ORIGINAL ARTICLE

A Snapshot of Stroke from Miri Hospital

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SUMMARY

Our objective was to study the profile of cerebrovascular accidents and proportion of cerebral haemorrhage (CH) among stroke patients. This project was designed after we observed higher incidence of CH in Miri hospital as compared to conventionally reported data.

Methods: This was a prospective observational study conducted from 1st June 2008 to 31st May 2009. All patients admitted in both male and female wards of the Medical Unit with the first incidence of a stroke were recruited for analysis. CT scan brain was done in all patients.

Results: Total admissions in one year in the medical department were 3204 patients, both male and female together, out of which 215 were due to a first incidence of stroke; Stroke accounted for 6.7% of admissions and 16.8% of deaths in medical unit. 139 (64.7%) were ischaemic strokes and 76 (35.3%) were cerebral haemorrhages. The incidence of CH (35.3%) was high compared to regional data. 71.7% % (154) patients had preexisting hypertension. Higher incidence of hypertension, diabetes mellitus and aspirin intake was noted in the ischaemic group. Also compliance to treatment for hypertension was better in the Ischaemic group with more defaults in CH category (P<0.01). Significantly more deaths were noted in patients with higher systolic blood pressure on presentation, poor Glasgow Coma Scale (GCS) and those with dysphagia.

Conclusion: Every third stroke was due to cerebral hemorrhage; CH patients were largely unaware of their hypertension or were altogether treatment naïve or defaulters while compliance was far better in ischaemic stroke category.

KEY WORDS:
Stroke; cerebral haemorrhage; ischaemic stroke; CVA; Sarawak

INTRODUCTION

Incidence of cardiovascular diseases including stroke is falling in Western countries due to rising standards of healthcare but is on the rise in the under developed regions of the world. [1, 2] Studies from developing countries have also shown higher incidence of cerebrovascular accidents due to cerebral haemorrhage (CH), as compared to developed ones.[3,4] Investigators attribute these differences to widespread prevalence of unrecognized hypertension and poor control of modifiable risk factors such as diet, smoking and diabetes mellitus. [3]

This study was designed after we observed higher incidence of CH in Miri General Hospital as compared to internationally reported data.[3] Our hospital provides services to the population of town and large number of rural communities spread over a vast area, a feature unique to Sarawak - the state with largest area in Malaysia. There is geographical diversity with a scattering of rivers, highlands and mountains. In remote areas there are nomadic tribes such as Penans who move with their settlements in search of food and water. This kind of terrain may have a bearing on disease outcomes as education, health conditions and delivery of optimum healthcare suffer in such environment.

So we proceeded to collect the data for compete one year for all stroke patients admitted in our hospital -with the aim to investigate the profile of stroke, its subtypes and determine the incidence of CH among stroke patients.

MATERIALS AND METHODS

This was a prospective observational study conducted from 1st June 2008 to 31st May 2009. All patients admitted in both male and female wards of Medical Unit with the first incident of stroke were recruited for study.

We adopted the WHO's criterion of stroke, namely: "acute loss of focal brain function, with symptoms lasting 24 hours or more and which are thought to be of vascular origin".[5] Hypertension was defined as either having at least two blood pressure readings of more than 160/90mmHg or requiring antihypertensive treatment. Atrial fibrillation was defined by a positive history or presence of atrial fibrillation on an electrocardiogram (ECG) during patient's hospital stay.

Parameters for analysis were recorded in patients' case notes by medical officers of the Medical Department. Patient's history included details of age, gender, ethnicity, risk factors like hypertension, diabetes, smoking and hypercholesterolemia etc. Patients who stayed within 15 km of Miri City were considered urban. Any patient who had smoked before for at least 1 year was considered a past smoker and one still smoking was grouped as current smoker. Specific cardiovascular history of any previous strokes or transient ischaemic attacks (TIAs), ischaemic heart disease, valvular heart disease, atrial fibrillation and ongoing medications were recorded. Clinical procedure included monitoring of blood pressure upon presentation and doing neurological examination with recording of Glasgow Coma Scale (GCS). All patients were subjected to plain computerized tomogram (CT) of brain to determine the type of stroke, usually done within the first few hours of presentation.

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Table I: Stroke Type, demographic factors and co-morbidities

Demographic Factors / Comorbidities		Ischemic (n=139)		Hemorrhagic (n=76)		P value
Age		62.98 ±13.69		61.61 ± 12.71		‡p=0.34
Gender	(male)	90	64.7%	40	52.6%	†p=0.82
	Female	49	35.3%	38	47.4%	†P=0.03
Ethnicity	(Malay)	21	15.1%	14	18.4%	†P=0.61
	(Chinese)	43	30.9%	18	23.7%	
	(Iban)	52	37.4%	28	36.8%	
	(others)	23	16.6	16	21.1%	
H/O* Hypertension		106	72.3%	48	63.2%	†p=0.04
Hypertensive defaulted treatment		26	24.4%	24	50.0%	†p<0.01
H/O Diabetes		30	22.1%	3	3.9%	†P<0.01
Diabetics defaulted treatment		9	30.0%	0	0.0%	†p=0.02
Aspirin		29	20.8%	6	7.9%	†p=0.01
Previous CVA		19	13.7%	5	6.5%	†P=0.12

‡ Statistical analysis done using t test,
† Statistical analysis done using chi squared test
*H/O (History Of)

Table II: Type of stoke and outcome characteristics

	Ischemic			Hemorrhagic		
	Discharged	Death	P value	Discharged	Death	P value
Male	95.6% (86)	4.4% (4)	p=0.03	71.4% (25)	28.6% (15)	p=0.90
Female	79.6% (39)	20.4% (10)		63.9% (23)	36.1% (13)	
Urban	91.7% (77)	8.3% (7)	P=0.40	74.4% (32)	25.6% (11)	p=0.02
Rural	87.3% (48)	12.7% (7)		48.5% (16)	51.5% (17)	
Dysphagia	75.6% (34)	24.4% (11)	p<0.01	74.2% (23)	25.8% (8)	p<0.01
No dysphagia	96.8% (91)	3.2% (3)		100.0% (25)	0.0% (0)	
Sys BP <140	96.5% (55)	3.5% (2)	p=0.04	70.0% (7)	30.0% (3)	p=0.01
Sys BP 140-180	88.7% (63)	11.3% (8)		77.5% (31)	22.5% (9)	
Sys BP >180	63.6% (7)	36.4% (4)		41.7% (10)	58.3% (14)	
GCS <8	33.3% (2)	66.7% (4)	p<0.01	10.0% (2)	90.0% (18)	p<0.01
GCS 8-10	66.7% (10)	33.3% (5)		61.5% (8)	38.5% (5)	
GCS >10	96.4%(133)	3.6% (5)		88.4% (38)	11.6% (5)	

All Statistical analysis done using chi squared test
*Significant positive correlation noted between Systolic Blood Pressure on presentation and outcome; Ischemic (r=0.251 p<0.01) and haemorrhagic (r=0.303 p=0.01)
** Significant negative correlation noted between GCS on presentation and outcome;
Ischemic (r=-0.49, p<0.01)) and haemorrhagic (r=-0.66, p<0.01).

Patients' progress during the hospitalization until discharge (or death) was recorded and later transcribed into a standardized data sheet. Follow up of patients or their readmissions were not part of this study protocol.

The entire data was compiled by two senior nurses, one from a male ward and another from a female ward; and this process of data collection was supervised by us.

Statistical analysis: Data was analyzed using IBM SPSS 17.0. The demographic factors were analyzed as a whole and sub analyzed to compare stroke type. The categorical variables like gender, ethnicity, residence, smoking, hypertension, diabetes and medication were analyzed using chi squared test with regards to stroke types. Similarly this test was used when we looked at outcome of stroke. Continuous and ordinal data like age, systolic blood pressure and GCS were analyzed using "t" test with regards to stroke type and outcome. We used Spearman's correlation to study the relationship of GCS and systolic blood pressure with regards to outcome as both independent variables were non parametric. Statistical significance was set at p<0.05.

RESULTS

During this one-year study period, total admissions in the medical unit were 3204 patients, both male and female together, out of which 215 were due to a first incidence of stroke. Among those 139 patients (64.7%) suffered from ischaemic stroke and 76 (35.3%) had primary intra cerebral haemorrhage. Table I shows demographic details and comorbidities of patients.

The mean age of patients with CH was one year younger but difference was not significant. We noticed a statistically significant female preponderance in the haemorrhagic group (p=0.03). In both groups Ibans recorded the highest proportion followed by Chinese, Malays and others ethnic races; however this difference was not significant. Overall 71.7% % (154) patients were aware of having hypertension and those were more in the ischaemic group (p=0.04). Compliance to hypertension therapy was also better among them as compared to CH group amongst whom default rate was higher with p<0.01. We observed a higher prevalence of diabetes amongst ischaemic stroke group (p=0.02).

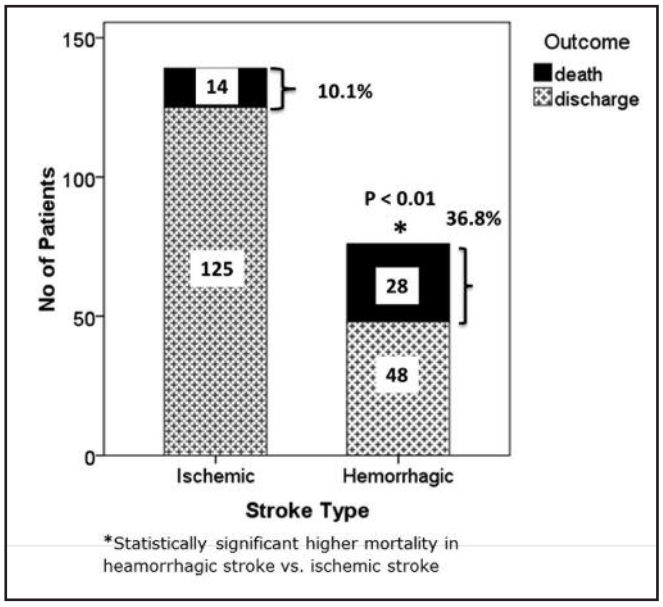

Fig. 1: Stroke numbers and Outcome in two groups.

Stroke accounted for 6.7% of admissions and 16.8% of deaths in medical unit. With regards to outcome of stroke there was an obvious difference between the 2 groups (figure 1).

Together there were 42 (19.5%) deaths. Patients with hemorrhagic stroke had higher mortality rate with 36.8% (28 out of 76 patients) deaths compared to ischaemic group with 10.1% (14 out of 139 patients) fatalities - difference was statistically significant ($p<0.01$). Between the two genders, females with 20.5% deaths fared significantly worse ($p=0.03$) in the ischaemic group compared to males (4.4% fatality). We noticed that haemorrhagic stroke patients living in rural area had a significantly ($p=0.02$) higher mortality (51.5% vs. 25.6%).

Higher systolic blood pressure on presentation correlated with poorer outcome in both ischaemic ($r=0.251$ $p<0.01$) and haemorrhagic ($r=0.303$ $p=0.01$) groups (Table II). There was a significant inverse correlation between Glasgow Coma Scale (GCS) on presentation and mortality in both Ischaemic ($r=-0.49$, $p<0.01$)) and hemorrhagic ($r=-0.66$, $p<0.01$) groups. Patients with dysphagia had worse outcome in both groups ($p<0.01$).

DISCUSSION

Demography

Ibans and Chinese are the two largest communities here with 29% and 24 % population of Sarawak respectively followed by Malays with 23%. The remaining quarter is made up of Bidayuh, Melanau, orang ulu and others including Indians who make a tiny fraction in Sarawak.[6] We observed a similar distribution in stroke incidence and did not notice any association between ethnicity and type of stroke or outcome. (Table I) The mean age for haemorrhagic stroke patients was one year younger but difference was not significant. There were more male patients compared to females as also noted in other studies.[7]

Stroke type and survival

19.5% of stroke patients died in hospital during their first admission. 36.8% of CH patients and 10% of ischaemic stroke succumbed to illness. We are aware that patients with haemorrhagic strokes fair worse: - A Malaysian study published in year 2003 had reported an in-hospital mortality of 11.7% for ischaemic stroke and 27.3% for haemorrhagic stroke.[8] Barber ET al9.reported 28% deaths due to haemorrhagic stroke and 7% in ischaemic stroke in a study done at Glasgow U.K.

The death rate in our study was still higher which could be due to late arrival of patients on account of difficulties of transport from far flung areas resulting in delayed medical attention. Other reasons could be lack of a dedicated stroke specialist and neurosurgical services unit in the hospital.

Higher systolic blood pressure on presentation predicted poor outcome with more deaths both in CH and ischaemic stroke groups. Similar observations have been made by other investigators. Data from the International Stroke Trial[10] involving 17398 patients showed that increasing systolic BP (SBP) was independently associated with risk of early death and late death or dependency.

In systematic review of 32 studies Willmot M *et. al*[11] concluded that high BP in acute ischaemic stroke or primary intra cerebral haemorrhage was associated with subsequent death, death or dependency, and death or deterioration. So it seems that in stroke patients high blood pressure initially or during hospitalization can have prognostic significance.

Higher incidence of haemorrhagic stroke

One of the aims of this study was to determine whether or not there was a comparatively higher incidence of CH occurring among stroke patients and we have confirmed this finding; 35% of all strokes were due to CH. This incidence is more than figures (17.2-25%) reported from Asia including by investigators from Malaysia.[2, 3, 8.12]

The Asian Acute Stroke Advisory Panel that studied acute stroke in Asia, involving hospitals from China, India, Indonesia, Korea, Malaysia, Philippines ,Taiwan, Thailand, Singapore, and Vietnam noted an incidence of 29.8% of CH.[7] In contrast much lower rates are seen in developed western societies.[13] In a systematic review and meta-analysis of 36 studies van Asch *et. al*[14] found the prevalence of CH in Asia was more than that in the Whites and Hispanics. Incidence of CH per 100,000 person-years was 24.2(95% CI 20·9-28·0) in white people, 22·9(14·8—35·6) in black people, 19·6(15·7—24·5) in Hispanic people, and 51·8(38·8—69·3) in Asian people.

There could be various explanations to account for this higher number of CH being seen in Asian studies.

According to experts, some ischaemic stroke patients may not seek medical attention in the hospital because of its milder nature.[15] As CH presents with acute and alarming symptoms, so there are more chances of hospitalization. Schneck MJ *et al*. attributed this higher incidence to "ascertainment bias as most of stroke subtype data are hospital based and Ischemic stroke may be less likely to have neuro imaging in developing countries".[15] Differences in results from a hospital-based study

as compared to community prevalence-study are understandable. However as most of data presented in the literature are from hospital-based studies and registries so the comparison is not inappropriate.

Medications compliance and stroke characteristics

Stroke has many risk characteristics similar to those of coronary artery disease but not all. It has been suggested that stroke is a syndrome with two broad categories of cerebral infarct and cerebral haemorrhage with differing etiologies. Whereas cerebral infarct and coronary heart disease share common pathogenesis, evidence suggests that cerebral hemorrhage may have a different background. [16]

In our study a statistically significant number of patients of ischaemic stroke had history of hypertension, diabetes mellitus and were more likely to be compliant to antihypertensive medications and taking aspirin as compared to those of CH. Over 16% (35/215) patients of our study were taking aspirin. To give perspective in AASAP stroke registry[7] 14% (347/3186) patients were taking aspirin. We noted that while 20.86% (29/139) of our patients with ischaemic stroke were taking aspirin at the time of presentation this number in CH group was lower at 7.89% (6/76) and this difference was statistically significant, with a p-value of 0.014.

One plausible explanation for higher incidence of hypertension, diabetes and more aspirin intake in cerebral infarct category could be that these patients had better access or exposure to medical care. Those who managed their risk factors well, developed over time vascular complications like coronary artery disease and cerebral infarcts. On the contrary a lesser consumption of antihypertensive medications and aspirin in cerebral haemorrhage patients might reflect limited access and exposure to medical care due to any number of reasons including unhelpful socioeconomic factors. In a retrospective analysis based on autopsies investigators found the ratio of cerebral infarct to cerebral haemorrhage increased fourfold from 1930s to 1990s; most of the increase took place between the 1930s and the 1970s.[16] This increase of cerebral infarcts has paralleled the social and economic prosperity in western hemisphere.

Hypertension

We observed prior history of hypertension in 71.7% patient. Similarly Ong TZ *et. al*[12] reported 71.5% of patients having preexisting hypertension in their stroke study from Penang General Hospital. The Third National Health and Morbidity Survey (NMHS-III) had also revealed that the prevalence of hypertension was 42.6% in the Malaysian population aged 30 years and above; Among all hypertensive patients only 35.8% (with a 95% confidence interval of 34.8% to 36.8%) were aware of their medical condition and only 26% of these patients actually achieved target their blood pressure. [17] So the message from NHMS data was that hypertension remained both under diagnosed and poorly managed.

In the last 50 years many studies conducted worldwide[18, 19] have conclusively proven that adequate treatment of hypertension lowers the risk of stroke, but in our population in Malaysia and for that matter in the developing world, treatment of hypertension is far from adequate. Unrecognized and poorly controlled hypertension -like the proverbial tip of iceberg- is underestimated both for its prevalence and impact on cardiovascular diseases and stroke. It is possible that poorly managed risk factors including unrecognized hypertension are likely causes of higher incidence of CH in underdeveloped populations. Many investigators have reiterated these views[3] and our data also supports similar trend.

Weakness of study: While the strength of this study was its prospective data collection, same set of investigators and CT scan imaging in all patients, there were many deficiencies. Risk factors like hyperlipidemia and smoking could not be analyzed as our data collection was not exhaustive. We were unable to explain as to why there was not a single case of atrial fibrillation in our study; possibly we overlooked or missed the findings.

CONCLUSIONS

(1) Every third stroke was cerebral haemorrhage; this was consistent with the higher reported incidence in Asia and underdeveloped countries as compared to the Western world.
2) History of prior hypertension was present in 71% of stroke patients. However CH stroke patients were largely unaware of their hypertension or were altogether treatment naïve. Nevertheless ischaemic stroke patients were better managed, compliant to treatment of diabetes mellitus, hypertension and were more likely on aspirin. It seems ignorance of risk factors was the bane of CH.
3) One fifth of stroke patients died during hospitalization. A higher systolic blood pressure on presentation, poor GCS and dysphagia were identified as markers of poor outcome.

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