DOI: https://doi.org/10.53350/pjmhs22165923

ORIGINAL ARTICLE

QTC Prolongation in Patients of Haemorrhagic Stroke

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ABSTRACT

Objective: To evaluatethe frequency of QTC Prolongation among the patients of haemorrhagic stroke

Methodology: A total of 120 cases of hemorrhagic stroke between 20-70 years of age of either gender presenting first time were enrolled from Rehmat-u-lil Alameen Institute of Cardiology, Lahore during the year May,2021 to April 2022. QT interval is a good non-invasive diagnostic indicator of ventricular repolarization and myocardial homogeneity. Low Glasgow coma scale (GCS), brain stem involvement, and a prolonged QTc interval are all poor prognostic indicators of hemorrhagic stroke.

Results: In our study, 20-50 years aged patients were recorded in 31.67%(n=38) and 68.33%(n=82) were between 51-70 years of age. Male gender were 61.67%(n=74) and 38.3%(n=46) were females.QTC prolongation was recorded in 34.17%(n=41) whereas 65.83%(n=79) had no QTC prolongation.

Conclusion: It is concluded by the results that frequency of QTc prolongation was higher in hemorrhagic strokecases, however, it is required that every stroke patient should be evaluated for cardiac examination so that early detection may reduce cardiac morbidities

Keywords: Hemorrhagic stroke, ECG, QTC Interval

INTRODUCTION

Globally, each year more than 15million people suffer with stroke. WHO confirms that stroke is the second most common cause of death following coronary artery disease.[1]Unlike Western countries; its rate is inclining in South Asian population. In Pakistan, no large scale data is available showing the exact frequency of this disease. According to an estimation 250/100,000 new cases are present every year.[2]

The risk of stroke in adult population (>25 years) is around 25%.[3] Central Europe, East Asia and Eastern Europe are found with the highest risk of this morbidity. Globally, it's the 2nd commonest cause of mortality and 3rd cause of disability.[4]Males are more prone to stroke than a female at younger age, however, not in older age.[5]

The commonest cause of mortality in stroke cases is cardiac. The documented rate of new onset cardiac arrhythmias in hemorrhagic and ischemic stroke without any history of cardiac disease is 25-40%.[6]In the modulation of cardiac activity and vasomotor tones, the central nervous system (CNS) plays a significant role. Autonomic systems, such as the cardiovascular system (CVS), are commonly disrupted by CNS disorders. Loss of heart rate variability and other electrocardiogram (ECG) alterations are symptoms of this form of autonomic dysfunction. [7] During acute stroke, 38–71 percent of individuals have a QTc interval that is longer than normal. [8]

Because it is intimately connected to the ventricular action potential, the QT interval is a good non-invasive diagnostic of ventricular repolarization and myocardial homogeneity. The QTc interval has been associated to an increased risk of arrhythmias and mortality in patients with long QT syndrome, cardiomyopathy, and chronic heart failure. [10] Low Glasgow coma scale (GCS), brain stem involvement, and a prolonged QTc interval are all poor prognostic indicators of hemorrhagic stroke. The QTc interval was extended in 50.5 percent of patients in lead III and 49.47 percent of patients in lead VI in a prior study of 95 patients with acute hemorrhagic stroke.[11]

METHODOLOGY

A total of 120 cases of hemorrhagic stroke between 20-70 years of age of either gender presenting first time were enrolled.Whereas those having transient ischemic attack, infarctive stroke, having any history of ischemic heart diseaseand abnormal serum calcium or potassium concentration were excluded from the study. After taking complete history and neurological examination, baseline investigations like electrolytes were done. At the time of admission to the hospital, a competent ECG technician recorded 12 leads ECGs at a speed of 25 mm/s and amplitude of 10 mm/mV under the supervision of the primary investigator. The QT interval in limb lead II and chest lead V6 was calculated from the commencement of QRS deflection to the end of the T wave, the point of T wave return to the isoelectrical line, or the nadir between T and U waves. The QT interval was manually measured in milliseconds (ms). Three successive QT intervals were measured in lead II& V6 and the mean was accepted as the measurement for that lead. Using Bazzett'sQTc handbook, this QT interval was adjusted (QTc) for heart rate. All of the data was entered and analyzed using SPSS 22 version.

RESULTS

In our study, QTC prolongation was recorded in 34.17%(n=41) whereas 65.83%(n=79) had no QTc prolongations. (Table No. 1)The QTC prolongation in hemorrhagic stroke according to age, gender and BMI is explained in Table 2.

Table 1: Frequency ofQtc prolongation in patients with hemorrhagic stroke (n=120)

QTC prolongation	No. of patients	%
Yes	41	34.17
No	79	65.83
Total	120	100

Table 2: QTc Prolongation InHaemorrhagic stroke according to age, gender and BMI

Variables		QTC prolongation		P value
		Yes	No	
Age(in years)	20-50	17	21	0.09
	51-70	24	58	
Gender	Male	27	47	0.49
	Female	14	32	
BMI	Upto 30	16	32	0.88
	>30	25	47	

DISCUSSION

The cardiologists and neurologists are continuously engaged in coordination for the care of various conditions in stroke cases. ECG changes in stroke cases are observed like repolarization, especially, aQTC prolongation in as many as90% of stroke patients.

In this study, mean age 63±8 years, similar to an Iraqi study in 2014 by Al-Asadi and Habib[11]documented 63.8±12.3 years as the mean age. These findings are supported by someother developing Asian countries.[12-13]In our study male outnumbered females and these findings are supported by Dalal PM and others in 2005-06.[14]

Consistent with Sidhartha et al,[15] hypertension was mainly responsible for stroke occurrence. In our study, 34.17 percent (n=41) of patients with haemorrhagic stroke had QTC prolongation; our findings are similar to those of a recent study that included 95 patients with acute haemorrhagic stroke. In 50.5 percent of patients in lead III and 49.47 percent of patients in lead VI, the QTc interval was prolonged.[16] In around 15% of the patients, the QT interval was longer than 370.16+1.78 ms. SAH patients were found to have abnormally long QT intervals. ECG anomalies are common following aneurysmal subarachnoid haemorrhage, according to a study conducted in the Netherlands by van den Bergh et al (SAH).[17]

Usually, ECG related abnormalities go away in a day or two with no alterations to the patient's neurological or cardiac health.[18]They are regarded as indicators of SAH severity but not predictors of cardiac problems or clinical outcomes.[19]

Patients with subarachnoid haemorrhage had a longer QTC in 34% of cases, according to Sakr and colleagues.[20] Another study indicated that 61% of patients admitted to the hospital with burst aneurysms had a prolonged QTc within 72 hours of admission.[21]

Patients with supra-tentorial intracerebral haemorrhage were found to have ECG abnormalities in 64% of cases, whereas 8% had a QTc interval that was longer than normal.[22] Patients with acute hemorrhagic stroke studied by Akbar et al. had a QTc interval lengthening in lead III or lead VI in 63.4 percent or 68% or 69% of the patients.[23]

Preexisting coronary disease is the most likely explanation for QTc interval prolongation seen in acute stroke (ischemic and hemorrhagic), according to Khechinashvili and Asplund.[24] The longer the QTc interval, the greater the risk of ischemic stroke, regardless of other known risk factors, according to Soliman and colleagues.[25] Maebuchi and collaborators documented that QTc interval prolongation has been associated to the development of cardiovascular disease in the general population.[26]

Finally, in our study the frequency of QTc prolongation was higher in hemorrhagic strokecases, however, it is required that every stroke patient should be evaluated for cardiac examination so that early detection may reduce cardiac morbidities

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