Pattern of ECG findings in Ischemic Stroke

SK MAHBUB ALAM[1], MD RAFIQUL ISLAM[2], HASAN ZAHIDUR RAHMAN[2],
MD REZAUL KARIM KHAN[2], MONIRUZZAMAN BHUIYAN[2]. ABDUL KADER SHAIKH[3]

Abstract:

Background: *The diagnosis of ischemic stroke remains a clinical one, with confirmatory evidence obtained through neuroimaging. ECG changes are common in patients with ischemic stroke. Objective: The objective of this study was to see ECG findings among ischemic stroke patients.* **Materials and Methods:** *This study was carried out in the Department of Neurology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka from July 2006 to October 2008. A total of 36 patients with acute Ischemic stroke were selected by purposive sampling method and diagnosed by history, clinical findings ard was confirmed by CT scan of head. The clinical details, investigations of the respondents were reviewed. Data were recorded in a pre-designed data collection sheet.* **Result:** *Majority of the subjects were in 7th decade 12(33.3%) and 6th decade 9(25%) with the male to female ratio was 1.25:1. Among the patients with abnormal electrocardiographic findings, 7(19.4%) patients each had myocardial ischemia, 4(11.1%) had conduction block and ventricular arrhythmias, 7(19.4%) had atrial fibrillation, 5(13.9%) had ventricular hypertrophy, 7(19.4%) had myocardial infarction, 6(16.7%) patients had non-specific ST changes.* **Conclusion:** *Myocardial ischemia, atrial fibrillation and myocardial infarction are common electrocardiographic findings of ischemic stroke patients.*

Introduction:

Acute stroke is characterized by the rapid appearance (usually over minutes) of a non-convulsive, non-traumatic focal deficit of brain function, most commonly a hemiplegia with or without signs of higher cerebral dysfunction (such as aphasia), hemisensory loss, and visual field defect or brain-stem deficit. Provided that there is a clear history of a rapid onset focal deficit, the chance of the brain lesion being anything other than vascular is 5% or less. Stroke is the third commonest cause of death after ischemic heart disease and cancer in developed countries and is responsible for a large proportion of physical disability[1]. It is also the commonest cause of morbidity and mortality among adult population, one year case fatality being 42 percent[2].The main types of stroke and their relative occurrences are: Ischemic stroke - 85% and Hemorrhagic stroke -15%[3]. Coronary heart disease and ischemic stroke share the same risk factors and may co-exist in the same patient and in most of the patients with ischemic stroke, the mortality may be related to the underlying coronary heart disease[4].ECG changes are common in-patients with ischemic stroke. Studies have shown that the frontal lobe, insular cortex and amygdale play an important role in the regulation of heart via the sympathetic and parasympathetic systems and cardiac involvement is more common in patients with cerebral lesion involving these areas[5,6] In financial terms, stroke represents 6% of hospital running costs and 4.6% of all National Health Service costs. About 40-50% of beds are occupied by stroke patients in neurology ward which is reported in a developing country like ours[7]. Ischemic stroke, which is perhaps the commonest subtype of stroke, is associated with ECG changes; some of these changes have been thought to be due either to the stroke itself or pre-existing heart disease. Because ECG is rapid, noninvasive and low cost, successful detection of cardiac complications early in the course of acute ischemic stroke could have an impact on clinical management.

1. Assistant Professor, Department of Neurology, Bangabandhu Sheikh Mujib Medical University, Dhaka.
2. Professor, Department of Neurology, Bangabandhu Sheikh Mujib Medical University, Dhaka.
3. Associate Professor, Department of Neurology, Bangabandhu Sheikh Mujib Medical University, Dhaka.

Aims and Objectives:

Many studies are available from other countries, especially from Japan, India but there has been no such study from Bangladesh. The aims of the study was to see the normal and abnormal EGG findings among the ischemic stroke patients in Bangladeshi population.

Materials and Methods:

This was an observational study carried out in the Department of Neurology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka. Study subjects were collected from admitted patients in neurology ward in Bangabandhu Sheikh Mujib Medical University followed up to discharge in the neurology ward and subsequent follow up were done in stroke clinic of neurology OPD from July 2006 to October 2008. A total of 36 patients with acute ischemic stroke with abnormal EEC were selected by purposive sampling method and diagnosed by history, clinical findings and was confirmed by CT scan of head and ECG were selected from among the patients admitted in neurology ward, Department of Neurology, BSMMU, during the study period. Chi-square test and unpaired students 't' test has been done in this study.

Results:

A total number of 36 ischemic stroke patients with abnormal electrocardiographic findings were taken in this study(Table-I). The age range were between 42 to 84 years and mean age was 62.39±10.64.

Table-I
Age distribution of ischemic stroke patients with abnormal ECG findings.

Age (years)	(N-36)	Percentage %
40-49	5	13.9
50-59	9	25.0
60-69	12	33.3
70-79	8	22.2
>80	2	5.6
Total	36	100
Mean±SDRange		62.39±10.64

Table-II
Sex distribution of study subject

Diabetes mellitus	(N-36)	Percentage %
Present	12	33.3
Absent	24	66.7
Total	36	100

Table-II showed sex distribution of ischemic stroke patients with abnormal ECG findings where 55.6% were male and 44.4% were female.

Table-III
Distribution of diabetes mellitus among the study subjects

| Diabetes mellitus	(N-36)	Percentage %
Present	12	33.3
Absent	24	66.7
Total	36	100

Table-III showed that diabetes mellitus was present in 12 (33.3%) patients among the study subjects

Table- IV
Distribution of dyslipidaemia among the study subjects

Dislipidaemia	(N-36)	Percentage %
Present	13	36.1
Absent	23	63.9
Total	36	100

Table-IV showed the distribution of dyslipidemia was present among 13(36%) patients the study subject.
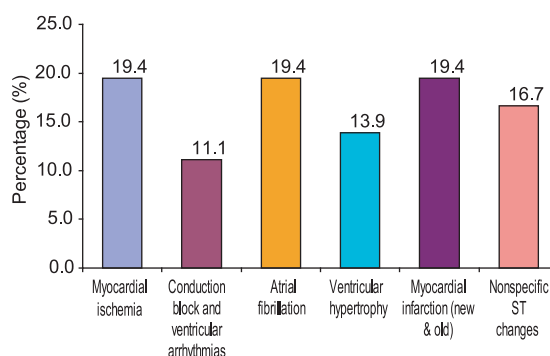
Fig.-1: *The EEG findings among the study subjects.*

Fig.-1 showed distribution of abnormal ECG findings among ischemic stroke patients, where 7(19.4%) patients had myocardial ischemia, 4(11.1%) had conduction block and ventricular arrhythmias, 7(19.4%) had atrial fibrillation, 5(13.9%) had ventricular hypertrophy, 7(19.4%) had myocardial infarction and 6(16.7%) patients had non-specific ST changes.

Discussion:

This was a hospital based observational study and was carried out to see the electrocardiographic findings of ischemic stroke patients. The study subjects were selected from the admitted patients of neurology ward, Department of Neurology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka with abnormal ECG findings. A total of 36 patients had been studied during the study period. In this study, majority of the subjects were in 7th decade 12(33.3%) and 6th decade 9(25%). Next common age group were 8th decade 8(22.2%) and 5th decade, 5(13.9%). In a previous study among 51 stroke patients majority of them were in the age group of 50-69 years[8]. In another study among 100 stroke patients, the age range was 18-84 years and most of his cases were between 50-70 years[9]. So, this study is consistent with other studies. In this study the mean (±SD) age of the patients 62.39±10.64 years. Similar past studies had comparable age statistics of the patients[10].

In this study, the male to female ratio was 1.25:1. Male involvement was 12.5% higher than that of female. In a previous study male to female ratio was 1.2:1 which is similar to this study[11].

In this study among patients 12 (33.3%) patients were diabetic. In a study carried out in Dutch community on stroke patients where 29% patients were diabetic[12]. In another study among ischemic stroke patients 30% were diabetic[13].Independent of age, coronary heart diseases (i.e. angina pectoris or myocardial infarction) are clearly associated with ischemic stroke. The evidences are available in postmortem[14,15], case control[16] and cohort studies[17].

In a previous study it was found that atrial fibrillation was present in 19.5% of cases[11]. In this study, 19.4% of patients with abnormal ECG had atrial fibrillation and 11.1% had ventricular arrhythmias. Therefore the present study is consistent with the findings of previous studies.

In this study, myocardial ischemia was one of the common (19.4%) ECG findings. In some previous studies it was also found that myocardial ischemia was a common ECG finding in stroke patients[11,18,19]. Therefore this study was consistent with many of the previous studies.

Considering all the above observations, it is established that this study showed a close relationship between abnormal electrocardiographic findings with ischemic stroke patients.

Conclusion:

From the statistical analysis of the results obtained in this study, it has been seen that myocardial ischemia, myocardial infarction and atrial fibrillation has a close relationship with ischemic stroke patients. Many patients has non-specific ST changes. Multi centered prospective study with large sample size could be done for better evaluation .

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