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A STUDY OF THE ELECTROCARDIOGRAPHIC CHANGES IN THE PATIENTS OF ACUTE STROKE IN A TERTIARY CARE HOSPITAL

General Medicine

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ABSTRACT

Stoke is the major cause of mortality worldwide. The interrelationship of cerebrovascular disease and cardiovascular disease has been repeatedly emphasised and the decompensation in one system can adversely affect the other. The possibility of stroke could result in cardiac rhythm disturbances or structural damage and may be associated with abnormal Electrocardiographic Changes (ECG) even in patients without any cardiovascular disease.

AIM: To study ECG changes in patients of acute stroke.

MATERIAL AND METHODS: Radiologically confirmed 50 cases of acute stroke who were hospitalized within 24 hours, were included in the study. It is a prospective observational study. 12 lead ECG was done at time of admission and changes were recorded. Results were compiled and statistical analysis was done.

RESULTS: Majority of cases were having ischaemic stroke. No ECG abnormalities were found in 16% cases. The most common ECG changes observed was T wave inversion seen in 34% cases. Other changes observed were ST segment changes in 20%, QTc prolongation in 20% cases and Atrial Fibrillation in 4% cases.

CONCLUSION: The study confirms the role of ECG in workup of acute stroke patients. Electrocardiographic changes are very common in cases of stroke, even in those having no history of coronary artery disease.

KEYWORDS

Stroke, Electrocardiography (ECG), Ischemic stroke and Hemorrhagic stroke.

INTRODUCTION

The WHO defines stroke or cerebrovascular accidents as neurological deficit of cerebrovascular cause that persists beyond 24 hours or is interrupted by death within 24 hours[1]. Stroke is classified as: ischemic stroke and hemorrhagic stroke[2]. It is one of the leading causes of mortality worldwide. Many studies have shown close relationship between stroke and cardiovascular disease. Physicians have known for many decades that primary cardiac disorders can lead to stroke, but realization that stroke may produce cardiac abnormalities is more recent[3].

A spectrum of cardiovascular events such as cardiac arrest, arrhythmias and severe hypotension are seen in stroke patients who may not have any pre-existing cardiac disease[4,5]. Stroke patients with abnormal ECG represent a common diagnostic challenge to the clinicians. These abnormalities in ECG can be due to pre-existing cardiac disease or can be because of stroke itself[6]. These changes in ECG may lead to misinterpretation and delay in management of stroke. Patients with stroke have increased incidence of ECG abnormalities consisting of ST elevation, ST depression, inverted T wave and QT prolongation[7]. The mechanism postulated for ECG changes are sustained sympathetic stimulation, direct damage to cardiac innervations or imbalance between left and right sympathetic outflows to the heart or asymptomatic undetectable primary heart disease[8]. Over activation of beta adrenergic receptors by catecholamine excess can lead to tonic opening of calcium channels and defect in repolarization and ECG abnormalities[9].

AIM AND OBJECTIVE

To study ECG changes in patients of acute stroke.

MATERIALS AND METHOD

A prospective observational study was conducted at tertiary care hospital SRMS-Institute of Medical Sciences Hospital, Bareilly in Rohilkhand region to see ECG changes in patients of acute stroke.

50 patients of acute stroke confirmed by CT/MRI admitted were included in the study. Detailed history and clinical examination was carried out and necessary biochemical investigations were done. A 12 lead ECG was done at the time of admission.

Inclusion Criteria:

a) Cases with cerebrovascular accidents within 24 hours.
b) Individuals without any primary cardiac diseases.
c) Cases with no hepatic or renal disorders that will induce circulatory, metabolic and electrolyte imbalances.
d) Age and sex - Individuals with age > 18 years and both male and female sex.

Exclusion Criteria:

a) Cases of head injury.
b) Cases that come 24 hours after stroke.
c) Patients with pre-existing cardiac diseases.
d) Patients with hepatic or renal disorders which are known to induce circulatory, metabolic and electrolyte imbalances.

RESULTS

Table no. 1: Distribution of age in stroke patients

Age (Years)	Frequency (n=50)	Percentage
≤30	1	2.0
31 – 40	5	10.0
41 – 50	7	14.0
51 – 60	14	28.0
≥60	23	46.0
Mean±SD	59.94±13.8	

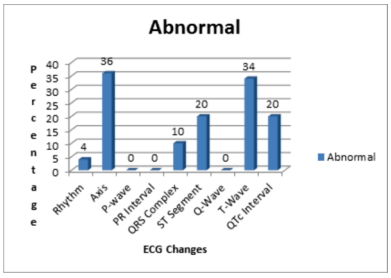
Table 1 shows age distribution of patients. Maximum were in the age group of greater than 60 years (46.0%), followed by 51-60 years (28%). Overall **Mean age** of patients was **59.9** years.

Table No. 2: ECG changes in stroke patients

ECG changes	Total (n=50)		Ischemic Stroke (n=42)		Hemorrhage Stroke (n=8)	
	Normal	Abnormal	Normal	Abnormal	Normal	Abnormal
Rhythm	48 (96)	2 (4)	40 (95.2)	2 (4.8)	8 (100.0)	0 (0.0)
Axis	32 (64)	18 (36)	29 (69.0)	13 (31.0)	3 (37.5)	5 (72.5)
P-wave	50 (100)	0	42 (100)	0	8 (100)	0
PR Interval	50 (100)	0	42 (100)	0	8 (100)	0
QRS Complex	45 (90)	5 (10)	38 (90.5)	4 (9.5)	7 (87.5)	1 (12.5)
ST Segment	40 (80)	10 (20)	34 (81.0)	8 (19.0)	6 (75.0)	2 (25.0)
Q-Wave	50 (100)	0	42 (100.0)	0 (0.0)	8 (100.0)	0 (0.0)
T-Wave	33 (66)	17 (34)	28 (66.7)	14 (33.3)	5 (62.5)	3 (37.5)

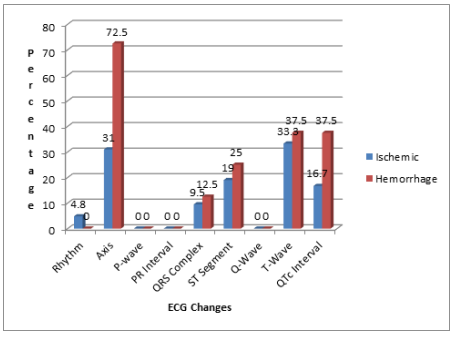
QTc Interval	40 (80)	10 (20)	35 (83.3)	7 (16.7)	5 (62.5)	3 (37.5)

Figure No. 1: ECG changes in stroke patients



ECG abnormalities were seen in 84% patients of stroke. Various electrocardiographic changes seen are shown in Table no. 2 and Figure no. 1. It was observed that out of 50 patients of stroke, 2 patients of ischemic stroke had irregularly irregular rhythm on ECG which is suggestive of atrial fibrillation. Left axis deviation was seen in 19% of ischemic stroke and 50% of hemorrhagic stroke patients. Right axis deviation was seen in 11% of ischemic stroke and 12.5% of hemorrhagic stroke. ST Segment abnormalities amongst the ischemic stroke patients was 11.9% (ST elevation) and 7.1% (ST depression), where amongst hemorrhagic stroke patients 12.5% had ST elevation and ST depression each. T-wave inversion was seen in 33.3% patients of ischemic stroke and in 37.5% patients of hemorrhagic stroke. QTc interval prolongation was found in 16.7% of ischemic and 37.5% of hemorrhagic stroke patients.

Figure No. 2: ECG changes in ischemic and hemorrhagic stroke



DISCUSSION

The ECG changes seen in patients of stroke are summarized in Table No. 3. Prolonged QTc was seen in 27.3% of cases in **Kamal kumar jain et al**[10] while in our study it is 20%. T-wave inversion was seen in 30% by **Nivedita R et al**[7] while in our study it is 34%. ST-segment changes were seen in 21.8% by **Kamal kumar jain et al**[10] while in the present study it was 20%. In 2 cases AF was detected.

Table No. 3: COMPARISION OF

ECG Findings	Present study	Manjunath et al[11]	Nivedita Ret al[17]	Kamal kumar jain et al[60]
Prolonged QTc	20.0%	41%	-	27.3%
T wave Inversion	34.0%	30%	30%	40%
ST segment Changes	20.0%	39%	38%	21.8%
AF	4%	-	-	-

CONCLUSION

The study confirms the role of electrocardiography as a part of routine investigation in patients of acute stroke. ECG changes are very common in patients of acute stroke, even in those having no history of cardiovascular disease. Interpretation of these ECG changes can aid the treatment and prevent unnecessary delay in proper assessment and operative management of stroke patients.

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