled studies has been done in Caribbean population, mainly in blacks[10] but there are virtually no comparable data from less developed countries (Africa, South America, Asia).[9]

MATERIALS AND METHODS

This is a retrospective study of cerebrovascular accidents (stroke) managed at Department of Medicine, Nepal Medical College Teaching Hospital during the period of 1st April 2000 to 31st March 2005 . The subjects with a diagnosis of CVA were identified from records from medical section as well as from department of medicine. We identified 80 cases of CVA among which 8 were diagnosed as TIA. An extensive retrospective study of the case records of each patient was done and data were collected using a format which included age and sex of the patient, detailed medical history, clinical presentation, vital signs, lab values (whenever available) and CT scan findings. Any patient, who did not have brain imaging, was excluded from the study. The cases of TIA were not included in the final analysis of the data due to uncertainty of diagnosis and lack of imaging (CT scan). The collected data was analyzed using data analysis software SPSS® (version 12).

RESULTS

We identified 80 cases with diagnosis of one from the spectrum of CVA. Out of those 8 were TIA and rest either ischemic or hemorrhagic stroke. Detailed analysis of data pertaining to TIA was abandoned due to lack of imaging evidence. The characteristics of the study population are given in Table-1.

The mean age at which, patients in this study experienced their first ever stroke was 61.65 yrs (SD 14.9 yrs), ranging from 20 to 100 years. Out of those 72 subjects, 42 (58.3%) were male and rest 30 (41.7%) were female. The mean age of first stroke in male was 65.0 yrs (SD 12.9) and for female 57.0 yrs (SD 16.5) (Table-2).

The commonest presenting complaints in our study population were weakness of limbs in 65 cases (90.3%), slurring of speech in 24 cases (33.3%), altered mental status in 21 cases (29.2%), deviation of angle of mouth and headache in 16 cases (22.2%) each and urinary incontinence in 10 cases (13.9%). Vomiting, dizziness, fever, personality changes, seizure, tingling sensation of limbs were uncommon clinical presentation and were present in 11 cases (15.3%) (Table-3).

The study of the CT scan of head revealed that majority of the stroke was of ischemic type. Out of 72 cases, 49 (68.1%) cases were ischaemic and rest 23 (40.0%) were hemorrhagic type. The right sided stroke was found in 44 cases whereas left sided stroke was in only 28 patients (Fig. 1).

Commonest non modifiable risk factors were male sex and age. As already mentioned above, 58.3% of the patients were male. Out of this population 38.4% were between 45 and 65 and 45.8 % were more than 65 yrs of age (Fig. 2).

The commonest modifiable risk factor in our study population was smoking in 42 (58.3%) patients (n=70). Smoking was most prevalent in patients with ischaemic stroke. Thirty one (44.3%) patients with ischaemic stroke had smoking as a risk factor whereas 17 (24.3%) were non-smokers. In case of haemorrhagic stroke patients, the risk factor was present in 11 and absent in 11 as well. Both, amount of smoking and duration of smoking were high in ischaemic subpopulation than haemorrhagic one [(12.9±7.2 sticks per day and 37.3±13.8 yrs of smoking as compared to 8.9±5.9 sticks per day and 32.8±10.3 yrs of smoking) (Table-4)].

Hypertension was second common modifiable risk factor in our population. (47.2%, n=72). Out of 23 haemorrhagic stroke patients, 15 patients had history of hypertension whereas this equation is reverse in case of ischaemic stroke patients. Out of 49 ischaemic stroke patients, only 19 had history of hypertension, rest 30 were normotensives. The systolic as well as diastolic blood pressures were high in haemorrhagic stroke patients as compared to ischaemic subpopulation. (Systolic BP of 164.8±32.1 mmHg and diastolic BP of 99.6±16.9 mmHg in haemorrhagic stroke as compared to systolic BP of 145.8±31.8 mmHg and diastolic BP of 89.2±15.8 mmHg in ischaemic stroke (n=59).

Alcohol consumption was also high in our population. The data of alcohol consumption was available in only 70 subjects. Out of those, 29 (41.4%) had history of alcohol consumption. Almost half of the patients with ischaemic stroke had history of alcohol consumption as compared to one-third in haemorrhagic subgroup. The data was not sufficient to quantify the amount and duration of alcohol consumption. However, considering the alcohol habit of population in our community, it should be considerably high. Only few patients had their lipid profile done. Mean cholesterol level was 177.2±32.9 mg/dl, LDL level 105.3±33.10 mg/dl and HDL cholesterol level 45.7±16.6 mg/dl. Since the number of observation was small, no further evaluation was done.

Atrial fibrillation (AF), which is an established risk factor, was found in 9 (12.5%) cases whereas diabetes mellitus was found in 8 (11.1%) cases. Out of 9 patients with AF, 7 had ischaemic stroke. Also, 6 patients out of 8, who were known diabetic, had ischaemic stroke. The mean random blood sugar level (n=63) was 122.9±49.2 mg/dl. There was no significant difference in mean blood sugar level between ischaemic and haemorrhagic stroke patients.

DISCUSSION

In this study, we evaluated 72 patients admitted at NMCTH with a diagnosis of stroke. The focus of this analysis was not only to study the characteristics of stroke patient in NMCTH but also assess and evaluate the risk factors present in those patients. We aimed to evaluate as many risk factors as possible. However, since this is a retrospective study, some parameters like lipid profile are not available in all of our patients. Therefore, analysis of those factors will be limited. Even then, most of our findings are in agreement with past studies done in this region.

The mean age of the patients experiencing their first stroke was 61.7±14.9 yrs. Women experienced their first stroke in quite younger age (57.0±16.5 yrs). A hospital-based study in Qatar reported the age for first stroke as 57 yrs which is comparable and reflects the Asian demographic.[17] Interestingly, we did not have any patient with second or more episode of stroke. Without the date from casualty and emergency department, which we did not include, we are in no position to make comments on incidence of second or more episode of stroke in our population.. Also, we included patients from only one hospital, hence we could not calculate incidence of stroke in our population.

Patients with intracerebral bleeds are more likely to have headache, altered mental status, seizures, nausea and vomiting, and/or marked hypertension; however, none of these findings distinguish reliably between hemorrhagic and ischemic strokes. Seizures are more common in hemorrhagic stroke than in ischemic stroke. An altered level of consciousness or coma is more common in haemorrhagic strokes than in ischemic strokes. Often, this is due to an increase in intracranial pressure. There are conditions which mimic stroke and make diagnosis more confusing. The conditions are seizures (17.0%); systemic infections (17.0%); brain tumors (15.0%); toxic-metabolic causes, such as hyponatremia (13.0%); and positional vertigo (6.0%).

In our study, 45.8% of the patients were above 65 yrs of age and 38.9% were between 45 – 65 yrs. There is a steep rise in incidence with age, with three quarters of all first strokes occurring after the age of 65, at least in white population.[11,12] Also, the incidence of stroke in younger population (<45yrs) in our study was 15.3%. Because of lack of planned population studies in this age group, it is difficult to comment on prevalence of stroke in these young individuals. Surveys from developing countries indicate that approximately 2.8% to 7.6% of all cases occur before the age of 45 years. Comparable figures from developing countries including India, vary from 18.0% to 35.0%.[2,3] Also, stroke study from Qatar reported 18.0% of its study population to be younger than 45 yrs.[17] Male predominance for stroke declines in younger patients. It is more common in females by a factor of 1.5 to 3.0. [1,2,13] In our study population we found this factor to be 2.67, which is well comparable.

Smoking is another strong risk factor for both ischaemic and haemorrhagic strokes. As compared to nonsmokers, cigarette smokers have 2 to 3 fold risk of either type of stroke.[14] *In* our study, we found 60.0% (42) of the subjects had history of smoking. It was our most common modifiable risk factor. Smoking was most prevalent in patients with ischaemic stroke. Both smoking duration and amount was high in ischaemic stroke patient. Colditz and colleagues found a strong causal relationship between cigarette smoking and stroke in young and middle-aged women. They also found that with an increase in number of cigarette smoked per day (1-14 cigarettes per day to 25 or more cigarettes per day) there was an increase in relative risk of stroke (2.2 to 3.7).[15] Stopping smoking has significant benefit.[16]

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47.2% of subject in our study had history high blood pressure which was the second most prevalent risk factor in our study. Stroke study in Qatar showed hypertension in 63% of its population.[17] Observational studies have shown that usual blood pressure levels are directly and continuously associated with the initial occurrence of ischaemic stroke and cerebral haemorrhage.[16] As a consequence, blood pressure is recognized as an important determinant of the risk of initial stroke in non-hypertensive individuals as well as in those with hypertension.[16,18] The relation between stroke and BP is steeper than that of IHD. The age specific associations are similar to men and women.[19] In our study we found history of hypertension was more common in hemorrhagic subgroup (2/3rd of subgroup) as compared to the ischaemic subgroup (1/3rd of subgroup). Since we did not have the premorbid blood pressure values in our patients, we could not evaluate further. The meta-analysis of 61 prospective studies showed that the relationship of stroke mortality with blood pressure to be strong and direct; and throughout the middle age the drop in 20 mmHg of systolic blood pressure or 10 mmHg in diastolic blood pressure is associated with twofold decrease in the risk of stroke death.[19] The same study suggested consideration of blood pressure-lowering treatment in patient with evidence of occlusive vascular disease irrespective of current blood pressure level or use of other medications. A randomized trial of perindropril-based pressure lowering regimen showed similar reduction in risk of stroke in hypertensive as well as non-hypertensive subgroup by reduction of blood pressure.[20] A larger study of 2435 clinically stable individuals with a history of minor ischaemic stroke or transient ischaemic attack detected no evidence of nonlinearity in the association of usual blood pressure with stroke recurrence: each 10 mm Hg lower level of systolic pressure was associated with a 28% (SE 8) lower risk of stroke.[21]

Alcohol consumption is a modifiable behavior, and drinking moderate amounts of alcohol may have protective effects against subtypes of stroke.[22-25] Although most studies show a positive correlation between drinking and the risk of hemorrhagic stroke,[22] the relation with ischemic stroke is less clear.[22,26-29] In Our study population, alcohol use was very common (41.4%). We could not quantify the amount of alcohol consumption; therefore, our study has some limitations over this issue. However, the pattern of alcohol consumption in our community makes it a significant risk factor. Light-to-moderate alcohol consumption reduces the overall risk of stroke and the risk of ischemic stroke in men. The benefit is apparent with as little as one drink per week. Greater consumption, up to one drink per day, does not increase the observed benefit.[30] Most cohort studies have reported risk reductions of 20 to 40 percent. Heavy drinking is a risk factor for hemorrhagic and ischemic stroke both.[22,25,31]

Atrial fibrillation is a known risk factor for thromboembolic phenomenon. In our stroke patients we found atrial fibrillation in 9 patients (12.5%) among which, 7 patients had ischaemic stroke and rest haemorrhagic stroke. In a study done in Qatar, they found atrial fibrillation in 4.5% of patients as a risk factor.[17] Direct association between the atrial fibrillation and ischaemic stroke could not be made due to lack of further investigations. Nonvalvular atrial fibrillation increases the risk of ischemic stroke by a factor of five, presumably by an atrioembolic mechanism. [32-35] Cardioembolic strokes are more severe than other types of ischaemic stroke, [36-39] and numerous population based studies have shown than mortality risk is higher in strokes associated with atrial fibrillation.[40-45] We did not have any mortality in our study population during the time of hospital stay.

Diabetes mellitus was also a common risk factor in our study (11.1%). It was more common in ischaemic stroke patient. However there was no significant different in mean blood sugar lever in two subtypes of stroke. In a study in Qatar, diabetes mellitus was present in 42% of their population[17] High blood sugar is a known risk factor for stroke and also a bad prognostic factor for recovery after stroke as evidenced by poor functional recovery in one of the study.[46] Lately a lot of emphasis has been put regarding lipid level and stroke. In our population only few patient had dyslipidemia and only a hand full of patient had their lipid profile done. Many studies have refuted any overall association between plasma cholesterol concentration and stroke.[16,18] Moreover, total triglyceride and high LDL-cholesterol level are not risk factor but a low HDL-cholesterol is risk factor for ischaemic stroke.[47] Interestingly, one study has reported inverse relation between the serum cholesterol level and the risk of death from haemorrhagic stroke in middle aged white males.[48] Many studies have failed to provide evidence for a benefit, or harm from interventions to alter serum lipid level in patients with a history of solely cerebrovascular disease.[49] However many studies have reported low HDL cholesterol level in stroke survivors than in controls.[50-53]

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Table-1: Stroke - Population characteristics (N=72)

Characteristics	Stroke		Total
	Haemorrhagic	Ischaemic	
Age (yr)	62.86±15.25	59.09±14.21	
Male sex (%)	18.06	40.28	58.3
History			
Hypertension (%)	20.83	26.39	47.2
Diabetes Mellitus (%)	2.8	8.3	11.1
Dyslipidemia (%)	2.8	5.6	8.4
Atrial Fibrillation (%)	2.8	9.7	12.5
Smoking (%), n=70	15.71	44.29	60
Alcohol intake (%), n=70	8.57	32.86	41.43
BP (n=59)			
Systolic (mmHg)	164.76±32.03	145.79±31.76	152.54±32.88
Diastolic (mmHg)	99.52±16.87	89.21±15.83	92.88±16.82
Lab. Results			
Blood glucose (mg/dl) (n= 63)	124.44±35.04	122.19±54.87	122.9±49.2
Total Cholesterol (mg/dl) (n=17)	183.33±34.56	175.93±33.68	177.24±32.85
LDL (mg/dl)	123.2±34.27	96.95±30.09	105.30±33.10
HDL (mg/dl)	41.36±7.90	47.65±19.28	45.65±16.57

Table-2: Stroke – Age and Sex Distribution

Sex	Number	%	Mean age	SD
Male	42	58.30	64.98	12.87
Female	30	41.70	57.00	16.53
Total	**72**	**100.00**	**61.65**	**14.93**

Table-3: Stroke -Clinical presentation

Complains	Prevalence	%
Weakness of limbs	65	90.28
Slurring of speech	24	33.33
Altered mental status	21	29.17
Deviation of angle of mouth	16	22.22
Headache	16	22.22
Incontinence	10	13.89
Others[†]	11	15.28

[†]Vomiting, dizziness, fever, personality changes, seizure, tingling sensation of limbs

Table4: Stroke - Common Modifiable Risk Factors	
Risk factor	**Prevalence (%)**
Smoking	42 (58.3)
Hypertension	34 (47.2)
Alcohol	29 (41.4)
Atrail Fibrilation	9 (12.5)
Diabetes Mellitus	8 (11.1)

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Fig. 1: Stroke - CT scan findings

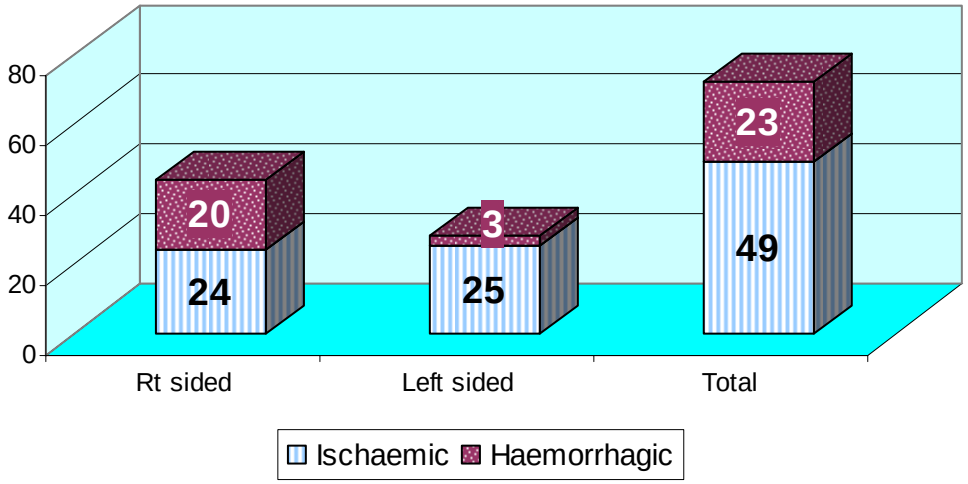
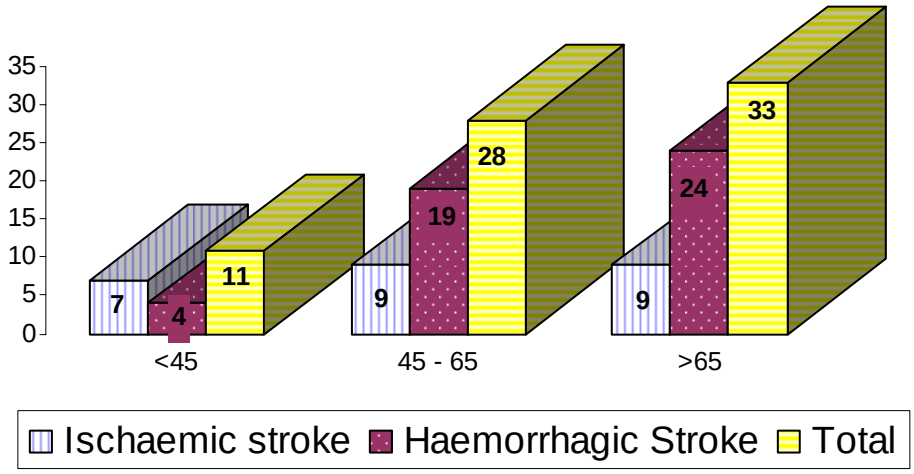


Fig 2: Age Group and Type of Stroke



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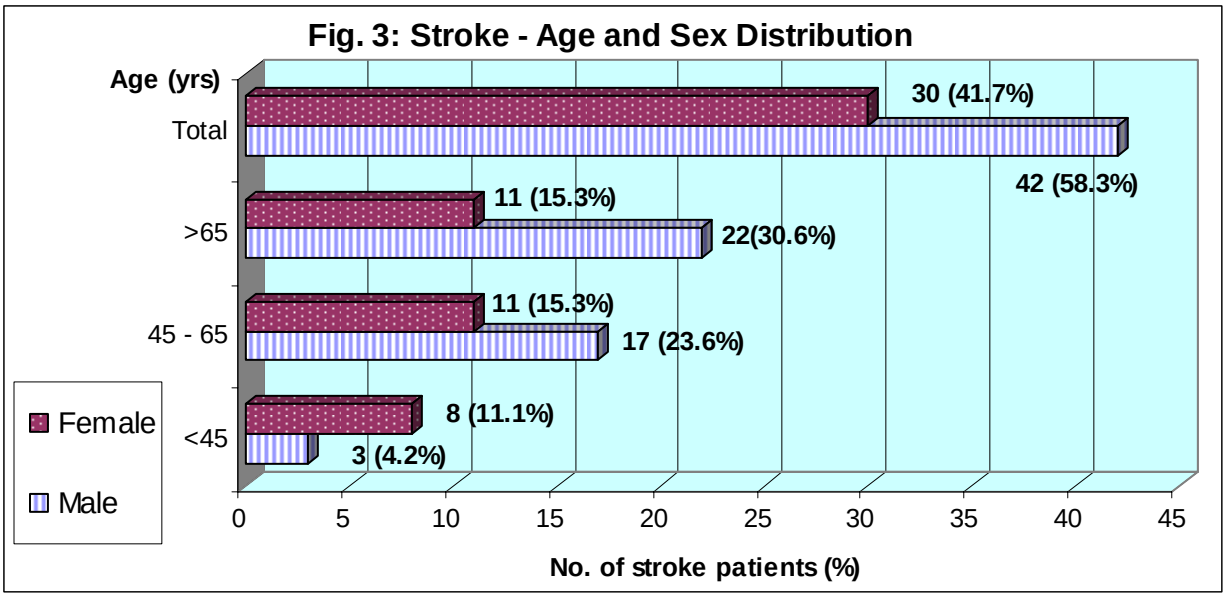
Fig. 3: Stroke - Age and Sex Distribution
Age (yrs)
Total
>65
45 - 65
<45
30 (41.7%)
42 (58.3%)
11 (15.3%)
22(30.6%)
11 (15.3%)
17 (23.6%)
8 (11.1%)
3 (4.2%)
Female
Male
0
5
10
15
20
25
30
35
40
45
No. of stroke patients (%)

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