



A STUDY ON ELECTROCARDIOGRAPHIC CHANGES IN ACUTE CEREBROVASCULAR ACCIDENT

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ABSTRACT **Background** Cardiac abnormalities are diverse and common with neurological injuries. Strokes are mainly two types- ischemic and hemorrhagic. Many patients with acute stroke have abnormal ECG changes that are seen immediately after an attack. This study was done to study the electrocardiographic changes in acute Cerebrovascular accident. **Methodology** This was a cross sectional observational study conducted in 100 patients who were admitted with acute cerebrovascular accidents in the department of medicine, Kanyakumari Government medical college 2020 to 2021 over a period 1 year after satisfying inclusion and exclusion criteria. **Results** Mean age of the patient in this study is 58.2 years, with minimum age of the patient is 41 years, maximum age is 75 years. 80 % of cerebral hemorrhage patients, 63% of cerebral infarct patients and 88% of patients with subarachnoid hemorrhage had ECG changes. Overall 71% of patients with stroke had some form of ECG changes. In our study 23 patients had sinus tachycardia, 10 had sinus bradycardia, 24 had ST elevation, 23 had ST depression, 36 had T wave changes, 32 had QTc prolongation and 5 had Q waves. None of the patients in the study group had abnormal U waves or electrolyte abnormalities. So, changes in the ECG are due to cerebrovascular lesions rather than electrolyte abnormalities. **Conclusion** ECG abnormalities are commonly found in patients with stroke. Of all stroke patients ECG abnormalities are more common in patients with cerebral hemorrhage than infarct. QTc prolongation was the common finding in patients of stroke followed by ST segment elevation. Other disturbances seen in the stroke patients were rhythm disturbances, T wave changes, Q wave abnormalities.

KEYWORDS : Electrocardiographic (ECG) changes, Cerebrovascular accident(CVA), Stroke.

INTRODUCTION

Cardiac abnormalities are diverse and common with neurological injuries. Many pathways are involved in the heart and brain interaction in humans and animals [1]. First Electrocardiographic changes associated with subarachnoid haemorrhage was found to be abnormalities in T waves, prolonged QTc intervals was published in 1947 [2,3]. Many patients with acute stroke have abnormal ECG changes that are seen immediately after an attack. So, in patients with acute stroke ECG can mimic that of myocardial ischemia. Supraventricular tachyarrhythmias are found to be increasingly associated with Right MCA strokes, whereas new onset Atrial Fibrillation with Left parieto insular stroke [4,5]. Along with ECG changes Echocardiogram revealing systolic dysfunction after SAH has been described [6,7]. Echocardiography provides clues to identify the patients at high risk for transient ischemic attack and stroke.

AIMS AND OBJECTIVES

- 1] To study the frequency of electrocardiogram changes with cerebrovascular accidents.
- 2] To determine the variation in ECG manifestations
- 3] To study the association of ECG changes with electrolytes abnormalities

METHODOLOGY

This was a cross sectional observational study conducted in 100 patients who were admitted with acute cerebrovascular accidents in , Kanyakumari Government medical college 2020 to 2021 over a period 1 year after satisfying inclusion and exclusion criteria. Patients aged above 18 years and CT Documented cases of acute cerebrovascular accidents admitted within 24 hours were included. Patients aged below 18 years ,with previous cerebrovascular accident , with underlying heart diseases ,Stroke due to trauma, previously diagnosed with electrolyte abnormalities ,Stroke due to dissecting aortic aneurysm, patient with hepatic or renal diseases, patients in whom admission to the hospital was delayed for more than 24 hours after the appearance of acute stroke were excluded. Details of demography, clinical presentation, comorbidities like hypertension, diabetes mellitus, alcohol, smoking, Ischemic heart disease (IHD), rheumatic heart disease, liver disease, kidney disease were obtained. Detailed neurological examination and cardiovascular examination for all the cases.

RESULTS

The number of patients selected for this study was 100 after satisfying the inclusion criteria, of which males were 67 [67%] and females 33 [33%]. Mean age of the patient in this study is 58.2, with minimum age of the patient is 41, maximum age is 75. Patients in the age group more than 60 years were about 41%, followed by 35% in the age group between 51 to 60 years and 24% were below 50 years. Out of 67 male patients in our study, about 32 patients were smokers (48%) and 44 patients were alcoholic (66%). None of the female patients were smokers or alcoholic. 80 % of cerebral hemorrhage patients, 63% of cerebral infarct patients and 88% of patients with subarachnoid hemorrhage had ECG changes. Overall 71% of patients with stroke had some form of ECG changes. (Table-1). Out of 57 patients with cerebral infarct, 12 had rhythm disturbances which accounts for 21 % with 11 having sinus tachycardia and 1 having sinus bradycardia. In patients with cerebral hemorrhage, 7 had sinus tachycardia and 9 had sinus bradycardia. 5 patients with subarachnoid hemorrhage had sinus tachycardia [63%]. Out of 57 patients with cerebral infarct, 23 [40%] had ST segment changes, of which 7% had ST segment elevation and 33% had ST segment depression. ST elevation was found in 49% and ST depression was found in 9% of patients with cerebral hemorrhage. 50% of patients with SAH had ST segment changes. 32% of patients with cerebral infarct, 46% of patients with cerebral hemorrhage, 25% with SAH had T wave changes. About 23 % with cerebral infarct, 46 % with cerebral hemorrhage, 37% with SAH had QTc prolongation. Q waves are seen in 9 % patients with cerebral infarct. Patients with hemorrhage did not have any Q wave abnormalities. None of the patients in the study group had abnormal U waves or electrolyte abnormalities. So, changes in the ECG are due to cerebrovascular lesions rather than electrolyte abnormalities. In our study 23 patients had sinus tachycardia, 10 had sinus bradycardia, 24 had ST elevation, 23 had ST depression, 36 had T wave changes, 32 had QTc prolongation and 5 had Q waves. (Table :2)

Table 1 : Cases with ECG changes

Diagnosis	Total Cases	Cases with ECG Changes	Percentage with Changes
Cerebral Infarct	57	36	63
Cerebral hemorrhage	35	28	80
Subarachnoid hemorrhage	8	7	88
Total cases	100	71	71

Table 2 : Distribution of ECG changes according to pathology

ECG changes	Cerebral infarct	Cerebral hemorrhage	Subarachnoid hemorrhage	Total
Sinus tachycardia	11	7	5	23
Sinus bradycardia	1	9	0	10
ST elevation	4	17	3	24
ST depression	19	3	1	23
Tall T wave	5	13	2	20
T wave inversion	13	3	0	16
Q wave	5	0	0	5
QTC Prolongation	13	16	3	32

Table 3 : Specific ECG changes according to location of lesion

Cerebral Lesion	Rhythm disturbances	ST segment changes	T wave changes	QTC prolongation
Basal Ganglia	2 [100%]	2 [100%]	2 [100%]	2 [100%]
Thalamus	4 [36%]	2 [18%]	4 [36%]	4 [36%]
Capsuloganglion	14 [25%]	33 [58%]	22 [39%]	15 [26%]
Frontal	5 [62%]	0	2 [25%]	5 [62%]
Temporo- Parietal	2 [17%]	6 [50%]	4 [33%]	3 [25%]
Occipital	1[50%]	0	0	0

DISCUSSION

Out of 100 patients in our study, 67 patients were male and remaining 33 were female. Majority of patients in our study were above the age of 60 years (41%) which was followed by 51-60 years age group of (35%). This is similar to the study conducted by Rambabu MV et al [8]. In our study, about 57% of the cases were ischemic type and 43% were of haemorrhagic type. This is comparable to the study by Banerjee et al done in Kolkata which shows 68% of ischemic strokes and 32% of haemorrhagic stroke [9]. In another study by Dalal et al, done in Mumbai, it shows 80.2% cases of ischemic strokes and hemorrhagic strokes contributes about 17.7% of cases. In our study, about 71% of the patients with stroke had ECG changes while remaining 29% of stroke patients had normal ECG pattern. This is similar to the study by Liu Q et al, where 304 patients studied, of which 67.1% had ECG changes [10]. In our study most common ECG abnormality in stroke patients was QT prolongation which accounts for about 32%. In a study conducted by McDermott MM et al, 29% of the patients had ST segment depression [11]. This is similar to our study, where 47% of cases had ST segment changes with 24% having ST segment elevation and 23% having ST segment depression. Togha M et al and authors found that the T wave abnormality was present in about 39.9%. This was similar to findings in our study where T wave abnormality contributes about 36% [12]. In our study about 32% of patient had QTC prolongation of which 23% were cerebral infarct patients, 46% were cerebral hemorrhage, 37% were subarachnoid hemorrhage. About 50% of QTC prolongation was found in hemorrhage which was reported by study done by Arruda and Lacerda [13], Keller and Williams [14] in stroke patients. A study done by Yamour et al using the computerized tomographic scan [15] revealed frontal lobe haemorrhages were associated especially with QT interval (QTc) prolongation and T waves. In our study Q waves are seen in about 9% of patients with cerebral infarct. This is similar to the study by Chou et al and Manning et al [16]. Patients with hemorrhage does not have any Q wave abnormalities. The most common ECG abnormality in stroke patient is QTC prolongation [32%] followed by ST elevation [24%] and ST depression [23%]. This is comparable to the study done by Goldstein which shows QT prolongation (45%) was the common abnormality [17]. There is another study conducted by Devarapu in which also common ECG abnormality is QTC prolongation [18]. The major limitations of this study include single centre study, small sample size and lack of control groups.

CONCLUSION

ECG abnormalities are commonly found in patients with stroke. Of all stroke patients ECG abnormalities are more common in patients with cerebral hemorrhage than infarct. QTC prolongation was the common finding in patients of stroke followed by ST segment elevation.

Other disturbances seen in the stroke patients were rhythm disturbances, T wave changes, Q wave abnormalities. These ECG changes should be analysed with care to rule out any coexisting cardiac disorders. If any, should be treated promptly. ECHO should be done in these patients to assess the LV function, if any abnormalities present treat early. It prevent the further attacks.

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