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Burden of stroke in Bangladesh

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Stroke is the third leading cause of death in Bangladesh. The World Health Organization ranks Bangladesh's mortality rate due to stroke as number 84 in the world. The reported prevalence of stroke in Bangladesh is 0.3%, although no data on stroke incidence have been recorded. Hospital-based studies conducted in past decades have indicated that hypertension is the main cause of ischaemic and haemorrhagic stroke in Bangladesh. The high number of disability-adjusted life-years lost due to stroke (485 per 10 000 people) show that stroke severely impacts Bangladesh's economy. Although two non-governmental organizations, BRAC and the Centre for the Rehabilitation of the Paralysed, are actively involved in primary stroke prevention strategies, the Bangladeshi government needs to emphasize healthcare development to cope with the increasing population density and to reduce stroke occurrence.

Key words: Bangladesh, hypertension, prevalence, rehabilitation, risk factor, stroke burden

Introduction

Bangladesh has a population of 162.2 million people, 26% of whom live in urban areas and the majority of whom (74%) live in rural areas. This population spans an area of 147 570 km², resulting in a population density of 966 people per km². The male : female ratio in Bangladesh is 1.003 : 1. Bangladesh is one of the least developed and low-income countries in the world, with an approximate per capita gross

domestic product (GDP) of \$544. However, less than 2.70% of the GDP is spent on health care (1).

Mortality

In Bangladesh, stroke has been ranked as the third leading cause of death after coronary heart disease and infectious diseases such as influenza and pneumonia. The mortality rate of stroke increased from 6.00% (in 2006) to 8.57%, (in 2011) with an age-adjusted mortality rate of 108.31 per 100 000 people (in 2011). The World Health Organization (WHO) ranks mortality due to stroke in Bangladesh as number 84 in the world (2). The crude death rate per 1000 people in Bangladesh is reported at 5.8%; the female and male life expectancies are reported as 64.4 years old and 65.1 years old, respectively (3).

Prevalence and incidence

The prevalence of stroke has been estimated from a community study involving 15 627 participants aged 40 years and older. Stroke prevalences were reported as 0.20%, 0.30%, 0.20%, 1.00%, and 1.00% for the age groups 40–49 years, 50–59 years, 60–69 years, 70–79 years, and 80 years and above, respectively (4). The overall prevalence for stroke was 0.30%, and the ratio of male : female patients was 3.44 : 2.41.

To date, there is no reported community study that has determined the stroke incidence in Bangladesh. However, a few hospital-based stroke studies have been carried out in the past decade involving three main hospitals: the Chittagong Medical College Hospital (CMCH), the Mymensingh Medical College Hospital (MMCH), and the Dhaka Medical College Hospital (DMCH).

The first study was conducted among 100 stroke patients admitted to CMCH between July 2001 and June 2003. Among the patients, 74% were males and 26% were females, with 61% suffering from ischaemic stroke (IS) and 39% suffering from haemorrhagic stroke (HS). A small percentage of the stroke patients had previous history of stroke (9%) or transient ischaemic attack (TIA) (3%). With respect to the demographic data, 54% and 46% lived in urban and rural areas, respectively, while 47% and 53% were from low- and middle-income groups, respectively. Hypertension (63%) was the main risk

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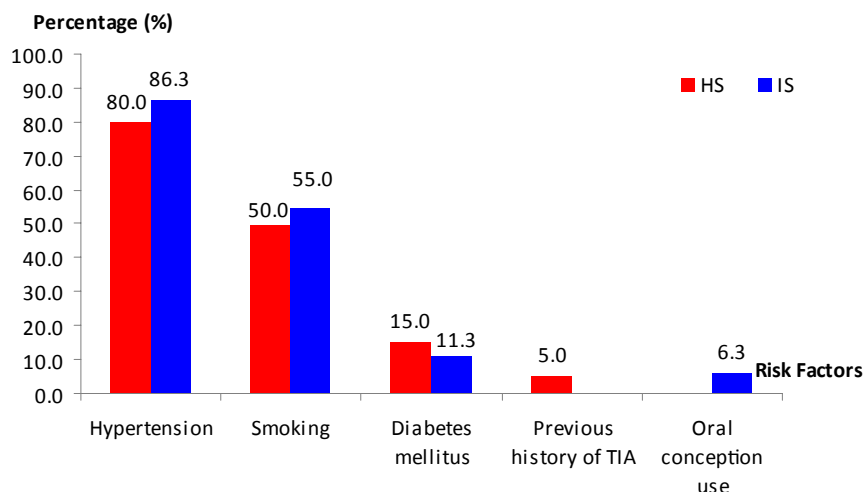


Fig. 1 The risk factors associated with ischaemic (IS) and haemorrhagic strokes (HS) ($n = 100$) (6). TIA, transient ischaemic attack.

factor for stroke, followed by heart disease (24%), diabetes mellitus (DM) (21%), and hyperlipidaemia (7%). The overall percentage of risk factors was larger than 100% due to the fact that some of the patients had multiple risk factors (5).

In another study, 100 stroke patients were hospitalized at CMCH between November 2003 and May 2004; the majority (80%) suffered from IS and the rest (20%) had HS. The ratios of male : female patients were 3:00 : 1:00 and 1:35 : 1:00 for HS and IS, respectively. The number of patients from rural areas was 60% and 46% for HS patients and IS patients, respectively. Hypertension was the most common risk factor for both types of stroke, followed by cigarette smoking, DM, oral conception use, and previous history of TIA (Fig. 1). At admission, hospitalized patients presented with hemiparesis, dysarthria, motor and sensory dysphasias, impaired consciousness, headache, vomiting, and nystagmus. According to the study, the most common brain area affected by stroke was the cortical region, followed by the basal ganglia, internal capsule, insula, thalamus, cerebellum, and multifocal areas (6).

In the MMCH study, there were 50 stroke cases that occurred between January and June 2008 and affected relatively young patients (mean age 35.8 ± 7.39 years). The majority of the cases (60%) were IS and the rest were HS (40%). Again, the majority of the patients were males; the ratio of male : female patients was 1:27 : 1:00. However, the most common stroke-related risk factor found in this study was dyslipidaemia and not hypertension, perhaps due to the smaller sample size. Other stroke-related risk factors were hypertension in the patient or in family members, smoking, DM, ischaemic heart disease in the patient or in family members, alcohol consumption, and family history of stroke. The data also indicated that IS patients had a higher likelihood of recovery (68%) compared to HS patients (32%). HS contributed significantly to overall inpatient mortality (12%), while no mortality rate was reported for IS (7).

Another study investigated the association between metabolic syndrome and stroke occurrences among randomly selected stroke patients ($n = 50$) hospitalized in DMCH between July and December 2009. Metabolic syndrome encompasses atherogenic dyslipidaemia, high blood pressure, hyperglycaemia, and centrally distributed obesity (8). Although 46% of patients observed had metabolic syndrome, overall, a higher contribution was seen in the IS cases (65.2%) than in the HS cases (34.8%). Of the 54% of patients without metabolic syndrome, 55.6% were HS patients (9). Atherogenic dyslipidaemia is characterized by increased triglyceride (TG) levels ($TG \geq 150$ mg/dl) and decreased high-density lipoprotein (HDL) levels ($HDL \leq 40$ mg/dl) (8). The data indicated that the majority (64%) of stroke patients had high TG levels and 68% had low HDL levels (9). However, the actual TG and HDL levels were not reported. In their study, the majority of the stroke patients (64%) were also reported to have high blood pressure [defined as systolic or diastolic blood pressure ≥ 130 mmHg or 85 mmHg, respectively] (8). Of those with high blood pressure, 69.60% were HS patients and 59.3% were IS patients. Forty-four per cent of the patients were also hyperglycaemic with a fasting blood glucose greater than 100 mg/dl (9). Centrally distributed obesity can be defined either by the waist to hip ratio (a ratio of more than 0.90 and 0.85 for men and women, respectively) or by having a body mass index greater than 30 kg/m² for both men and women (8). Based on these definitions, only 12% of patients were categorized as obese (9).

Stroke-related risk factors have also been studied among patients ($n = 400$) hospitalized in DMCH between July and December 2007. The male : female ratio was 1:20 : 1:00 and the patients were classified into different stroke subtypes according to the findings from computed tomography (CT) scanners or magnetic resonance imaging (MRI). The data indicated that 56.25%, 38.25%, and 5.50% of the patients had cerebral infarction, intracerebral haemorrhage, and subarach-

noid haemorrhage, respectively. The risk factors present in the stroke cases included hypertension (present in 58.62% of the stroke cases), cigarette smoking (53.79%), lipid disorder (48.01%), heart diseases (25.75%), DM (20.01%), and previous history of stroke (10.61%) (10).

In another study, the risk factors for stroke were investigated in 85 young patients (aged 14 to 45 years) hospitalized at the DMCH between January 2008 and July 2009. The majority (61.18%) suffered from an IS, while others had intracerebral haemorrhage (29.40%), subarachnoid haemorrhage (8.24%), or aneurysm (1.18%). The common risk factors for both IS and HS were hypertension (60.00%), hypercholesterolaemia (38.80%), diabetes (35.20%), smoking (32.90%), premature atherosclerosis (8.20%), and oral contraceptive use (3.8%) (11).

Economic impact

The WHO reported that the number of disability-adjusted life years (DALY) lost (per 1000 people) because of stroke was 485, while the age-standardized DALY rate (per 100 000 people) for stroke was 864 (12). These numbers indicate that stroke will have a great economic burden in Bangladesh in the future. The situation is compounded by the fact that 40.30% of Bangladeshi are already reported to be living in poverty (13).

Prevention and rehabilitation

In this highly populated country, there are only 2213 hospitals with 45 723 registered physicians and only 60 trained neurologists. Furthermore, neurology training programs are only provided in DMC and Bangabandhu Sheikh Mujib Medical University (14,15). In terms of equipment, there are only 1300 technologists operating 150 CT scans and 45 MRIs throughout Bangladesh (16). This situation is dismal for Bangladeshi stroke patients because the mortality rate due to stroke is increasing.

A non-governmental organization (NGO) named BRAC provides stroke rehabilitation services to stroke patients who cannot afford treatment and provides stroke-related education programs to raise awareness among Bangladeshi about the signs and symptoms of stroke (17). Another NGO that is actively involved in stroke rehabilitation activities is The Centre for the Rehabilitation of the Paralysed, which provides physiotherapy, speech and language therapy, and occupational therapies to stroke patients, while educating the public on the symptoms of stroke (18).

Conclusion

Stroke cases in Bangladesh have significantly increased in number over the past decades; adverse outcomes from these cases are also rising due to the low number of neurologists and specialized hospitals in the country. Because stroke poses

long-term economic impacts on individuals, families, and the country, we urge the Bangladeshi government to put more emphasis on healthcare development by building more stroke rehabilitation units and tertiary hospitals to prevent stroke occurrence and recurrence.

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