

ORIGINAL RESEARCH

A prospective study of electrocardiographic and echocardiographic changes in patients with cerebrovascular accidents**¹Dr. Shilpa, ²Dr. Basavaraj Machnur, ³Dr. Sharan Shravan Hesarur**^{1,3}Assistant Professor, Dept of medicine MD general medicine, Raichur Institute of Medical Science²Associate Professor, Department of Medicine, MD general medicine DM cardiology, Raichur Institute of Medical Science, India**Corresponding Author: Dr. Shilpa**

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Abstract**Background:** Cerebrovascular accidents (CVA) or strokes are the most common lifethreatening disorder. The present study was conducted to assess electrocardiographic and echocardiographic changes in patients with cerebrovascular accidents.**Material & Methods:** A detailed history and clinical examination was carried out in all the cases. The diagnosis of CVA was made. All patients were subjected to investigations. All the data was analyzed using IBM SPSS ver. A p value less than 0.05 was considered significant.**Results:** In present study out of 50 patients 29 were male and 21 were female patients. Out of 50 patients majority of them had ischemic stroke accounting for 40 patients (80%) and remaining 10 patients (20%) had haemorrhagic stroke. Abnormal electrocardiographic changes were seen in 31(62%) patients and 28 (58%) patients showed abnormal echocardiography. Mortality was higher in patients of stroke with QTc prolonged (50%) followed by ST segment depression and T-wave inversion (25%) respectively. Mortality was higher in patients with LV dysfunction (66.66%).**Conclusion:** The study concluded that QTc prolonged and LV dysfunction has important reference value in the evaluation of severity and prognosis in patients with cerebrovascular accidents.**Keywords:** Cerebrovascular accidents, strokes, electrocardiograph.**Introduction**

Cerebrovascular accidents (CVAs) or stroke is defined as “rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 h, or longer or leading to death, with no apparent cause other than of vascular origin”.¹ A typical ischemic stroke presents with the abrupt onset of a focal neurological deficit and is characterized clinically by mode of onset and subsequent course in it. Three major classes of strokes are now recognized, i.e., the ischemic variety with cerebral infarction or ischemia, the hemorrhagic variety intracerebral with ruptured aneurysm in the young, and the hypertensive cerebral hemorrhage in the elderly group and subarachnoid hemorrhage, and rare type lacunar strokes are deep, small cerebral infarcts.² Ischemic stroke is accountable for about 80% of the first episode of cerebrovascular accidents. Primary intracerebral hemorrhage was responsible for 10% cases and subarachnoid hemorrhage for 5%.³ Cerebrovascular accidents are the second leading cause for the deaths worldwide. With the present trends it has been projected that mortality due to stroke in united states will be doubled by 2030.⁴ Above 20 years, cerebrovascular accidents occurrence in India was around 203 per 1 lakh population, attributing to about 1 million cases. Amongst all strokes, 12% of them are seen in the age

group of less than 40 years of age.⁵ With age, there is increase in the risk of death due to stroke; among all deaths 2.4 % occur in old age (>70years of age).⁶ Many studies have shown CVA associated with electrocardiography (ECG) changes and wall motion abnormalities of two-dimensional echocardiography (2D ECHO). The changes of ECG in CVA were reported in many studies.⁷⁻⁹ Changes occurring in ECG following stroke were changes in T-wave, U-wave, ST-segment, QT-interval, and various arrhythmias, these ECG changes may resemble those of myocardial ischemia or sometimes myocardial infarction. Along with ECG changes, many studies have shown wall motion abnormalities on 2D ECHO following a stroke, especially with subarachnoid hemorrhage.^{10,11} The present study was conducted to assess electrocardiographic and echocardiographic changes in patients with cerebrovascular accidents.

Material & Methods

A Descriptive Observational Clinical study was done to assess electrocardiographic and echocardiographic changes in patients with cerebrovascular accidents. 50 patients admitted in the Department of General medicine in Raichur Institute of Medical Science, Raichur were included in the study after obtaining consent from the patients. All the patients above 18 years of age presenting with stroke within 72 hours of onset, patients who gave informed consent were included in the study. Stroke that occur secondary to trauma, neuro-infections, malignancy, patients with underlying cardiac disorders, Electrolyte disturbances and those patients presenting after 72 hours of onset of stroke were excluded from the study. Prior to conduct the study, the purpose of the study was clearly explained to the patients and written consent was obtained before the initiation of study. After admission a detailed history and clinical examination including fundoscopy and cardiovascular examination was carried out in all the cases. The diagnosis of CVA was made on the basis of Temporal profile of clinical syndrome, Clinical examination and CT scan of brain of the patients. A 12 lead ECG and 2D echocardiography was done within 24 hours of admission. All patients were subjected to investigations like: complete blood count, erythrocyte sedimentation rate, blood urea and serum creatinine, serum electrolytes and lipid profile. In hospital follow-up was done to know their prognosis under two categories: live/dead. All the data was analyzed using IBM SPSS ver. 20 and expressed in the form of numbers and percentage. Chisquare test was used to establish the significance level between groups. A p value less than 0.05 was considered significant.

Results

In present study out of 50 patients 29 were male and 21 were female patients. Out of 50 patients majority of them had ischemic stroke accounting for 40 patients (80%) and remaining 10 patients (20%) had haemorrhagic stroke. Abnormal electrocardiographic changes were seen in 31(62%) patients and 28 (58%) patients showed abnormal echocardiography.

Table 1: Test for association between electrocardiographic abnormalities and type of stroke

ECG changes	Ischemic stroke	Hemorrhagic stroke	Total
Abnormal	24(77.4%)	7(22.58%)	31(62%)
Normal	16(84.21%)	3(15.78%)	19(38%)

Total	40(80%)	10(20%)	100(%)
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Table 2: Mortality in stroke patients and its correlation with ECG changes

Type of ECG changes	Stroke patients	
	Alive (20) N(%)	Dead (4) N(%)
QTc prolongation	7(35%)	2(50%)
T Wave inversion	6(30%)	1(25%)
ST segment depression	5(25%)	1(25%)
U Waves	2(10%)	0(0%)

Mortality was higher in patients of stroke with QTc prolonged (50%) followed by ST segment depression and T-wave inversion (25%) respectively.

Table 3: Mortality in stroke patients and its co-relation with Echo changes

2D Echo changes	Stroke patients	
	Alive (22) N(%)	Dead (6) N(%)
LV dysfunction	11(50%)	4(66.66%)
Mitral valve abnormality	6(27.27%)	1(16.66%)
Aortic valve abnormality	5(22.72%)	1(16.66%)

Mortality was higher in patients with LV dysfunction (66.66%).

Discussion

In 1947, Byer et al¹² described large and upright T waves and prolonged QT intervals in a patient with subarachnoid hemorrhage. In 1953, Levine¹³ reported inverted, deep T waves and ST segment elevations in a patient with a ruptured aneurysm of the circle of Willis, while the next year Burch et al¹⁴ described a new electrocardiographical pattern consisting of a prolonged QT interval, large and often inverted T waves and large U waves in patients with cerebrovascular accidents.

Mortality was higher in patients of stroke with QTc prolonged (50%) followed by ST segment depression and T-wave inversion (25%) respectively Mortality was higher in patients with LV dysfunction (66.66%).

Tandur S et al¹⁵ concluded that Patients with cerebrovascular accidents often have abnormal ECG in the absence of known organic heart disease or electrolyte imbalance. These ECG changes are more common in hemorrhagic than ischemic stroke. The mortality in these

patients did not relate to the ECG changes seen but was dependent on the type of cerebrovascular accident and the level of consciousness on admission.

Devarapu C et al¹⁶ concluded that ECG abnormalities in stroke patients do not have any prognostic significance. But LV dysfunction has prognostic significance in predicting mortality in cerebrovascular accident.

SudhiSh G et al¹⁷ concluded that ECG abnormalities were commonly seen among patients with acute cerebrovascular accidents which vary from T wave inversion to ST segment depression. CPK MB, troponin T and BNP were elevated among 32 patients with ECG changes and 40% patients with ECG changes had abnormalities noted in their echocardiogram. Mortality was slightly higher among the haemorrhagic group compared to the ischaemic stroke group, though not significant.

Sebastian S et al¹⁸ concluded that ECG changes occurred very commonly in acute stroke. The changes are thought to be independent of the nature of stroke. It was noted that ST and T inversion being common in ischemic while T inversions and arrhythmias common in haemorrhagic CVA. It was also noted that the mortality was higher in patients with abnormal ECG following an acute Cerebrovascular event.

Nagdev et al³ aimed to study variations in Electrocardiogram and 2D Echo in stroke patients in stroke patients and to rule out end organ insufficiency of vital organs and found that there was a significant correlation between ECG changes and stroke.

Conclusion

The study concluded that QTc prolonged and LV dysfunction have important reference value in the evaluation of severity and prognosis in patients with cerebrovascular accidents.

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