IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 2 Ser.8 (February. 2020), PP 60-64
www.iosrjournals.org

"Risk Factors of Ischemic and Hemorrhagic Strokes inGopalgonj, Bangladesh: A hospital-based study"

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Abstract
Background*: Ischemic stroke pertains to having very little blood supply to provide parts of the brain with less oxygen and nutrients, while hemorrhagic stroke pertains to too much bleeding within the enclosed cranial cavity. Basic stroke features are hardly known in Gopalgonj area of Bangladesh and no data are available here.*
Aim of the study: *The aim of this study was to assess therisk factors of ischemic and hemorrhagic strokes inGopalgonj, Bangladesh.*
Methods*: It was a retrospective hospital-based study and was conducted among 214patients admitted in the Department of Medicine, Sheikh SayeraKhatun Medical College, Gopalgonj,Bangladesh from January 2018 to December 2018 with symptoms related to Strokes. This study was approved by the ethical committee of the respective hospital previously. Proper written consents were obtained from all the patients with strokes before starting the intervention. Strokes had to be ascertained by computed tomography (CT) scanners.*
Results*:In analyzing the risk factors in Group I we found the highest 70.42% patients were associated with hypertension. Besides this, 29.58% were untreated stroke, 39.44% were with diabetes mellitus, 12.68% were with the habit of smoking, 14.79% were with atrial fibrillation, 34.51% were with Atherosclerosis, 23.94% were with previous treated stroke and 21.83% were with alcohol consumption. On the other hand, in analyzing the risk factors in Group II we found the highest 40.68% patients were associated with hypertension. Besides this, 23.73% were untreated stroke, 18.64% were with diabetes mellitus, 11.86% were with the habit of smoking, 3.39% were with atrial fibrillation, 32.20% were with Atherosclerosis, 11.86% were with previous treated stroke and 10.17% were with alcohol consumption. In analyzing all these data regarding the risk factors any significant co-relation was not found.*
Conclusion*:Hypertension is the main risk factor for both ischemic and hemorrhagic strokes in this hospital-based study. Except that in analyzing all these data regarding the risk factors any significant co-relation was not found.*
Key Word*:IschemicStroke,Hemorrhagic,Risk factors, Tomography.*

Date of Submission: 30-01-2020 Date of Acceptance: 15-02-2020

I. Introduction

Ischemic stroke pertains to having very little blood supply to provide parts of the brain with enough oxygen and nutrients, while hemorrhagic stroke pertains to too much bleeding within the enclosed cranial cavity. Basic stroke features are hardly known in Gopalgonj area of Bangladesh and no data are available here.Stroke is a highly heterogeneous disorder with distinct subtypes, each presenting specific clinical and epidemiological aspects[1,2]. Risk factors for stroke include systolic or diastolic hypertension, diabetes, atrial fibrillation, hypercholesterolemia, cigarette smoking, heavy alcohol consumption, and oral contraceptive use. By definition, stroke produces neurologic deficits that persist for at least 24 hours. Stroke produces focal symptoms and signs that correlate with the area of the brain supplied by the affected blood vessel. Ischemic stroke has many causes with different clinical presentations, risk factors, courses and outcomes[3,4]. The prognosis and management of ischemic stroke are directly related to the specific mechanism of ischemic lesion.

Comparison of functional outcome and survival and recurrence rates can allow clinicians to identify patients at a higher risk of stroke recurrence and death. Early classification of ischemic stroke subtype is of substantial practical clinical value. The classification of ischemic stroke used in this study was The Oxfordshire Community Stroke Project (OCSP) classification, which defines four clinically identifiable subgroups of cerebral infarction: total anterior circulation infarction (TACI), partialanterior circulation infarction (PACI), posterior circulation infarction (POCI), and lacunar infarction (LACI). OCSP has the ability to predict the prognosis and shows good correlation with the underlying pathophysiology and imaging findings on cranial computed tomography[5,6]. There is another stroke classification system used in some recent stroke studies, and it is named TOAST (Trial ofORG 10172 in Acute Stroke Treatment) classification, which denotes five diagnostic subgroups of ischemic stroke: large-artery atherosclerosis, cardioembolism, small-vessel occlusion, i.e. lacunar, stroke of other determined etiology, and stroke of undetermined etiology. One argument against the use of this type of subclassification system is the difficulty of performing the necessary technical examinations in all patients; so we decided to use OCSP in this particular survey. Hemorrhagic stroke was classified as intracerebral hematoma or subarachnoid hemorrhage. Correct classification of stroke subtypes in patients with acute stroke is crucial for early management and for predicting the prognosis[7,8]. The objective of this hospital-based study was to evaluate outcomes of patients with stroke (according to risk factors and stroke type) treated at Split University Hospital Center during a one-year period. The hypothesis was that ischemic and hemorrhagic strokes do not differ in outcome when risk factors are considered.To describe risk factors and stroke subtypes in Bangladesh, and to compare the results with the ones of other Indian sub-continents, we undertook a retrospective hospital-based study inGopalgonj,Bangladesh, a developing city of Bangladesh.

II. Objectives

a) General objective:

- To assess therisk factors of ischemic and hemorrhagic strokes inGopalgonj, Bangladesh

b) **Specific Objectives:**

- To evaluate basic stroke features both in ischemic and hemorrhagic strokes.

III. Materials And Methods

It was a retrospective hospital-based study and was conducted among 201 patients admitted in the Department of Medicine of Sheikh SayeraKhatun Medical College, Gopalgonj,Bangladesh from January 2018 to December 2018 with symptoms related to Strokes. The total study population was divided into two groups. In group I there were 142 patients with Ischemic stroke and in Group II there were 59 patients hemorrhagic stroke. This study was approved by the ethical committee of the respective hospital previously. Proper written consents were obtained from all the patients with Strokes before starting the intervention. Strokes had to be ascertained by computed tomography (CT) scanners.Stroke was defined in accordance with the World Health Organization as "rapidly developing clinical signs of focal, or at times, global disturbance of cerebral function, lasting more than 24 hours or leading to death with no apparent cause other than vascular origin"14. Thus, transient ischemic attack was discarded. To differentiate between ischemic and hemorrhagic strokes, and to rule out differential diagnosis such as tumor, subdural hematoma, or subarachnoid hemorrhage, brain imaging was mandatory. Our hospital is fitted with 2 CT scanners. Registers from all medical wards of the hospital and that of the intensive care unit were screened. Age, sex, date of admission, and clinical outcome at discharge were recorded. Stroke risk factors were examined, including diabetes mellitus, hypertension, current or past history of smoking, hypercholesterolemia, and atrial fibrillation. Diabetes mellitus was defined as fasting glucose level 7 mmol/L or plasma glucose 11 mmol/L at any time of day15. Hypertension was ascertained as known blood pressure 160/90 before admission. Patients were defined as current smokers or nonsmokers. Hypercholesterolemia was ascertained by cholesterol concentration 6.5 mmol/L. Atrial fibrillation was defined as evidence of cardiac arrhythmia byfibrillation on ECG. History of previous stroke was also recorded on the basis of self and family reporting. Causes of ischemic strokes were determined according to the trial of Org 10172 in Acute Stroke Treatment (TOAST) classification16. Briefly, 5 categories were described: (1) large artery atherosclerosis, when there was a stenosis 50% or occlusion of a major brain artery presumably attributable to atherosclerosis; (2) cardioembolic infarcts, where cardio sources included evidence of atrial fibrillation, recent (3 months) myocardial infarction, and infective endocarditis, defined as valvular lesions on echocardiogram and positive blood cultures; (3) lacunar infarcts, when the patient had a history of hypertension or diabetes mellitus with a clinical lacunar syndrome and an ischemic lesion not 15 mm or a normal CT and no other cause of infarct, for example, significant stenosis or atrial fibrillation; (4) other determined etiology; and (5) undetermined etiology, in cases of incomplete evaluation. To assign etiology, all imaging and radiological data were used. In SSA, CT is far from being widely available. Requiring brain imaging in the inclusion criteria increases the validity of data about stroke but may result in creating an inclusion bias. To estimate this bias, we recorded for 2 months any patient who presented at the emergency ward with a presumed stroke, and compared patients who had CT and

were subsequently hospitalized to the ones who did not have a CT and were discharged. Statistical analysis was performed with Epi Info v6.2.2 software package (Centers for Disease Control). Comparison of 2 categorical variables was performed using the X2 test. Quantitative variables were analyzed using the Student Fisher test or the Mann–Whitney test in case of inequality of variances. One-month mortality rates were calculated by the Kaplan–Meier method and compared with the logranktest.

IV. Results

In this study we identified 201stroke patients in total. Complete data were available from all that 201 patients. We found in total142 ischemic stroke patients which were 71% and in total 59 hemorrhagic stroke patients which was 29%. In both the group male were dominating and their ratio was above 70%. For all strokes, mean age was 51.74 years. Mean age for ischemic strokes was 50.21 years, without a significant male–female difference. Mean age for hemorrhagic strokes was 52.13 years without a significant male–female difference. Hemorrhagic patients were significantly younger than ischemic ones (P=0.031). Median time between the onset of symptoms and hospitalization was 2 days. In our study we found, the highest 56.22% patients were from 56-65 years' age group followed by 30.85% from 46-55 years' age group, 8.46% from ≥66 years' age group and 4.48% from ≤45 years' age group. In both the group we found the same age ratio of the participants. In analyzing the risk factors in Group I we found the highest 70.42% patients were associated with hypertension. Besides this, 29.58% were untreated stroke, 39.44% were with diabetes mellitus, 12.68% were with the habit of smoking, 14.79% were with atrial fibrillation, 34.51% were with Atherosclerosis, 23.94% were with previous treated stroke and 21.83% were with alcohol consumption. On the other hand, in analyzing the risk factors in Group II we found the highest 40.68% patients were associated with hypertension. Besides this, 23.73% were untreated stroke, 18.64% were with diabetes mellitus, 11.86% were with the habit of smoking, 3.39% were with atrial fibrillation, 32.20% were with Atherosclerosis, 11.86% were with previous treated stroke and 10.17% were with alcohol consumption. In analyzing all these data regarding the risk factors any significant co-relation was not found.

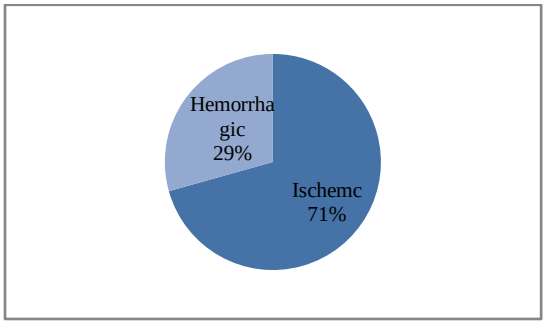

Figure I: Distribution of type of strokes among participants (N=201)

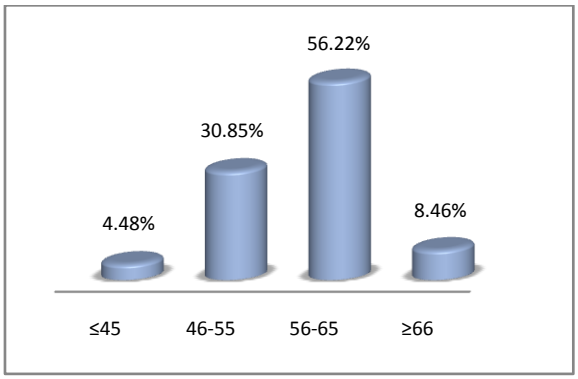

Figure I: Age distribution in year of the total participants (N=201)

Table I: Group wise age distribution of participants (N=201)

Age	Group-I		Group-II		Total	
(Yrs.)	(n=142)	%	(n=59)	%	N	%
≤45	7	4.93	2	3.39	9	4.48
46-55	43	30.28	19	32.20	62	30.85
56-65	80	56.34	33	55.93	113	56.22
≥66	12	8.45	5	8.47	17	8.46
Total	142	100	59	100	201	100

Table II: Risk Factors distribution among participants (N=201)

Risk Factors	Group-I		Group-II		Total	
	n	%	n	%	N	%
Hypertension	100	70.42	24	40.68	124	61.69
Untreated	42	29.58	14	23.73	56	27.86
Diabetes mellitus	56	39.44	11	18.64	67	33.33
Smoking	18	12.68	7	11.86	25	12.44
Atrial fibrillation	21	14.79	2	3.39	23	11.44
Atherosclerosis	49	34.51	19	32.20	68	33.83
Prev. stroke (Treated)	34	23.94	7	11.86	41	20.40
Alcohol consumption	31	21.83	6	10.17	37	18.41

V. Discussion

Prognosis depends on the type of stroke, the degree and duration of obstruction or hemorrhage, and the extent of brain tissue death. The location of hemorrhagic stroke is an important factor in the outcome, and this type generally has a worse prognosis than ischemic stroke. The 30-day mortality from hemorrhagic stroke ranges from 35 to 52 percent[9]; one-half of these deaths occur within the first two days[10]. Prognosis is generally poor when compared with ischemic stroke. Age, Glasgow Coma Score less than 8 at presentation, hematoma volume of greater than 60 mL, and intraventricular blood are predictors of high mortality[11]. Considering risk factors, atherosclerosis was more frequently found in ischemic stroke patients because atherosclerotic plaques narrow the inner diameter of the vessel, resulting in inadequate tissue vascularization. Results of this hospital-based study confirmed that there was no sex difference in the type of stroke. Considering risk factors for ischemic stroke, there is a consensus in population and hospital-based studies that hypertension is the most common risk factor predisposing patients for all subtypes of ischemic stroke. Our study confirmed this statement. Results of previous hospital-based studies suggest that ischemic stroke is a polyetiologic disturbance with clear differences in the risk factor profile among particular ischemic stroke subtypes. According to previous investigations, the synergistic action of hypertension, diabetes and hyperlipidemia predisposes patients for lacunar stroke'. Of the known controllable risk factors, hypertension is most important[12]. Hypertension accelerates the atherosclerosis process, therebyincreasing the risk of atherothrombotic cerebral infarction. It also increases the risk of cerebral hemorrhage in part by promoting the development of cerebral vascular micro aneurysms (Charcot-Bouchard aneurysms)[13]. Hemorrhagic and ischemic stroke differ according to outcome and risk factors. Atherosclerosis, atrial fibrillation and hyperlipidemia are the most powerful risk factors, which contribute to differences in manifestation of the resulting stroke type and outcome. These risk factors are by far more common in ischemic than in hemorrhagic stroke. Ischemic stroke can be predisposed by excessive alcohol intake and by intracerebral and subarachnoid hemorrhage via multiple mechanisms (e.g., via hypertension, atrial fibri11ation, rebound thrombocytosis and platelet aggregation and clotting disturbances)[14]. The individuals with a relatively high risk profile can take steps to modify other risk factors through lifestyle changes and/or medical treatment. Similarly, public awareness programs aimed at increasing the recognition of stroke warning signs and altering modifiable risk factors can be designed to address the high-risk groups. Although this study did not produce any new or surprising results, the value of small hospital-based studies like this one lies in strengthening the awareness of the important role of stroke prevention while influencing risk factors. Every person, not only health care professionals, can contribute to stroke prevention by promoting healthy lifestyle and avoiding known risk factors for stroke.The aim of this study was to assess the risk factors of ischemic and hemorrhagic strokes in Gopalgonj, Bangladesh.

LIMITATIONS

This was a single centered study with small size sample. So the findings of this study may not reflect the exact scenario of the whole country.

VI. Conclusion And Recommendations

The findings may be helpful for further studies and in the treatment arena. But for more specific results we would like to recommend for conducting more studies on similar issues with larger sized sample in several places.

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Dr. Mahabubur Rahman. "Risk Factors of Ischemic and Hemorrhagic Strokes inGopalgonj, Bangladesh: A hospital-based study". *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(2), 2020, pp. 60-64.