MEDICAL CONDITIONS RELATED TO ISCHEMIC AND HAEMORRHAGIC STROKE: A HOSPITAL BASED STUDY

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Abstract:
Objective: To evaluate the distribution of common medical conditions related to stroke among Bangladeshi patients.

Methods: This is an observational study. It involved 336 stroke patients from different medicine words in Dhaka Medical College Hospital over a period of twelve months. We evaluated some common established medical conditions observed among stroke patients e.g. age, sex, family history, hypertension, diabetes, ischemic heart disease, smoking, obesity, dyslipidaemia, alcoholism, use of oral contraceptive pill, lack of fresh fruit consumption etc. A predesigned check list was used for data collection.

Result: Among the 336 patients, Most of the stroke events occurred after the age of forty (82.3%) and the ischemic stroke (72%) being the most common. Other than the non modifiable risk factors (advancing age, sex, Family history of stroke) hypertension was the most common factor found in relation to stroke patients (57.6%) followed by smoking (44.6%), tobacco use (24.3%), OCP use in female (40% of female stroke), diabetes (23%), ischemic heart disease (17.1%), obesity (10.6%) and dyslipidaemia (5.3%).

Conclusion: Stroke is common after the age of forty. Ischemic events are commonest type of stroke. Hypertension, smoking, diabetes, tobacco use, and ischemic heart disease were five most common conditions related to stroke.

Key words: Stroke, hypertension, diabetes.

Introduction:
Stroke is the second leading cause of death worldwide and a major cause of disability among adult in most of the regions¹,². About 16.3 million people suffer from stroke worldwide each year, among which 11.2 million events occur in developing countries including Bangladesh. About 5.8 million people die of stroke each year, the two third of which occurs in developing nations². An estimated 64.5 million stroke patients survived an acute stroke event and living with varying degree of disability². Worldwide, stroke consumes about 2–4% of total health-care costs, and in industrialized countries, stroke accounts for more than 4% of direct health-care costs³. Though the trend of stroke mortality in developing countries is largely unknown, the average age adjusted mortality of stroke differs even among the developed countries⁴. The geographic variation may be due to difference of risk factor prevalence, genetic susceptibility and level of healthcare facilities. Even though there has been a constant reduction in stroke mortality in developed countries during the past 50 years⁵, it is less certain about trends in developing countries. The most acceptable explanation for the reduction in mortality in western countries is improved control of stroke risk factors (especially high blood pressure and cigarette smoking) combined with a parallel improvement in living standards⁶-¹³.

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Bangladesh is a small country in South Asia with high density of population (an average of 964 inhabitants/square kilometer)\textsuperscript{14}. The prevalence of stroke here is 3 per 1000 above the age of 40 years\textsuperscript{15}. We could find few similar studies involving stroke patients\textsuperscript{16-18}. So we conducted the study in medicine ward of Dhaka Medical College Hospital (DMCH), Dhaka, involving a considerable sample to know about the distribution of common factors related to stroke.

**Methods:**

This cross sectional study was conducted in medicine wards of Dhaka Medical College Hospital involving 336 patients over a period of one year. The diagnosis of was based on WHO definition of stroke, with the support of convincing history, compatible clinical examination finding and confirmed by CT scan of Head. MRI of brain was done only in required cases e.g. suspected cerebellar or brain stem stroke. We excluded patients with recurrent stroke, encephalopathy from this study. We collected all the data using a preformed questionnaire. Required information about presence of other factors e.g. age, sex, family history, hypertension, diabetes, ischemic heart disease (IHD), smoking, obesity, dyslipidaemia, alcoholism, use of oral contraceptive pill, pregnancy. Patients were evaluated meticulously with history, clinical examination and necessary investigation at the time of hospital visit by specialists in medicine. All findings were noted and recorded.

**Results:**

In this study the majority of strokes occur after the age of 40 years (82.3%), the most common being in 51-60 years age group (31.1%), followed by 41-50 years age group (27.5%). Ischemic stroke was common in all age group. Stroke events showed a male preponderance (73.4%). The male to female ratio for ischemic stroke was 3:1, as compared to 2:1 for haemorrhagic stroke. We found that about 6% of the patients had history of stroke within the family (Table-I). Ischemic stroke was the most frequent event (72%), followed by intracerebral hemorrhage (23%) and subarachnoid hemorrhage (5%) (Figure-I). Hypertension was the most common risk factor in stroke patients (56.7%). Smoking was the next common entity (44.6%) in stroke patients after hypertension followed by tobacco use (24.3%) and Diabetes (23%). History of ischemic heart disease, in the form of acute coronary syndrome, was present in 17.1% stroke patients and dyslipidaemia in 5.3%. About 10.6% patients were obese (BMI > 24.9). A good proportion of female stroke patients (40%) took oral contraceptive pills. A very few patients (1.2%) were binge alcohol drinker (Figure-II).

**Table I**

*Non modifiable risk factors of stroke (N=336)*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Total</th>
<th>ISH</th>
<th>HRG</th>
<th>Percentage</th>
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<tr>
<td><strong>Age</strong></td>
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<td></td>
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</tr>
<tr>
<td>11-20yr</td>
<td>2.3</td>
<td>0.7</td>
<td>1.6</td>
<td></td>
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<tr>
<td>21-30yr</td>
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<td>2.4</td>
<td>0.6</td>
<td></td>
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<tr>
<td>31-40yr</td>
<td>12.3</td>
<td>9.6</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>41-50yr</td>
<td>27.5</td>
<td>22.4</td>
<td>5.1</td>
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<tr>
<td>51-60yr</td>
<td>31.1</td>
<td>24.1</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>&gt;60 yrs</td>
<td>23.7</td>
<td>18.3</td>
<td>5.4</td>
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<tr>
<td><strong>Sex</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>73.4</td>
<td>58.1</td>
<td>15.3</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>26.6</td>
<td>18.9</td>
<td>7.6</td>
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<tr>
<td><strong>Family History of Stroke</strong></td>
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<td>Positive family history of stroke</td>
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</table>

Table-I shows non modifiable risk factors in stroke patients. Most of the patients are older than 40 years and male.
Discussion:
Hospital-based stroke registries help to study the relationship between stroke, risk factors and prognosis. The present report provides the detail information regarding stroke subtypes and distribution of common factors and medical conditions related to stroke. Our study provides essential information on common, nonmodifiable and potentially modifiable vascular risk factors, and builds on previous epidemiological studies. It is well established that the incidence of stroke rises steeply with age, a finding that is consistent in most of the studies conducted worldwide. The highest age specific rates occurred in Japan, Russia, and Ukraine. We also have observed age specific increased frequency of stroke after forty and commonly with ischemic events. But in our study stroke events are common at much younger age (40-60 years) than other parts of the world. The overall difference in life expectancy may be a possible explanation for the fact. Though rare, before the age of 20 years, hemorrhagic events were seen frequently. Chen et al also reported a relatively higher incidence of hemorrhagic stroke in children below 10 years and 10-19 years, irrespective of sexes. A recent study from Texas also showed higher incidence of hemorrhagic stroke than ischemic (3.2 versus 1.1 per 10000). Thus we have confirmed from the observation of previous studies that ischemia is much more common than hemorrhagic events in adulthood stroke. But geographic variation exists for childhood stroke. The estimates of the incidence rates for childhood stroke ranged from 2.1 to 13 per 100,000 children-years in Hong-Kong, the United States and France. Stroke was three times higher among male in our study, a fact also established by others. The Framingham Heart Study found a higher risk of stroke in men than in women until age 84 years, when risk in women exceeded that in men. Data from a population-based study from Sweden also showed a reversal in the sex difference with advanced age. Others have reported that stroke risk in men remains higher than that in women throughout life, although the magnitude of the sex difference diminishes with age. Still others have reported that the sex differences no longer exist at older ages. In the socio economic and cultural context of Bangladesh, female stroke patients are often reluctant to get hospitalized. So not surprisingly we found less number of female stroke patients. Likewise in other developing countries, in our study, ischaemic stroke represents the majority of stroke subtypes, followed by primary intracranial haemorrhage and subarachnoid haemorrhage. In developed countries, up to 67.3–80.5% of strokes are attributed to ischaemic stroke, whereas 6.5–19.6% are primary intracerebral haemorrhage, about 0.8–7% are subarachnoid haemorrhage, and 2–14.5% are of undefined type. In some developing countries, there is a tendency for a higher proportion of haemorrhagic strokes than in western countries. Most of the East Asian studies have suggested that the proportion of intracerebral haemorrhage is significantly higher (up to 35% of the total) than in people of European descent.

We found the frequencies of the common factors or medical conditions related to stroke in Bangladesh to be similar to those of the other countries. Consistent with previous studies, our findings showed that hypertension was the most common risk factor (57.6%) for all stroke subtypes. Reports from both the
developing and developed world are similar in this regard\textsuperscript{58-61}. The high frequency of hypertension is probably due to self reporting of patients and the clinic recording of increased blood pressure. Systemic review study also confirms this type of finding\textsuperscript{62-65}. Consistent with the report of Bak et al\textsuperscript{66} smoking was the next major risk factor of stroke following hypertension in the present study. Daily smoking also doubled the risk of stroke among male in Europe, Honolulu and China\textsuperscript{65,67-69}. Though smoking is uncommon among Bangladeshi women, they are habituated more to tobacco use in the form of betel nut chewing, which is evident by this study (one fourth of the stroke patient chewed betel nut with tobacco). Ischemic heart disease and ischemic stroke shares common modifiable risk factors. Hence, it is not surprising to find that one in every six stroke patient had associated ischemic heart disease. Our finding is also supported by the report of Jorgensen et al\textsuperscript{69}.

We observed an increased frequency of stroke among diabetic population which is also established by several other studies for the last thirty years\textsuperscript{71-74}. This increase has been connected to the pathophysiological changes seen in the cerebral vessels of patients with diabetes\textsuperscript{75,76}. The relative risk of stroke is approximately doubled compared with that in patients without diabetes\textsuperscript{77}. As in ischemic heart disease, obesity and dyslipidaemia were also common as risk factor of stroke in our study. Though truncal fat may be better predictor\textsuperscript{78}, most of the epidemiologic studies measured BMI like us. High BMI significantly predicted stroke in several studies\textsuperscript{79-81}. Thus, the excess risk was approximately 30% per BMI unit in Framingham men\textsuperscript{67}, 10% in Japanese-American men in Honolulu. The role of hyperlipidaemia on stroke has been studied by several researchers. Statins have been shown to reduce stroke incidence by 29% in some trials\textsuperscript{81-84}. Haque et al\textsuperscript{85} also confirmed a strong association of LDL-cholesterol and triglyceride with ischemic stroke among Bangladeshi patients. A considerable fraction of women in our study (40%) used oral contraceptives (OCP). OCP increases the risk of cerebral infarction up to 9 fold\textsuperscript{87} and the risk cumulates among women with hypertension, migraine and smoking\textsuperscript{86-90}. The relation between alcohol intake and stroke seems complex one. Epidemiological studies confirmed that alcohol intake has a J-shaped relation with ischaemic stroke, but is associated with a graded increased risk of haemorrhagic stroke. Due to social and cultural and legal restrictions in our country, the frequency of drinking alcohol was minimal\textsuperscript{91}.

Nonetheless we had some limitations in this study. Though this hospital based observational study may not reflect the real scenario within the community. Moreover, we could not measure the odd ratio for individual risk factors due to the nature of the study. This warrants further case control studies to confirm the level of association.

**Conclusion:**

Stroke is common after the age of forty but patients in Bangladesh have stroke at relatively younger age than the west. Similar to other low income countries, our findings suggest that five simple factors or medical conditions are associated with majority of the risk of ischaemic and intracerebral haemorrhagic stroke in Bangladesh. Targeted interventions could substantially reduce the overall burden of stroke.

**References:**


