Original Article

Knowledge of stroke risk factors among the patients with previous stroke or transient ischemic attack in a tertiary care hospital of Bangladesh

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ABSTRACT

Background: Patients of stroke or transient ischaemic attacks (TIA) are at risk of further stroke. Our objective was to study patients admitted with stroke/TIA regarding their knowledge about risk factors for having anew event of stroke/TIA, possible associations between patient characteristics and patients' knowledge about risk factors, and patients' knowledge about their preventive treatment for stroke/TIA.

Methods: A questionnaire was used for 200 patients with stroke/TIA diagnoses. We asked 13 questions about diseases/conditions and lifestyle factors known to be risk factors and four questions regarding other diseases/conditions ("distractors"). Additional questions concerned with the patients' social and functional status and their drug use were asked. Categorical variables were analyzed using chi square test, while one-way analysis of variance and univariate analysis of variance were used for continuous variables. Logistic regression was employed to describe risk. A p value of, $p < 0.05$ was considered statistically significant.

Results: The risk factors that were most often identified by the patients were Diabetes(75.9%), hypertension(83.3%), previous stroke or TIA(81.5%), smoking (85.2%), regular exercise(75.9%), older age(83.3%), overweight (75.9%) and patients with ischemic heart disease (70.4%). Atrial fibrillation and carotid stenosis were identified by less than 50% of the patients. 44.5% of the patients could identify 10 or more stroke/TIA risk factors. We observed that higher age, having a diagnosis of cerebral infarction/TIA, patients residing in urban area, high income group, businessman/retired service holder, family history of cardiovascular disease, past history of stroke / TIA were related to better knowledge of stroke/TIA risk factors. Anticoagulants and antiplatelets are important drugs for stroke/TIA prevention but only 20(9.3%) of the patients who reported anticoagulants and 76(35.2%) of the patients taking these drugs marked them as intended for prevention.

Conclusion: Knowledge about diabetes, hypertension and smoking as risk factors was good, and patients who suffered from atrial fibrillation or carotid stenosis seemed to be less informed about these conditions as risk factors. The knowledge level was low regarding the use of anticoagulants and antiplatelets for stroke/TIA prevention. Better patient educational strategies for stroke/TIA patients should be developed. Furthermore, individuals with less knowledge should be given special consideration when developing strategies and programmes thus improving awareness of stroke risk factors.

Key words: stroke, transient ischemic attacks, knowledge, risk factors.

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INTRODUCTION

Stroke is the leading cause of disability in the Asian population.[1, 2]It becomes important health problem for Bangladesh as more than 25% of its population live below the poverty line.[3] A large number of preventable deaths in Bangladesh occur due to stroke.[4, 5] Individuals in Bangladesh having age of 40 years or more have a stroke prevalence of 0.3% and its prevalence increases to 1% in individuals aged 70 years or more.[5]Risk factors for stroke in Bangladesh include hyperlipidemia, diabetes mellitus, heart disease, cigarette smoking, and previous history of TIA.[6, 7] Bangladesh due to its large population lacks the requisite health infrastructure and trained human resource needed to deal with the high burden of stroke.[8] Prevention of stroke is crucial for all, as individuals who have suffered a previous stroke are at increased risk of recurrence [9, 10]; hence secondary prevention becomes a major concern. Recurrent stroke, although known to be characterized by greater level of mortality and morbidity compared to first-ever stroke, is preventable.[11, 12]Many reports have shown that secondary prevention after stroke or TIA is not satisfactory.[13-15] One of the reasons for unsatisfactory secondary prevention could be patients' lack of knowledge about risk factors for suffering stroke, which was suggested as a contributing factor to the lack of compliance with medical advice and treatment.[16] Some previous studies have demonstrated poor understanding of stroke risks and symptoms among general people.[17-20]Some studies showed that knowledge about stroke and stroke risk factors was poorest among groups at highest risk of suffering from stroke.[21, 22] Further, a few studies assessing stroke or TIA patients'knowledge about stroke risk factors have indicated poor knowledge about stroke, including knowledge about risk factors some months after stroke.[15] Our objective was to study primary health care patients who have already suffered from stroke or Transient ischemic attack (TIA) regarding their knowledge about risk factors for having a new event of stroke/TIA, possible associations between patient characteristics and patients' knowledge about risk factors and their knowledge about their own treatment for stroke/TIA prevention. Improvement of knowledge of stroke risk factors among patients may be an effective means of achieving prevention. This is particularly important in making feasible policies to enhance knowledge and consequently aid in effective prevention of recurrent stroke.

METHODS

Study design: A cross-sectional study

Study population: This study was carried out in Department of Neurology, BIRDEM General Hospital from January, 2019- Dececember, 2019.Two hundred consenting stroke survivors participated in the study. Patients with previous stroke (Ischemic stroke and cerebral hemorrhage)/TIA, ≥18 years of age were consecutively and purposively selected for the study. Patients with cognitive impairment were excluded from the study. Subarachnoid hemorrhage and venous infarction, which are considered as a stroke subtypes, but was excluded due to different aetiology and risk factors.

Questionnaire

A questionnaire was used to assess the patients' knowledge about diseases and conditions established as important factors increasing the risk of having a new stroke/ TIA. Patients were asked to evaluate how 13 diseases/conditions, established as stroke/TIA risk factors, influenced the risk of having a new stroke/TIA. The risk factors were presented in the questionnaire in the following order: higher age, hyperlipidemia, diabetes, a family history of cardiovascular disease, atrial fibrillation, hypertension, overweight, regular physical exercise, excessive alcohol consumption, previous stroke/TIA, carotid stenosis, smoking and ischaemic heart disease. The questionnaire was designed as a series of questions about stroke/TIA risk factors with the same response alternatives.

To reduce this risk of giving the same answer to each question without really considering it, four

Questions regarding medical diagnoses/conditions which are known not to be stroke/TIA risk factors ("distractors") were added: rheumatoid arthritis, osteoporosis, thyroid disease and allergy. An example of a question was: "How do you think that diabetes influences the risk of having a new stroke/TIA?" Possible answers were: "it increases the risk", "it reduces the risk", "it does not influence the risk", "do not know". We considered "increases the risk" to be the correct

answer for questions about stroke/TIA risk factors, except for the question about regular exercise habits, where "reduces the risk" was considered to be correct. The correct answer for the distractors was "does not influence the risk".

Patients were also asked if they regarded the disease/ condition in the questionnaire as their own; for example, "Do you have diabetes?" with the following response alternatives: "yes", "no", "do not know". For questions concerning lifestyle factors (overweight, level of physical activity, alcohol consumption, smoking) we asked the patients to add self-reported information to their answers about their weight and height (from which Body Mass Index, BMI was calculated), exercise habits, alcohol and tobacco use. Finally the patients were asked to list all the drugs they were taking and to mark those which they considered to be prescribed for preventing new events of stroke/TIA.[29]

Data analysis

The main outcome measure of the study was the extent to which patients could correctly identify the different stroke/TIA risk factors in the questionnaire. Only the answer "it increases the risk" was considered to be correct (except for the question about regular exercise habits, which was constructed in the opposite way: "How do you think that regular exercise influences the risk of having a new stroke or TIA?" and where the correct answer was "it reduces the risk"). We also calculated each patient's knowledge about stroke/TIA risk factors, defined as the number of correctly identified stroke/TIA risk factors in the questionnaire(range 0-13). The patients' knowledge about their own treatment for stroke/ TIA prevention was assessed by reviewing the patients' ability to mark, in their self-reported lists, the drugs which they thought were prescribed to prevent new events of stroke or TIA. The dependent variable (the number of correctly identified risk factors) was then categorized for the purpose of statistical analysis. We defined "good" and "poor" knowledge of stroke/TIA risk factors according to the distribution of percentiles of correct answers. This resulted incut-off points of less than 8 correct answers, which were categorized as poor knowledge; and more than 11 correct answers, which was categorized as good knowledge. The group with an intermediate number of correct answers (8-11) was categorizedas having "moderate" knowledge.

Statistical analyses

All data were entered into a database and this was exported to statistical software (SPSS Inc, version 20) for analysis. Descriptive statistics such as mean, standard deviation, frequency, median, range and percentage were used to express data. Categorical variables were analyzed using chi square test, while one-way analysis of variance and univariate analysis of variance were used for continuous variables. Logistic regression was employed to describe risk. A p value of, $p < 0.05$was considered statistically significant.

RESULTS

Majority of the patients in the study population were 51-70 years age group (78%), and 126 patients (63.0%) were men. Cerebral infarction was registered as diagnosis for 146 patients (73%) followed by TIA (14.5%) and intracerebral hemorrhage (12.5%). Higher proportion of the patients belonged to higher BMI (61%) group, living in urban area (60%) and a higher proportion of patients had low educational level (62%). Current smoker is reported in 68 patients (31.5%) and tobacco chewer in 48 patients (22.2%).108 patients belonged to stressful work environment group (62.8%). Other lifestyle and social factors are described in Table I.

Patients' identification of stroke/TIA risk factors

The risk factors that were most often identified by the patients were Diabetes(75.9%), hypertension(83.3%), previous stroke or TIA(81.5%), smoking(85.2%), regular exercise(75.9%), older age(83.3%), overweight (75.9%) and ischemic heart disease (70.4%) Table II. Atrial fibrillation and carotid stenosis were identified by less than 50% of the patients. The proportion of incorrect answers, i.e. where the patients answered that the risk factor "does not influence" or "reduces" the risk (for exercise habits "increases" instead of "reduces"), was generally low. Few patients considered medical conditions that were not stroke/ TIA risk factors (distractors) as stroke/ TIA risk factors (Table II). The most common answer was "do not know", although there was a group of patients who stated that these conditions did not affect the risk of having a new event of stroke/TIA (9.3% for osteoporosis, 33.3% for allergy, 18.3% for rheumatoid arthritis and 11.1% for thyroid disease). 44.5% of the patients could identify 10 or more stroke/TIA risk factors. A frequency histogram with the proportions of patients who correctly identified different numbers of stroke/TIA risk factors is shown in Figure 1.

Table I Stroke/TIA related diagnosis and patient characteristics

Age (years)	n(%)	Work Place Environment	n(%)
31-50	20(10.0%)	Not stressful	64(37.2%)
51-70	156(78.0%)	Stressful	108(62.8%)
71-90	24(12.0%)	Monthly Income	n(%)
Sex	n(%)	< 20,000 Taka	104(56.5%)
Male	126(63.0%)	> 20,000 Taka	80(43.5%)
Female	74(37.0 %)	Education Level	n(%)
Stroke Related Diagnoses	n(%)	SSC or below	124(62.0%)
Cerebral infarction	146(73.0%)	HSC or above	76(38.0%)
Intracerebralhaemorrhage	25(12.5%)	HSC	20(10.0%)
Transient ischaemic attack	29(14.5%)	Graduate	40(20.0%)
Life style factors		Postgraduate	16(8.0%)
BMI (kg/m^2)	n(%)	Dependency on Aid	n(%)
≤25 (kg/m^2)	122(61.0%)	Dependent on Aid	68(32.1%)
<25 (kg/m^2)	78(39.0%)	Cane	12(5.7%)
Alcohol Consumption	n(%)	Crutch	32(15.1%)
Alcohol intake	12(5.6%)	Walker	24(11.3%)
Tobacco Consumption	n(%)	Not needed	144(67.9%)
Tobacco Chewer	48(22.2%)		
Current Smoker	68(31.5%)		
Former Smoker	32(14.8%)		
Address	n (%)		
Rural	80(40.0%)		
Urban	120(60.0%)		
Physical Activity Level	n(%)		
Sedentary (<30 min/24 h)	68(32.7%)		
Mild (30–59 min/24 h)	72(34.6%)		
Moderate (60–90 min/24 h)	52(25.0%)		
High (>90 min/24 h)	16(7.7%)		
Work status	n(%)		
Labour Work	20(9.3%)		
Unskilled worker	12(5.6%)		
Agriculture	8(3.7%)		
Housewife	80(37.0%)		
Business	52(26.0%)		
Sedentary Work	20(9.3%)		
Office job (Public sector)	8(3.7%)		
Office job (Pvt. Sector)	8(3.7%)		
Skilled worker	4(1.9%)		
Not Working	28(13.0%)		
Unemployed	4(1.9%)		
Retired	24(11.1%)		
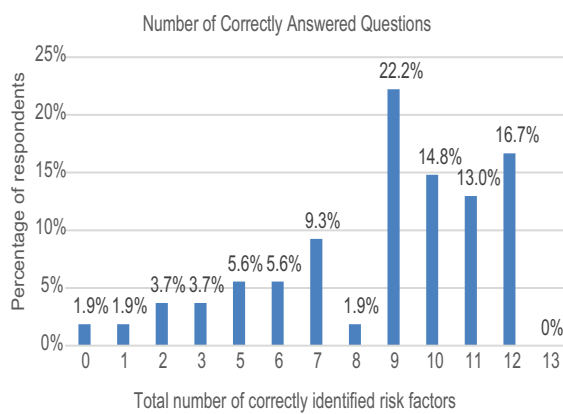
Figure 1 Proportion of patients who could correctly identify different numbers of stroke/TIA risk factors

Table II Proportion (%) of patients considering diseases/conditions to be or not to be stroke/TIA risk factors

	Increases the risks, n(%) n(%)	Reduces the risks, risks, n(%)	Does not influence the n(%)	I do not know,
1. Diabetes	164(75.9%)		12(5.6%)	40(18.5%)
2. High blood pressure	180(83.3%)		8(3.7%)	28(13.0%)
3. Dyslipidaemia	4(1.9%)		60(27.8%)	152(70.4%)
4. Carotid stenosis	92(42.6%)		4(1.9%)	120(55.6%)
5. Atrial fibrillation	92(42.6%)		16(7.4%)	108(50.0%)
6. Suffering previous stroke / TIA	176(81.5%)	4(1.9%)	4(1.9%)	32(14.8%)
7. Ischaemic heart disease	152(70.4%)		4(1.9%)	60(27.8%)
8. Smoking	184(85.2%)		4(1.9%)	28(13.0%)
9. Excessive alcohol consumption			52(24.1%)	164(75.9%)
10. Regular exercise	4(1.9%)	164(75.9%)	8(3.7%)	40(18.5%)
11. Overweight	164(75.9%)		8(3.7%)	44(20.4%)
12. Older age	180(83.3%)		8(3.7%)	28(13.0%)
13. Family history of cardiovascular disease	136(63.0%)		20(9.3%)	60(27.8%)
Distractors				
14 a. Osteoporosis	36(16.7%)		20(9.3%)	160(74.1%)
14 b. Allergy	12(5.6%)		72(33.3%)	132(61.1%)
14 c. Rheumatoid arthritis	20(9.3%)		40(18.5%)	156(72.2%)
14 d. Thyroid disease	40(18.5%)		24(11.1%)	152(70.4%)

Associations between patient characteristics and patients' knowledge about risk factors

After performing an ordered logistic regression analysis, we observed that higher age(OR 1.053; 95% CI 1.007 – 1.10), having a diagnosis of cerebral infarction/TIA(OR 4.63; 95% CI 1.485 – 14.481), patients residing in urban are(OR 5.266; 95% CI 1.864 – 14.875), high income group(OR 6.477; 95% CI 2.21-18.91), businessman/retired service holder(OR 6.05; 95% CI 1.44 – 25.47),Family history of cardiovascular disease(OR 4.60; 95% CI 1.83 – 11.52), Past history of stroke / TIA (OR 8.87; 95% CI 2.62 – 29.94) or living alone (OR 0.490; 95% CI 0.241 - 0.997) were related to better knowledge of stroke/TIA risk factors (Table III).

Table III Number and proportion of patients who reported taking drugs and listing them as intended for stroke/TIA prevention

	Taking for Prevention	Taking for Treatment	Not taking this drug	Question not answered
Anticoagulants (warfarin)	20(9.3%)	40(18.5%)	144(66.7%)	12(5.6%)
Antiplatelets	76(35.2%)	128(59.3%)	8(3.7%)	4(1.9%)
Antihypertensive agents	16(7.4%)	168(77.8%)	24(11.1%)	8(3.7%)
Lipid lowering drugs	48(22.2%)	156(72.2%)	8(3.7%)	4(1.9%)
Oral Hypoglycemic agents	184(85.2%)		24(11.1%)	8(3.7%)
Insulin	188(87.0%)		24(11.1%)	4(1.9%)

Table IV Model of factors influencing the knowledge about stroke/TIA risk factors

Factor	Odds ratio	Confidence Interval		p-value
		Lower limit	Upper limit	
Age	1.053175	1.007466	1.100958	0.022107
Sex				
Male	0.208729	0.040366	1.079303	0.061633
Female	4.791784	0.926677	24.77799	0.061605
Address				
Urban	5.266551	1.864638	14.87503	0.001712
Rural	0.189898	0.067237	0.536332	0.001713
Diagnosis				
Cerebral infarction or Transient ischaemic attack	4.637872	1.485285	14.48198	0.008268
Hemorrhagic stroke	0.215624	0.069054	0.673297	0.00827
Monthly Income				
< 20,000 Taka	0.154407	0.052865	0.450988	0.000635
> 20,000 Taka	6.477307	2.217573	18.91956	0.000635
Occupation				
Housewife, Labour Work, Unemployed	0.165092	0.039261	0.694217	0.013971
Business, Sedentary Work, Retired	6.057181	1.440489	25.47013	0.01397
Education				
SSC or below	0.517868	0.203663	1.316814	0.16698
HSC or above	1.931159	0.759467	4.910522	0.16693
Past history of stroke / TIA	8.87098	2.628022	29.9443	0.000437
Family history of cardiovascular disease	4.601226	1.836635	11.52721	0.001124

Odds ratio (OR) > 1 means that the factor is related to better knowledge, and OR < 1 to poorer knowledge. Results from ordered logistic regression analysis; Statistical significance at level: *) $p < 0.05$; **) $p < 0.01$; ***) $p < 0.001$.

Knowledge about treatment for reducing the risk of having a new stroke/TIA

Anticoagulants and antiplatelets are important drugs for stroke/TIA prevention but only 20(9.3%) of the patients who reported anticoagulants and 76(35.2%) of the patients taking these drugs marked them as intended for prevention. About three fourth of patients reported taking antihypertensive or Lipid lowering drugs them as intended for treatment. Surprisingly majority of those taking oral hypoglycemic agents/insulin marked them as intended for prevention (Table IV).

DISCUSSION

Our study showed that knowledge of stroke/TIA risk factors among patients varied. Some diseases/conditions (diabetes and hypertension)and lifestyle related factors

(older age, smoking, regular exercise, overweight, suffering previous stroke/TIA) seemed to be quite well known stroke/TIA risk factors. Specific diseases such as carotid stenosis and atrial fibrillation were identified as risk factors to a lesser extent.

Diabetes mellitus and hypertension had the high identification rate. Poor understanding of the fact that diabetes could be a stroke/TIA risk factor was observed previously by Kraywinkel et al in a study conducted among people without prior stroke/TIA events[23] and also in a study by Maasl and et al.[24] In a study conducted in India, diabetes was among the best known stroke/TIA risk factors, at the same level as hypertension, smoking which is similar to our study.[25] This could be the result of more frequent contacts with medical care(because of regular monitoring and follow up of

diabetic patients in BIRDEM General Hospital), or a particular interest in health issues, since these patients had probably received more detailed information regarding diabetes and hypertension. In the prevention and education of the diabetic patients, most focus tends to be on cardiovascular complications, complications from the eyes and the feet, and stroke related complications.

81.5% of the patients could identify the fact that a previous event of stroke/TIA was a factor that increased the risk of having a new stroke/TIA which is similar to other studies.[19]Patients in our study who had a registered diagnosis of cerebral haemorrhage had a lower level of knowledge about stroke/TIA risk factors, which might be due to worse clinical condition) that follows a haemorrhagic stroke as compared to an ischaemic stroke.[26] Occasionally, a diagnosis of cerebral haemorrhage is used as exclusion criteria when studying knowledge about risk factors.[28]

In some studies, a number of socio demographic factors have been found to influence patients' knowledge about stroke/TIA risk factors; for example, older age, male sex, and lower educational level.[27]Older age, patient residing in urban areas, patients of high income group, family history of cardiovascular disease have been identified to influence patients' knowledge about stroke/TIA risk factors in our study. We found that being older is a factor that positively influenced knowledge of stroke/TIA risk factors. Higher age was found to have a negative effect in some studies[19, 27, 28]but no effect in others.[23] Lower educational level was found to have a negative effect in a study conducted in India[25],but not in some other studies.[23, 27]We also didn't find any significant effect of level of education.

Patients who are given anticoagulants or anti-platelets should be informed about the preventive effect of these drugs, and the fact that only 9.3% of those reporting the use of anticoagulants and 35.2% of those reporting the use of antiplatelets indicated that their purpose was preventive is worrying. The lower proportions for patients using antihypertensive, lipid lowering agents also indicate the importance of better patient education. It is a matter of good hope that patient taking oral hypoglycemic agents and insulin showed good knowledge as a preventive effect of these drugs. These results are similar to this study.[29]Limitation of this study is small sample size and single center study.

Conclusion

Our study shows that knowledge about diabetes, hypertension and smoking as risk factors was good, and patients who suffered from atrial fibrillation or carotid stenosis seemed to be less informed about these conditions as risk factors. The knowledge level was low regarding the use of anticoagulants and antiplatelets for stroke/TIA prevention. We observed a better knowledge in our study population to some of the risk factors. However, it is suggested that, there is lacking in terms of knowledge of stroke patients about some other risk factors of stroke. This situation will adversely affect the potential to prevent the disease. Healthcare professionals especially those who are directly involved in the care of stroke patients must therefore be more cautious during patient education. Policymakers must see the situation as a call to action by putting in place necessary policies that will facilitate stroke education. Furthermore, individuals with little knowledge should be given special consideration when developing strategies and programmes thus improving awareness of stroke risk factors.

Authors' contributions: MRI drafted the protocol, collected data, did literature search and drafted the manuscript. TR performed the literature search and helped in drafting manuscript. RNI did statistical analysis. MSHK collected data. MI collected data. RH helped in preparation of manuscript and did literature search. All authors read and approved the final manuscript.

Conflict of interest: Nothing to declare.

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