

MAJOR CO-MORBIDITIES IN STROKE PATIENTS: A HOSPITAL BASED STUDY IN BANGLADESH

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Abstract:

Objective: To evaluate comprehensively all the major co morbid diseases seen in stroke patients.

Methods: In this observational study, 4579 patients were recruited from outdoor based stroke clinic in a tertiary care hospital. Twelve common co morbid conditions were evaluated in these patients through a preformed questionnaire and data were then analyzed.

Result: Hypertension was the most frequent co morbid condition found in stroke patients (57.6%) followed by diabetes (23%), ischemic heart disease (17.1%), obesity (10.6%) rheumatologic disorder (6.6%) and dyslipidaemia (5.3%). All the above other than rheumatologic disorder were significantly associated with stroke. There was no significant sex difference among co morbid conditions except obesity, which is more common in female (p value= 0.000).

Conclusion: Stroke patients should be searched for co morbid diseases. As they may affect functional outcome during the period of rehabilitation, physicians should pay special attention in managing them properly.

Key Words: Ischemic stroke (ISC), Haemorrhagic stroke (HRG), Hypertension (HTN), Diabetes Mellitus (DM), Chronic kidney disease (CKD)

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Introduction:

Stroke is defined as sudden onset of focal neurologic deficit of non traumatic cerebral vascular origin which persists for more than 24 hours. It is the second commonest cause of death (9%) and a major cause of disability worldwide¹. The age adjusted annual death rate from stroke in UK is about 200 per 100,000 (12% of all death)¹. Annually 16.3 million people suffer from stroke worldwide, among which 11.2 million events occur in developing countries

like ours and 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. The burden is projected to rise from 38 million DALY (Disability Adjusted Life Year) in 1990 to 61 million DALY in 2020³. The term “comorbidity” refers to one or more other disease among people with an index disease⁴. It is often difficult to determine whether a

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clinical entity should be marked as comorbidity or complication of the disease itself. The working definition of complication is regarded as existence of a second disease when the occurrence of an index disease is required⁵. Comorbidity is a common phenomenon in elderly⁶. The fraction of senior citizens is expected to increase up to 19-26% within 2025⁷. The incidence of stroke also rises steeply with age⁸. There is high incidence of coexisting medical disorders among patients recovering from stroke. In general these coexistent medical conditions have a negative impact on disease outcome and quality of life⁹. In our study we tried to identify the probable co morbid conditions in stroke patients who attended a specialized stroke clinic at Neurology outpatient department of Dhaka Medical College Hospital. The optimal management of these conditions may accelerate recovery from stroke during the phase of rehabilitation¹⁰.

Materials and Methods:

This is an observational study carried out in weekly Stroke outdoor clinic of Department of Neurology, DMCH from October 1996 to July 2011. During this period a total of 57821 patients with neurological complaints were seen in Neurology OPD of DMCH. Among them 4579 patients of stroke were enrolled for the study using a preformed questionnaire. Required information on age, sex, social status, presence of co morbid conditions eg, hypertension, diabetes, obesity, smoking, dyslipidaemia, heart disease, lung disease, renal problem, rheumatologic disorder, malignancy etc were noted. Patients were examined by research assistants. Diagnosis was made following WHO definition of stroke and the ICD-10 (chapter-VI) criteria and confirmed by CT scan of Head. MRI of brain was done in required cases. Patients were later evaluated and treated by consultant neurologists.

Result:

In our study 3527 patients (77%) presented with ischemic stroke and 1052 patients (23%) with hemorrhagic stroke (Figure-1). The frequency of stroke increased after the age of 40 years (84.3%), the most common being in

51-60 years age group (31.1%). But the occurrence of stroke somewhat decreased after sixty (23.7%). Stroke events showed a male preponderance (73.4%). The number of female stroke was 1216 (26.6%) (Table-1). There was an increased frequency of haemorrhagic stroke in female patients in comparison to male counterpart. The male female ratio in ischemic subgroup was 3:1 and in haemorrhagic subgroup 2:1 (Figure: 3). Hypertension was the most common co morbid condition in stroke patient (56.7%). Most of them were known hypertensive (97.8%). Only 56 patients (2.2%) were diagnosed as hypertensive for the first time in stroke clinic. Majority of the patients took their antihypertensive medication regularly (58.4%) except for 38.5% patients who had a history of taking irregular antihypertensive medication and 3.1% patients who did not take any medication at all (Table-II). Diabetes was the next common entity (23%) in stroke patients after hypertension. They commonly took oral hypoglycemic agent (67.2%). About 26.5% patients were on Insulin and 6.3% followed only dietary advice for controlling blood glucose level (Table-II). About 10.6% patients were morbidly obese. Ischemic heart disease was present in 781 stroke patients (17.1%) and dyslipidaemia in 5.3%. Rheumatologic conditions like osteoarthritis, low back pain and a few cases of inflammatory arthritis were present in 6.6% (301) patients. Respiratory disease in the form of bronchial asthma, chronic obstructive lung disease and pneumonia were found in 3.6% patients. Chronic kidney disease (2.4%), electrolyte imbalance (1.2%), thyroid disorder (1.5%-mostly hypothyroidism), dementia (1.2%) and malignancy (0.2%) were found less commonly in our study (Table-II). Statistical analysis showed a strong association of hypertension, diabetes, ischemic heart disease, obesity and dyslipidaemia with stroke (Table-III). But there was no significant sex difference of these conditions except for obesity (p value- 0.000). About 16.9% of the female stroke patients were obese. Hypertension was also slightly more common among female (60.2%). But the difference was not statistically significant (Table-III).

Table I
Socio demographic profile of the patients (N=4579)

Parameter	n	%
Age		
11-20yr	14	0.3
21-30yr	141	3.1
31-40yr	561	12.3
41-50yr	1352	29.5
51-60yr	1426	31.1
>60 yrs	1085	23.7
Sex		
Male	3363	73.4
Female	1216	26.6
Socioeconomic status		
Lower	1636	35.7
Middle	2924	63.9
Higher	19	0.4

Table-I shows the demographic profile of stroke patients. Most of the patients are older than 40 years and male.

Table II
Major co morbid conditions (N=4579)

Parameter	n	%
Obesity	486	10.6
HTN	2638	57.6
Previously diagnosed HTN	2582	97.8
Newly diagnosed HTN	56	2.2
Anti HTN Medication		
Taking regularly	1506	58.4
Not taking	81	3.1
Irregularly taking	995	38.5
DM	1055	23
Previously diagnosed DM	1014	96.1
Newly diagnosed DM	41	3.9
Anti diabetic medication		
Diet alone	64	6.3
OHA	682	67.2
Insulin	268	26.5
Smoking	2041	44.6
Ischemic Heart Disease	781	17.1
Dyslipidaemia	244	5.3
Rheumatologic Disease	301	6.6
Chronic Kidney Disease	111	2.4
Electrolyte Imbalance	53	1.2
Respiratory Disease	165	3.6
Thyroid Disorder	67	1.5
Dementia	55	1.2
Malignancy	8	0.2

Table-II Shows the major co morbid conditions in stroke patients. Hypertension, diabetes, ischemic heart disease, obesity and dyslipidaemia are five most common conditions.

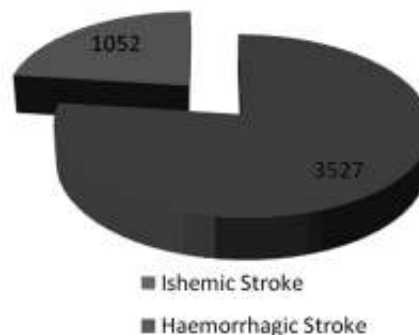


Fig.-1: Distribution of stroke subtype, showing that about 3/4th of the patient had ischemic stroke

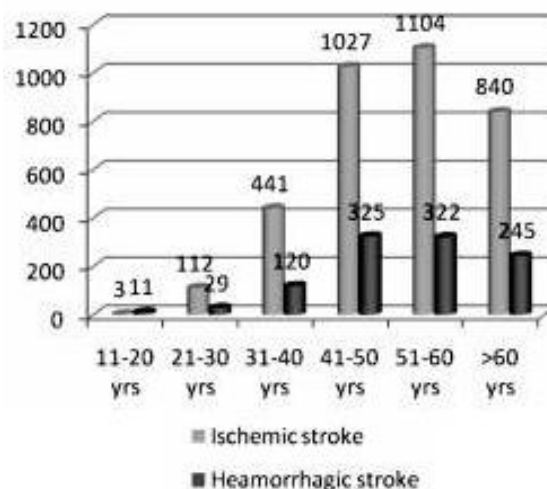


Fig.-2: The frequency stroke increased after 40 years and the ratio of ischemic and haemorrhagic stroke are nevertheless similar in all age group.

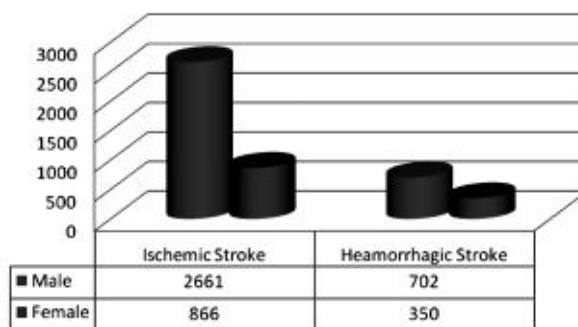


Fig.-3: The male to female ratio for haemorrhagic stroke is less than that for ischemic stroke which means, the female had relatively higher frequency of haemorrhagic stroke.

Table III
Comorbidity and Stroke

Parameter	Stroke Subtype*			Sex		
	ISC	HRG	<i>p</i> value [†]	Male	Female	<i>p</i> value
Obesity	7.5%	3.1%	0.001	8.3%	16.9%	0.000
HTN	43.3%	14.3%	0.0001	56.7%	60.2%	0.033
DM	20.1%	2.9%	0.0001	23.3%	22.3%	0.466
IHD	14.7%	2.3%	0.0001	17.8%	15%	0.023
Dyslipidaemia	3.7%	1.7%	0.002	5.1%	5.8%	0.355
Rh. disease	5%	1.6%	0.687	6.5%	6.9%	0.589
CKD	1.9%	0.5%	0.602	2.4%	2.5%	0.740
Resp disease	2.6%	1%	0.087	3.5%	3.9%	0.473
Thyroid disorder	1.2%	0.3%	0.321	1.4%	1.6%	0.780
Dementia	1%	0.2%	0.395	1.3%	0.9%	0.356
EI	0.8%	0.3%	0.354	1.3%	0.8%	0.273
Malignancy	0.2%	0	0.481	0.2%	0.2%	1.00

* ISC= Ischemic stroke; HRG= Haemorrhagic stroke, EI= Electrolyte imbalance[†] Chi-square test with 95% confidence interval

Discussion:

In this outdoor clinic based study, the ratio of ischemic (77%) versus haemorrhagic (23%) stroke was 3.34: 1. The finding contradicted the study of Hossain et al and Alam, conducted in hospitalized patients of Dhaka Medical College, who showed the ratio of 1.5:1 in ischemic versus haemorrhagic stroke.^{11,12} But our report was similar to average ratio of stroke subtypes in ASEAN (Association of South East Asian Nations) countries¹³. But the country specific frequency of haemorrhagic stroke in hospital based study varies from 38.6% in Indonesia to 26% in Singapore¹³. Banerjee et al in community based study in Kolkata reported a ratio of 2.21:1 of stroke subtypes¹⁴. The trend of increased frequency of haemorrhagic stroke found in hospital based study is probably due to increased rate of hospitalization of haemorrhagic stroke patients as a result of acuteness in clinical presentation. But the hospital outdoor based study reflects the gross scenario of prevailing disease in the community. There is also a tendency of higher proportion of haemorrhagic stroke in developing countries than the western population. Most of the studies conducted in East Asia, reported a significantly

higher frequency of intracerebral haemorrhage (up to 35%)¹⁵. The majority of stroke patients were above 40 years of age which was similar to findings of dissertations of Arif, Bashar and Chowdhury¹⁶⁻¹⁸. Feigin et al in his report of 15 developed countries, showed a progressive increase of age specific incidence rate of stroke with each decade of life, the largest number being in people older than 85 years. The highest age specific stroke events occurred in Japan, Russia and Ukraine¹⁹. But in our series the stroke frequency decreased after 60 years of age. The difference from the developed countries accounts for the fact that average life expectancy is 65 years in Bangladesh. In this study the male to female ratio of stroke was 2.75:1. The finding differs significantly from a community based study in China that reported the ratio from 1.3-1.5:1²⁰. Though we found a significantly higher proportion of hemorrhagic stroke among female ($p = 0.000$), it demands further research to find out the cause beneath this relationship. Johansen et al also showed similar report from Canada where in each age group subarachnoid haemorrhage was more common among the female and the difference was statistically

significant²¹. Hypertension was the most common co morbid condition among stroke patients (57.6%). The finding is 1.8 times higher than the report of Johansen (35%)²¹ and 1.4 times less than the reports from Turkey (83%)²². Diabetes, ischemic heart disease, obesity, dyslipidaemia are the other major co morbid conditions found in stroke patients and all these factors had statistically significant association with stroke. The reports are also similar to that of Johansen²¹ but differ slightly in terms of order of frequency of these factors from the study of Karatepe et al²². Nuyen et al found a different set of co morbid conditions in stroke patients. He reported Epilepsy, TIA, Congenital abnormalities, Parkinsons disease and blood pressure problems as the most common five conditions associated with stroke patients²³. Age, sex, hypertension, DM, heart disease, hyperlipidaemia are also established risk factors of stroke²⁴. Wong et al showed that ischemic heart disease and diabetes were independent risk factors for early death in ischemic stroke patients. Hypertension and young age were protective whereas diabetes was risk factor for early death in haemorrhagic stroke patients²⁵. There are very few studies available regarding co morbid conditions in stroke and their effect on functional outcome. Goldstein et al showed the functional outcome at discharge from hospital and 1year mortality was associated with the number and severity of co morbid conditions²⁶. In another study, coronary artery disease and diabetes both predicted an unfavorable outcome²⁷. There are some contradictory results published about co morbid disease and functional gain. Some authors suggested no relationship between functional gain and co morbidities while others showed the negative effect of co morbid conditions on functional outcome²⁸⁻³¹. Most of the tools developed for measuring comorbidity are adapted for acute stroke patients who are hospitalized. Our study was a hospital outdoor based observation and we did not measure the co morbidities through any index. So their effect on functional outcome was not analyzed. Other than obesity and hypertension all the co morbid conditions were equally distributed among both the sex. The female had a higher

frequency of obesity which was statistically significant ($p=0.000$). But higher frequency of hypertension in female was proved statistically insignificant. Our finding contradicts to the community based study of Holroyed-Leduc et al in Canada where men were more likely to have ischemic heart disease and diabetes mellitus whereas women had higher prevalence of atrial fibrillation and hypertension³². The ethnic, geographic composition and nature of study might have contributed to the differences in observation. We certainly had some limitations in this study that warrant consideration. First of all, this is a hospital outdoor based study which excludes all the acute cases of stroke. Data were taken from patients during the period of rehabilitation. Secondly, we just noted the presence or absence of comorbid conditions but did not measure the disease severity through any scale and the effect of the conditions on functional outcome. Despite these limitations we tried to identify the common comorbid conditions in stroke patients that demands appropriate management for a better functional outcome in the long run.

Conclusion:

Co morbidities are common among stroke patients. The role of hypertension and diabetes on pathogenesis of stroke is well established. Ischemic heart diseases pose a great problem in treating haemorrhagic stroke patients. Obesity and dyslipidaemia are often found in stroke patients as a part of metabolic syndrome. As most of the patients are old, they often have osteoarthritis and other form of bone disease. Though the incidence of CKD, Lung diseases, electrolyte imbalance are not high enough, needs special attention to treat. Our study result should create awareness among physicians and care givers. This may improve the diagnosis and management of these conditions. Evidences are accumulating that there is negative impact of these conditions and functional recovery of stroke patients. Further studies should be carried out to determine the effect of these co morbid diseases on functional outcome of stroke patients in Bangladesh.

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