



Association of Ischaemic Heart Disease with Hospitalized Ischaemic Stroke Patients in a Tertiary Care Hospital



Md. Nazmul Kabir¹, KM Ahasan Ahmed², Md. Sadekur Rahman Sarker³,
Md. Tauhidul Islam Chowdhury⁴, Rafiqul Islam⁵

¹Junior Consultant (Medicine), 250 Bedded General Hospital, Khulna, Bangladesh; ²Junior Consultant, Department of Neurology, National Institute of Neurosciences & Hospital, Dhaka, Bangladesh; ³Assistant Professor, Department of Neurology, National Institute of Neurosciences & Hospital, Dhaka, Bangladesh; ⁴Professor, Department of Neurology, National Institute of Neurosciences & Hospital, Dhaka, Bangladesh; ⁵Associate Professor, Department of Pharmacology, National Institute of Neurosciences and Hospital, Dhaka, Bangladesh

Abstract

Background: Stroke and IHD is a major health problem all over the world. But few studies have been done in our country to see the association of IHD among ischaemic stroke patients. **Objective:** The purpose of the present study was to evaluate the prevalence of IHD among hospitalized ischaemic stroke patients and to identify their common risk factors. **Methodology:** This was a cross-sectional study carried out in 50 ischaemic stroke patients admitted in Medicine Wards of Khulna Medical College Hospital, from July 2012 to December 2012. The patients were taken in both sexes having more than 18 years age and CT-scan evidence of ischaemic stroke by purposive sampling technique. After recruitment of patients IHD was established by ECG findings. Subsequently other risk factors were identified and were recorded. **Results:** The incidence of stroke for individuals older than 80 years was approximately 30.0% compared with 8.0% for individuals between 31 to 40 years of age. Among them IHD was more common in 51 to 60 years old stroke patients (33.33%) but less common in older than 80 years of age (8.33%). All of those having both ischaemic stroke and IHD were hypertensive. Among them 58.33% cases had severe hypertension but those having only stroke but no IHD 73.68% cases were hypertensive. Among them 34.21% had severe hypertension. Regarding lipid profile those having both ischaemic stroke and IHD 83.33% were dyslipidaemic but of those having only stroke but no IHD 52.63% were dyslipidaemic. This study revealed 41.67% diabetic patients developed both Ischaemic stroke and IHD compared to 31.58% diabetic patients developed only ischaemic stroke. **Conclusion:** In conclusion IHD and ischaemic stroke patients share similar pathophysiological mechanisms and, consequently, many risk factors. [*Journal of National Institute of Neurosciences Bangladesh, July 2023;9(2):98-102*]

Keywords: Ischaemic heart disease; ischaemic stroke; dyslipidaemia

Introduction

Stroke is the term used to describe episodes of focal brain dysfunction due to focal ischaemia or haemorrhage. Among them 85.0% are ischaemic stroke which is mostly due to thromboembolic disease¹. Stroke and IHD share common risk factors and pathological mechanisms, and coronary artery disease is an important cause of death in patients with cerebrovascular disease. This Scientific Statement addresses issues in management of the relatively healthy patient with brain ischemia a transient ischemic attack (TIA) or an ischemic stroke who does not have recognized IHD but often has risk factors in addition to having had a TIA or

stroke that indicate an increased likelihood of disability or death from cardiac disease in the future. The etiology of stroke is multifactorial, and therapeutic actions focused on vascular risk factors, particularly in secondary stroke prevention have been shown to reduce the risk of recurrent stroke, as well as the risk of any other coronary or peripheral vascular episode²⁻³. Several small studies have shown that patients with TIA and stroke have a high prevalence of asymptomatic coronary artery disease. In a study⁴, he exercise thallium (Tl) 201 scintigraphy and exercise radionuclide ventriculography were performed on 50 consecutive patients with TIA or stroke. Sixteen patients had

Correspondence: Dr. Md. Nazmul Kabir, Junior Consultant (Medicine), 250 Bedded General Hospital, Khulna, Bangladesh;

Email: drnazmul40@gmail.com; Cell no.: +8801711487086;

ORCID: <https://orcid.org/0009-0008-6922-3348>

©Authors 2023. CC-BY-NC

symptoms suggestive of cardiac ischemia; the other 34 patients were asymptomatic. The results of myocardial perfusion imaging were abnormal in 15 of 16 symptomatic patients (94.0%) and 14 of 34 asymptomatic patients (41.0%).

In another study⁵, 83 consecutive patients with TIA or minor stroke and no symptoms of ischemic heart disease underwent exercise electrocardiography. Patients with positive results on exercise ECG subsequently underwent exercise Tl-201 myocardial scintigraphy. Asymptomatic coronary artery disease was detected in 28.0% patients studied with these noninvasive techniques. Coronary angiography was performed in 2 patients, one with 3-vessel IHD and the other with 2-vessel IHD. Later it has been reported 190 consecutive patients with cerebral ischemia but without symptoms or ECG signs of ischemic heart disease, a positive exercise test was found in 26.0% cases.

However, it has found 20.0% prevalence of unsuspected cardiac disease among 132 stroke patients without a history of cardiac disease⁶. Although these studies are small, they indicate that abnormal results of provocative tests for myocardial ischemia are not uncommon in patients with TIA and stroke. These small studies suggest that 20.0% to 40.0% of stroke patients may have abnormal tests for silent cardiac ischemia. The purpose of the present study was to evaluate the prevalence of IHD among hospitalized ischaemic stroke patients and to identify their common risk factors.

Methodology

Study Settings and Population: This was a cross-sectional study carried out in 50 ischaemic stroke patients admitted in Medicine Wards of Department of Medicine at Khulna Medical College Hospital, Dhaka, Bangladesh from July 2012 to December 2012 for a period of six months. The patients were taken in both sexes having more than 18 years' age and CT-scan evidence of ischaemic stroke by purposive sampling

technique.

Study Procedure: Patients with history of old stroke or IHD were excluded from the study. A protocol was prepared and approved by ethical board before commencement of this study. The aims and objectives of the study were explained to the patient and guardian and then informed consent was taken from each patient. After recruitment of the patients IHD was established by ECG findings. Subsequently other risk factors were identified and recorded.

Statistical Analysis: After collection of all the required data, these were checked, verified for consistency. Statistical significance is set as 95% confidence interval at 5% acceptable error level. Chi-square test was done whenever necessary. For all the analysis p value less than 0.05 was considered statistically significant. After completion of the data collection, all were sorted and rechecked. Then data were inputted into the spread sheet of the statistical software (SPSS). Collected data was analyzed by the SPSS 17.0.

Ethical Consideration: Submitted the research protocol to the Institutional Review Board (IRB) of local institute to review the scientific and ethical issues related to the research to obtain the required approval. The study objectives were explained to each participant and written informed consent was taken from the patient who willingly participated in the study. Strictly maintained treatment and investigation papers confidentiality. The information of the treatment and investigation papers were only used for this research purpose. Thus, the researcher maintained the anonymity of the individual patients.

Results

A total number of 50 cases of ischaemic stroke patients were recruited in this study. All patients were divided into six groups according to age. Among them 15 patients were more than 80 years of age. After recruitment, 12 IHD patients were established by ECG

Table 1: Showing frequency of IHD according to age of the Ischaemic stroke patients.

Age Group	IHD Status		Total	P Value
	Present	Absent		
31 to 40 Years	1(8.33%)	3(7.89%)	4	>0.05
41 to 50 Years	2(16.66%)	3(7.89%)	5	
51 to 60 Years	4(33.33%)	2(5.26%)	6	
61 to 70 Years	3(25%)	5(13.15%)	8	
71 to 80 Years	1(8.33%)	11(28.94%)	12	
More than 80 Years	1(8.33%)	14(36.84%)	15	
Total	12(100.0%)	38(100.0%)	50(100.0%)	

findings. IHD was more common (33.33%) between 51 to 60 years of age but less common (8.33%) below 40 and above 70 years of age (Table 1).

Equal number (25) of male and female patients were recruited in this study, but IHD were found among 07 male and 05 female patients (Table 2).

Table 2: Showing frequency of IHD in equal number (25) of male and female Stroke patients.

IHD	Frequency	Percent
Male(25)	07	28.00
Female(25)	05	20.00

Regarding blood pressure analysis all IHD patients were hypertensive, but those having only ischaemic stroke 26.32% were normotensive. Among hypertensive patients those having IHD 58.33% had severe hypertension and those without IHD 34.21% had severe hypertension (Table 3).

Table 3: Relationship of Blood Pressure with Ischaemic Stroke Patients with IHD and without IHD (n=38)

Blood pressure (mm Hg)	IHD Status		P value
	Present	Absent	
>180/110	7(58.33%)	13(34.21%)	0.05
160-179/100-109	3(25.00%)	8(21.05%)	
140-159/90-99	2(16.67%)	7(18.42%)	
<140/90	0(00.00%)	10(26.32%)	
Total	12(100%)	38(100%)	

Regarding lipid profile analysis, the study showed that among those having both ischaemic stroke and IHD 83.33% cases were dyslipidaemic but of those having only stroke but no IHD 52.63% cases were dyslipidaemic (Table 4).

Table 4: Association of fasting lipid profile with Ischaemic stroke patients with IHD and without IHD

Lipid Profile	IHD Status		P value
	Present	Absent	
Dyslipidaemia	10(83.33%)	20(52.63%)	<0.001
Normal lipid profile	2(16.67%)	18(47.37%)	
Total	12(100%)	38(100%)	

The study revealed 41.67% diabetic patients developed both Ischaemic stroke and IHD compared to 31.58% diabetic patients developed only Ischaemic stroke. IGT were found 25% of patients having IHD but 10.53% patients without IHD (Table 5).

Table 5: Association of Diabetes mellitus with Ischaemic Stroke patients with IHD and without IHD

Blood Sugar Status	IHD Status		P value
	Present	Absent	
Diabetes Mellitus (RBS>11.1 mmol/L)	5(41.67%)	12(31.58%)	0.001
IGT (RBS 7.8-11.1mmol/L)	3(25%)	4(10.53%)	
RBS <7.8mmol/L	4(33.33%)	22(57.89%)	
Total	12(100%)	38(100%)	

Discussion

Ischemic heart disease and ischemic stroke are conditions that share in many cases a common pathophysiology, based on arteriosclerosis. The incidence of ischaemic heart disease (IHD) among the 50 consecutive patients admitted in KMCH due to ischaemic stroke on the basis of resting ECGs were 12 that is 24.0% cases. The incidence was similar to that of coronary artery disease documented in stroke registries in Western populations⁴⁻⁵.

The study showed that Age is the strongest determinant of stroke, which is unlikely before 30 years of age. According to data obtained from study, incidence of stroke increased steeply with age. Hence, incidence of stroke for individuals older than 80 years is approximately 30.0% compared with 8.0% for individuals between 31 to 40 years of age. Among them IHD is more common in 51 to 60 years old stroke patients (33.3%) but less common in older than 80 years of age (8.33%). In a similar to the study⁶, prevalence of stroke for individuals older than 80 years is approximately 27.0% compared with 7.0% for those who are 31 to 40 years of age. The highest incidence of acute coronary syndrome is found in younger patients with stroke, around the 5th and 6th decades of life⁶. In relation to age, in 2006, it was found that 93.0% of subjects who had suffered a stroke in Spain were older than 64 years of age⁷. Age is a continuous risk factor for the occurrence of stroke and dementia, with a two-fold increase in the incidence and prevalence rates for each successive 5 years after age 65 years⁸⁻⁹.

Ischaemic heart disease is more common in male than female stroke patients. Among 25 male cases, 7(28.0%) cases had IHD and among 25 female cases 5(20.0%) had IHD. A recent meta-analysis¹⁰ showed that incidence of stroke is 33.0% more in men than in women. Regarding IHD, its prevalence is also higher among men. The study also showed that all of those

having both ischaemic stroke and IHD are hypertensive. Among them 58.3% cases have severe hypertension. On the other hand of those having only stroke but no IHD 73.7% are hypertensive. Among them 34.2% have severe hypertension. In the Athens Stroke Registry¹¹, high blood pressure is present in 80% of lacunar infarcts, in 73.0% of atherothrombotic, in 62.0% of cardioembolic, and in 62.0% of cryptogenic strokes.

Regarding lipid profile the study showed that among those having both Ischaemic stroke and IHD 83.3% cases are dyslipidaemic but of those having only stroke but no IHD 52.63% are dyslipidaemic. In the APCSC study each 1-mmol / l higher level of total cholesterol was associated with 25.0% increased risk of ischemic stroke less than increased risk seen in the case of IHD, but still a significant risk and with 20% increased risk of fatal stroke hemorrhagic¹². In the study by Simons et al¹³, unlike what observed with IHD, a high LDL-cholesterol level predicted ischaemic stroke, but HDL-cholesterol level did not. This lack of consistency has been suggested to be due to the heterogeneity in the pathogenesis of ischemic stroke, thus some subtypes of stroke would be more related to hypercholesterolemia¹⁴.

The study revealed 41.7% diabetic patients developed both ischaemic stroke and IHD compared to 31.6% diabetic patients developed only Ischaemic stroke. Diabetes is the main risk factor following hypertension of cerebral small vessel disease and has been identified as a significant independent variable of symptomatic recurrence in patients with first-ever cerebral infarction of the lacunar type¹⁵⁻¹⁶.

Conclusion

IHD and Ischaemic stroke patients share similar pathophysiological mechanisms and, consequently, many risk factors. ECG changes are significant in number in acute ischaemic stroke. ST depression and T wave inversion suggesting that these ECG changes are due to coexisting ischaemic heart disease. As both of these disease share common risk factors, so by controlling the risk factors of ischaemic stroke we can reduce the incidence of IHD.

Acknowledgements

None

Conflict of interest

There is no financial conflict of interest relevant to this paper to disclose.

Financial Disclosure

This research project was not funded by any organization.

Contribution to authors

Kabir MN contributed from the protocol preparation, data collection up to report writing. Manuscript writing was performed by Ahmed KMA, Sarker MSR and Islam R. Chowdhury MTI have revised the manuscript.

Data Availability

Any inquiries regarding supporting data availability of this study should be directed to the corresponding author and are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

How to cite this article: Kabir MN, Ahmed KMA, Sarker MSRN, Chowdhury MTI and Islam R. Association of Ischaemic heart disease with hospitalized ischaemic stroke patients in a tertiary care hospital. *J Natl Inst Neurosci Bangladesh*, 2023;9(2):98-102

Copyright: ©Kabir et al. 2023. Published by Journal of National Institute of Neurosciences Bangladesh. This is an open access article and is licensed under the Creative Commons Attribution Non Commercial 4.0 International License (CC BY-NC 4.0). This license permits others to distribute, remix, adapt and reproduce or changes in any medium or format as long as it will give appropriate credit to the original author(s) with the proper citation of the original work as well as the source and this is used for noncommercial purposes only. To view a copy of this license, please See: <https://creativecommons.org/licenses/by-nc/4.0/>

ORCID:

Md. Nazmul Kabir: <https://orcid.org/0009-0008-6922-3348>

KM Ahasan Ahmed: <https://orcid.org/0000-0002-5578-9454>

Md. Sadekur Rahman Sarker: <https://orcid.org/0009-0003-7000-4429>

Md. Tauhidul Islam Chowdhury: <https://orcid.org/0000-0001-6452-241>

Rafiqul Islam: <https://orcid.org/0009-0009-1699-9764>

Article Info

Received on: 7 April 2023

Accepted on: 24 May 2023

Published on: 1 July 2023

References

1. Colledge NR, Walker BR, Ralston SH; Davidsons principles and practice of medicine; Churchill Livingstone Elsevier 21st edition 2010; Cerebrovascular disease 1180-1181
2. Marrugat J, Arboix A, García-Eroles L, Salas T, Vila J, Castell C, et al. The estimated incidence and case fatality rate of ischemic and hemorrhagic cerebrovascular disease in 2002 in Catalonia. *Rev Esp Cardiol*. 2007;60:573–580
3. The European Stroke Organization (ESO) Executive Committee and the ESO Writing Committee. Guidelines for management of ischaemic stroke and transient ischaemic attack 2008. *Cerebrovasc Dis* 2008;25:457–507
4. Coca A, Messerli FH, Benetos A, et al. Predicting stroke risk in hypertensive patients with coronary artery disease: a reports from the INVEST. *Stroke*. 2008;39:343–8

5. Gongora-Rivera F, Labreuche J, Jaramillo A, Steg PG, Hauw JJ, Amarenco P. Autopsy prevalence of coronary atherosclerosis in patients with fatal stroke. *Stroke*. 2007;38:1203–10
6. Lorgis L, Zeller M, Beer JC, et al. Epidemiology of acute coronary syndrome in Europe. *Ann Cardiol Angeiol* 2007;56:S2–S7
7. Arboix A, García-Eroles L, Comes E, Oliveres M, Targa C, Balcells M, et al. Importance of cardiovascular risk profile for in-hospital mortality due to cerebral infarction. *Rev Esp Cardiol*. 2008;61:1020–1029
8. Furie KL, Kasner SE, Adams RJ, Albers GW, Bush RL, Fagan SC, et al. Guidelines for the prevention of stroke in patients with stroke or transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2011;42:227–276
9. Goldstein LB, Adams R, Alberts MJ, Appel LJ, Brass LM, Bushnell CD, et al. Primary prevention of ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council: cosponsored by the Atherosclerotic Peripheral Vascular Disease Interdisciplinary Working Group; Cardiovascular Nursing Council; Clinical Cardiology Council; Nutrition, Physical Activity, and Metabolism Council; and the Quality of Care and Outcomes Research Interdisciplinary Working Group: the American Academy of Neurology affirms the value of this guideline. *Stroke*. 2006;37:1583–1633
10. Appelros P, Stegmayr B, Terént A. Sex differences in stroke epidemiology. A systematic review. *Stroke*. 2009;40:1082–90
11. Vemmos KN, Takis CE, Georgilis K, Zakopoulos NA, Lekakis JP, Papamichael CM, et al. The Athens stroke registry: results of a five-year hospital-based study. *Cerebrovascular Diseases*. 2000;10(2):133–41
12. Asia Pacific Cohort Studies Collaboration. Cholesterol, coronary heart disease, and stroke in the Asia Pacific region. *International journal of epidemiology*. 2003;32(4):563–72.
13. Simons LA, Simons J, Friedlander Y, McCallum J. A comparison of risk factors for coronary heart disease and ischaemic stroke: the Dubbo Study of Australian Elderly. *Heart Lung Circ*. 2009;18:330–3
14. Ansell BJ. Cholesterol, stroke risk and stroke prevention. *CurrAtheroscler Rep*. 2006;2:92–6
15. Megherbi SE, Milan C, Minier D, Couvreur G, Osseby GV, Tilling K, et al. Association between diabetes and stroke subtype on survival and functional outcome 3 months after stroke: data from the European BIOMED Stroke Project. *Stroke*. 2006;34:688–694
16. Arboix A, Font A, Garro C, García-Eroles L, Comes E, Massons J. Recurrent lacunar infarction following a previous lacunar stroke: a clinical study of 122 patients. *J Neurol Neurosurg Psychiatry*. 2007;78:1392–1394.