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A Study of Cardiac Arrhythmia and Abnormal Electrocardiogram in Patient with Acute Stroke in a Tertiary Care Hospital, Maharashtra, India.

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ABSTRACT

Cardiac Arrhythmias and Electrocardiogram (ECG) abnormalities occur frequently but are often underrecognized after strokes. Acute ischemic and hemorrhagic strokes in some particular area of brain can disrupt central autonomic control of the heart, precipitating cardiac arrhythmias, ECG abnormalities, myocardial injury and sometimes sudden death. Identification of high-risk patients after acute stroke is important to arrange appropriate cardiac monitoring and effective management of arrhythmias and to prevent cardiac morbidity and mortality. To study the pattern of electrocardiogram changes associated with acute stroke among patient without cardiovascular disease. It was a prospective hospital observational study which was conducted in Department of Medicine, Krishna Institute of Medical Sciences, Karad, India. This study was conducted for a period of 18 Months from 1 St January 2015 to 30th June 2016. In our present study 34% of patients were in between 61 – 70 years age group, 28% between 51 – 60 years age group. 58% of patients were males and 42% patients were females. Out of 150 patients, 100 were with ischemic stroke and 50 were with hemorrhagic stroke. Various ECG chages are observed Table -1 in presence study including Prolonged QTc interval in 22%, ST segment elevation in 11.33%, T wave inversion in 33.33% LVH in 13.33%, Q wave in 12.66%. Abnormal T wave, prolong QTc interval and arrhythmia were the common ECG findings in patients of acute ischemic stroke and also the study underlies the importance of cardiac abnormalities in patients of acute ischemic stroke which would help in early recognition of the same and in-turn better treatment of patients which helps in decreasing mortality and morbidity of these patients.

Keywords: cardiac arrhythmia, ECG, stroke.

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INTRODUCTION

Most cerebrovascular diseases are manifested by the abrupt onset of a neurological deficit. A stroke or cerebrovascular accident is defined as abrupt onset of a neurologic deficit that is due to vascular cause.[1] Stroke is sometimes called as brain attack. It can injure the brain like the heart attack injures the heart.[2]

ECG changes are present in 60-90% of patients with intra-parenchymal or subarachnoid bleed and in about 5-20% of patients with acute ischemic stroke.[3] The underlying basis is disordered repolarization process.[4]

The possible mechanism is through disturbances in autonomic regulation and massive stimulation of the sympathetic nervous system.[5] The prevalence of stroke in India was estimated as 203 per 100,000 populations above 20 years, amounting to a total of about 1 million cases. The male to female ratio was 1.7:1. Around 12% of all stroke occurred in population below 40 years.[6] It is estimated that stroke represent 1.2% of the total deaths in the country, when all ages are included.

The proportion of stroke death increases with age, and in the oldest group (>70 years of age) stroke contributes to 2.4% of all deaths.[7] Heart attack and stroke are both caused by diseases of blood vessels. They share same risk factors and by modifying these risk factors may reduce the possibility of stroke.[8]

ECGs of patients with acute neurological syndromes (ANS) can mimic acute coronary syndromes (ACS) especially in elderly.[8] Stroke induced ECG changes are evanescent, resolving over a period of days to months. However, the frequency and severity of ECG changes is highest within 48 hours of the onset of stroke which explains the importance of continuous ECG monitoring for these patients.

MATERIALS AND METHODS

It was a prospective hospital observational study which was conducted in Department of Medicine, Krishna Institute of Medical Sciences, Karad, India. This study was conducted over a period of 18 Months from 1 St January 2015 to 30th June 2016 including data collection, data organization, data presentation, data analysis and data interpretation. All patients within this time period fulfilling inclusion and exclusion criteria were included in the study.

Inclusion criteria

- Patients presenting with acute stroke within 24 hours
- Age: 18 years and older
- Gender: Both

Exclusion criteria

- Ischemic Heart Disease
- Congenital Heart Disease
- Prior history of stroke
- Electrolyte Imbalance
- CKD patients

Case Definition

Patient with stroke presented within 24 hours of episode having acute infract or bleed on NCCT Head/MRI.

Demographic features and general physical examination carried out along with detailed systemic examination was conducted with special emphasis on CNS examination.

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All patients underwent

- Complete blood count
- Random blood sugar
- 12 lead ECG
- CT/MRI Brain
- Serum creatinine
- 6 . Serum electrolytes

ECG Criteria

- HR of 100/min was regarded as tachycardia.
- T- wave was considered abnormal when inversion of T-waves is present and it should have been upright i.e. 1,2, V3-V6 , may be variable in 3,AVL,V1,V2
- QTc Prolongation: The QT interval is measured from the beginning of QRS complex to the end of Twave, the rate corrected QTc is obtained by dividing the actual QT by the square root of the RRinterval(both measured in seconds), QTc is prolonged if it is more than 0.44m-sec.
- U- wave is taken as significant when exaggeration of U- wave voltage was noted when appeared in more than 2-leads when appeared in leads in which it was not normally seen(other than V3-V4)
- RVH: R-waves in right chest leads and R wave may be taller than S wave in leadV1, persistent S wave in V5-V6
- LVH

RESULTS

Fig-1 Age Distribution Among Study Population

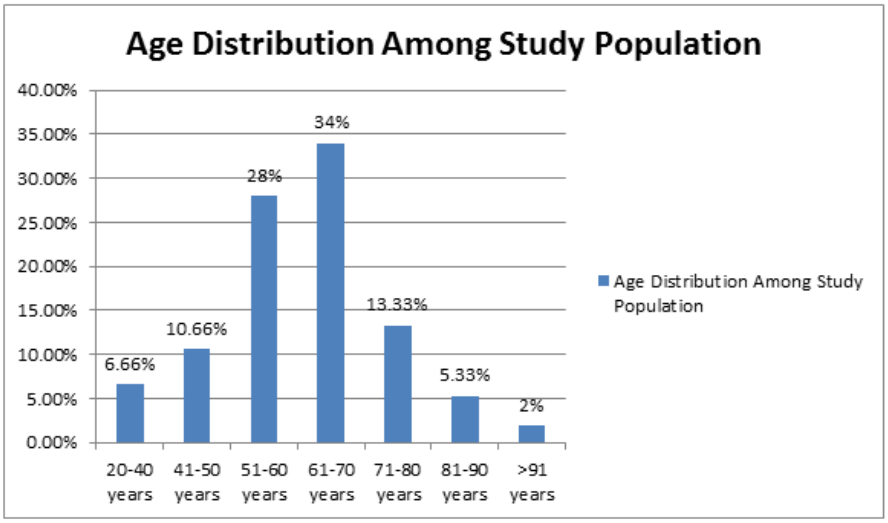

Table-1 Distribution according to ECG Changes

ECG Changes	Ischemic Group	Hemorrhagic Group	Total
Prolonged QTc interval	26/100	7/50	33/150 (22%)
ST segment Elevation	12/100	5/50	17/150 (11.33%)
ST segment Depression	2/100	1/50	3/150 (2%)
T-wave inversion	34/100	16/50	50/150 (33.33%)
Q-wave	13/100	6/50	19/150 (12.66%)
U wave	8/100	3/50	11/150 (7.33%)
Overall Arrhythmia	16/100	11/50	27/150 (18%0
LVH	12/100	8/50	20/150 (13.33%)

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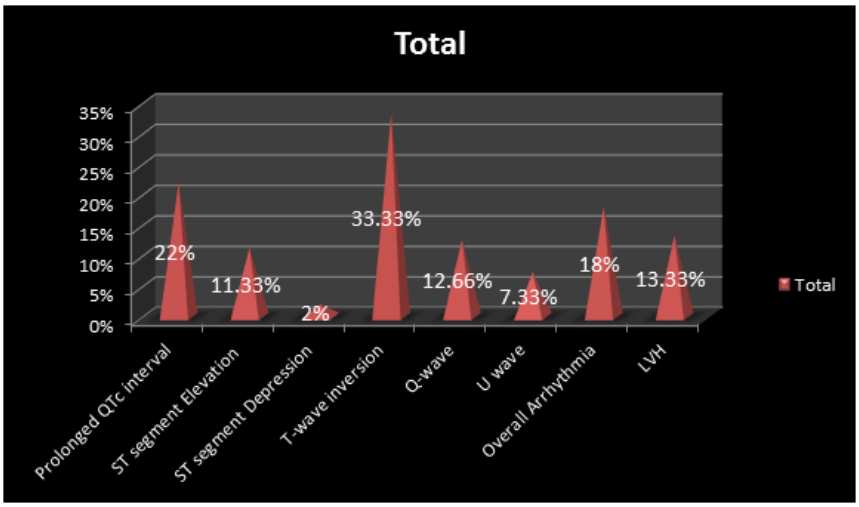
Fig-2 Distribution according to ECG Changes



DISCUSSION

Coronary artery disease and ischemic cerebrovascular disease are leading causes of morbidity and mortality. Coronary artery disease often coexists with asymptomatic carotid artery atherosclerosis, Transient ischemic attacks or ischemic stroke. Numerous studies have shown that mortality from all forms of ischemic cerebrovascular disease is primarily due to Coronary artery disease. Thus, there is increasing interest in identfying pattern of electrocardiogram changes associated with acute stroke.

The incidence of stroke increases with increasing age. In present study 34% of patients were in between 61 – 70 years age group, 28% between 51 – 60 years age group, 13.33% of patients were in between 71 – 80 years age group, 5.33% of patients were in between 81 – 90 years age group 2% above 90 years of age,10.66% of patients were in between 41 – 50 years age group, 6.66% 18 patients were between 20 – 40 years age group. 58% of patients were males and 42% patients were females i.e., male incidence was 21.33% higher than female which is almost similar to the study of Siddique MR et. al[10]

In Goldstein's study incidence of 25% of new arrhythmias was observed compared with 3% of the control group. Among these, atrial fibrillation was the most common, present in 14% of the cases, followed by ventricular arrhythmia in 5%, with ventricular extrasystoles in the majority of cases.[10]

Arrhythmias of any type occurred in 41/150 (27%) patients with acute stroke, and new arrhythmias occurred in 13/53 (25%) patients who had prior available tracings. Atrial fibrillation was the most common arrhythmia, occurring in 21/150 (14%) patients.

Akbar MA et al studied 200 patients of stroke, found sinus tachycardia (HR>=100/min) in 63.8% patients among ischemic group and 30.95% patients among hemorrhagic group.[11] AF was observed in 17.24 % of ischemic group, not in hemorrhagic group.

Stober et al described sinus bradycardia in 23%, multifocal ventricular ectopic beats in 54%, asystolic intervals in 27%, and atrial fibrillation in 4% of the cases with conventional electrocardiography. In the present study, sinus bradycardia, atrioventricular block, and the junctional rhythm were the only arrhythmias found (9.1% for each).[12]

In present study overall rhythm disturbances (including sinus tachycardia, sinus bradycardia, atrial fibrillations, ventricular premature complexes, bundle branch block, heart block, etc) were observed in 27 patients (18%), out of which 16 belong to ischemic group and 11 to hemorrhagic group. Atrial fibrillation found in total of 14 patients , out of which 11 belong to ischemic group and 3 belong to hemorrhagic group.

Most of the patients of hemorrhagic stroke had ECG evidence of left ventricular hypertrophy. Their proportion was quite large when compared with sufferers of cerebral infarction (69% vs 15.51%).[11]Bozluoclay M et al left ventricular hypertrophy is detected more frequently in sufferers of hemorrhagic stroke (69%) than cerebral infarction (15.5%). A higher rate of occurrence of hypertension in patients with intra-cerebral hemorrhage could explain such difference.[13]

Goldstein gave a figure of 26% for this ECG change. But he gave an overall estimate of this illness, rather than acute stroke, forms the basis for left ventricular hypertrophy and Bundle branch blocks.[11] The underlying mechanism is volume/pressure overload.

Arruda WO observed 21.8% patients with acute cerebrovascular hemorrhage had LVH.[14] In present study it was found that out of 150 patients enrolled in this study, 20 patients (13.33%) had LVH as per ECG finding, 12 were of ischemic group and 8 of hemorrhagic group.

Goldstein DS corrected QT intervals were prolonged in 45% of the patients with stroke, constituting the most frequent single ECG abnormality and the most common new ECG abnormality in stroke. QT prolongation occurred significantly more frequently in subarachnoid haemorrhage (71%) than other types of stroke (39%), and in intracranial haemorrhage (28/44, 64%) than in strokes without intracranial haemorrhage (40/106, 38%; $x2= 8.42$, $p < 0.01$).[10]

Arruda WO in 1992 observed 67.2% patients with acute cerebrovascular hemorrhage had prolonged QTc. Akbar MA et al observed QTc prolongation in limb lead III in 52.27 % in ischemic group and 63.4 % in hemorrhagic group, and QTc prolongation in lead V6 in 63.63 % in ischemic group and 68.29 % in hemorrhagic group.[11] In present study QTc interval was found prolonged in 33 patients (22% %) out of 150 patients enrolled , including 26 patients in ischemic group and 7 patients in hemorrhagic group.

Arruda WO observed 34.5% patients with acute cerebrovascular hemorrhage had ischemic T and ST changes.[14] Goldstein DS states ST-depression and T inversion were more common manifestations of ischemic change than ST-elevation (46.66% vs 15.5%). This was true irrespective of the stroke type.[10] In present study ischemic changes were observed in the form of ST and T wave changes. ST segment elevation was found in total of 3 patients (2%) out of 150, including 2 patients in ischemic group and 1 patients in hemorrhagic group.

While ST segment depression was found in total of 17 patients (11.33%) out of 150, including 12 patients in ischemic group and 5 patients in hemorrhagic group. While T wave inversion was found in total of 50 patients (33.33%) out of 150, including 34 patients in ischemic group and 16 patients in hemorrhagic group.

CONCLUSION

Abnormal T wave, prolong QTc interval and arrhythmia were the common ECG findings in patients of acute ischemic stroke.

The study underlies the importance of cardiac abnormalities in patients of acute ischemic stroke which would help in early recognition of the same and in-turn better treatment of patients which helps in decreasing mortality and morbidity of these patients.

REFERENCES

[1] Smith WS, English JD and Johnston SC. In: Longo DL, Fauci AS, Kasper DL, Hauser, Jameson JL, Loscalzo J, editors. Harrrison`s principles of internal medicine. 19th ed. New York: McGraw-Hill. 2011; 370: 3270.

[2] Ince B, Celik Y, Bingol H, Harmanci H, Denktas H. Electrocardiographic findings and prognosis inischemic stroke. Cerrahpasa J Med. 1998;29:70-4.

[3] Fentz V, Gormsen J. Electrocardiograph patterns in patients with acute cerebrovascular accidents. Circulation. 1962;25:22-8.

[4] Oppenheimer SM, Hachinski V. The cardiac consequences of stroke. Neurol Din. 1992;10:167-76.

[5] Melville KI, Blum B, Shistr HE. Cardiac ischemic changes and arrhythmias induced by hypothalamic stimulation. Am J Cardiol. 1963;12:78.
[6] Anand K, Chowdhury D, Singh KB, Pandav CS, Kapoor SK. Estimation of mortality and morbidity due to stroke in India. Neuroepidemiology. 2001;20:208-11.
[7] Cropp D, Manning GW. Electrocardiographic changes simulating myocardial ischemia and infarction associated with spontaneous intracerebral hemorrhage. Circulation. 1980;12:25.
[8] Venkatesan S, Rare skills in medicine: Diagnosing stroke with the help of electrocardiogram. Editor Venkatesan S. 2010;11:28.
[9] Siddique MR, Islam QT, Haque MA et al. Dyselectrolytaemia in Acute Stroke
[10] Patient, An Observational Study, Bangladesh J Medicine 2011; 22: 30-34
[11] Goldstein DS. The electrocardiogram in stroke: Relationship to pathophysiological type and comparison with prior tracings. Stroke. 1979;10:2539.
[12] Akbar MA, Awan MM, Haider SA, Choudhry GM. Stroke; electocardiographic changes, Professional Med J Mar. 2008;15(1):91-5.
[13] Stober T. Cardiac arrhythmias in subarachnoid hemorrhage. Acta Neurochir. 1998;93:37-44.
[14] Bozluoclay M, Ince B, Celik Y, Harmanci H, Llerigelen B, Pelin Z. Electrocrdiographic findings and prognosis inischemic stroke. Neurol Ind. 2003;51:500-2.
[15] Arruda WO. Electrocardiographic findings in acute cerebrovascular hemorrhage. Arq Neuro-psiquiat (sao paulo). 1992;50(3):269-74.