ORIGINAL ARTICLE

Frequency of QTC Prolongation in Chronic Liver Disease

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ABSTRACT

Aim: To determine the frequency of QTc prolongation in patients with chronic liver disease at a tertiary care hospital.
Study design: Cross sectional survey.
Setting: Department of Medicine, Mayo Hospital, Lahore during six months
Results: Most of the patients were recorded between 41-60 years, 73(30.42%) between 41-50 years, 70(29.17%) between 51-60 years, 256(3.33%) between 35-40 years, and only 41(17.08%) were recorded between 61-70 years. Mean and standard deviation was calculated as 43.54±4.35, 161(67.08%) were males while 79(32.92%) were females. Frequency of QTC prolongation in patients with liver disease reveals 53(22.08%) while 187(77.92%) had no prolongation of QTC interval among patients with chronic liver disease.
Conclusion: The frequency of QTC prolongation is high among patients with chronic liver disease. So, it is recommended that every patient who present with chronic liver disease, should be sort out for QTc interval prolongation. However, it is also required that every setup should have their surveillance in order to know the frequency of the problem.
Keywords: *Liver disease, QTC prolongation, frequency*

INTRODUCTION

Chronic liver disease involves a process of progressive destruction and regeneration of the liver parenchyma leading to fibrosis, nodule formation and cirrhosis. It is the 10th leading cause of death in adults worldwide[1]. In developing countries like Pakistan the prevalence of chronic liver disease is very high[2] mostly caused by viral hepatitis B and C. Ascites, portal hypertension, esophageal varices, encephalopathy, hepatocellular carcinoma, hepatorenal and hepatopulmonary syndromes are well documented complications of chronic liver disease.

A wide spectrum of cardiovascular changes characterizes chronic liver disease, ranging from the subtle subclinical alterations of pre-ascitic stages to the hyperkinetic syndrome observed when decompensation develops[3]. A prolongation of QT interval has been shown in patients with chronic liver disease and represents the most common electrocardiographic finding in this setting.[4'5] The QT interval is the final interval of ECG waveform, which is measured from beginning of the QRS complex to the end of the T wave in the lead with longest interval and without prominent U waves. The QT interval bears an inverse relationship with heart rate and several formulas are available for correcting the QT intervals for heart rate. The most widely used algorithm is the Bazett equation, in which corrected QT (QTc) is calculated by dividing measured QT interval by square root or R-R interval in seconds. The normal length of QTc is 0.38-0.44 sec.

The QT-interval represents the length of ventricular systole, and its prolongation may provide the substrate for ventricular arrhythmias or sudden death.[6] The expected frequency of QTc prolongation in chronic liver disease in Pakistan is 19.2%.The patients of chronic liver disease with prolonged QTc interval showed higher mortality rates than those with normal QTc interval and prolongation of QTc interval relates with the severity of chronic liver disease[7,8].

The purpose of our study is to determine the frequency of QTc interval prolongation in chronic liver disease as it is associated with increased mortality rate. So regular screening of all patients of chronic liver disease for QTc interval prolongation prophylactically during their hospital stay or at presentation predicts the development of malignant arrhythmias. Early recognition of prolonged QTc interval and avoidance of factors known to prolong QTc interval, will be a novel therapeutic approach for patients of chronic liver disease. Previous local studies have been done with a small sample size (78 patients ē 15 showing QTc prolongation). We planned to conduct this study with a large sample size to get more authentic results.

MATERIALS AND METHODS

The study was carried out in Department of Medicine, Mayo Hospital, Lahore for a period of six months. Sample size of 240 cases was calculated with 95%

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confidence level, 5% margin of error and taking expected percentage of QTc prolongation as 19.2% in patients with chronic liver disease. The technique was non-probability purposive sampling. It was a Cross sectional survey. All patients with a history of chronic liver disease (as per operational definition) of 35 to 70 years of either sex were included while patients with history of ischemic heart disease (wall motion abnormalities on echocardiography), valvular heart disease (on echocardiography),chronic renal failure (Serum creatinine >1.5mg/dl) and patients taking calcium channel blockers, anti arryhthmics, cardiac glycosides, macrolides, quinolones, anti psychotics and other medicines causing QT interval prolongation, < 35 years and > 70 years of age were excluded.

Two hundred and forty diagnosed cases of chronic liver disease both from the outpatient department and medical wards of Mayo Hospital, fulfilling the inclusion and exclusion criteria were selected. The age, name and gender of the patients were noted. Informed consent was taken. A 12 leads ECG was taken. The ECG was analyzed by the researcher himself. The R-R interval and QT interval was measured. The QTc interval calculated from Bazzete's equation was labeled as prolonged (as per operational definition). A proforma was designed and used for data collection. Data was entered in computer program SPSS version 10 and analyzed. Mean±S.D. was calculated for age. Gender and QTc prolongation was presented as frequency and percentages.

RESULTS

Age distribution of the patients was done in tabulated form, where most of the patients were recorded between 41-60 years, 73(30.42%) between 41-50 years, 70(29.17%) between 51-60 years, 56(23.33%) between 35-40 years, and only 41(17.08%) were recorded between 61-70 years. Mean and standard deviation was calculated as 43.54±4.35 .Gender distribution of the patients show male participants in majority i.e. 161(67.08%) while 79(32.92%) were females. Frequency of QTc prolongation in patients with liver disease reveals 53(22.08%) while 187(77.92%) had no prolongation of QTc interval among chronic liver disease patients.

DISCUSSION

A wide spectrum of cardiovascular changes characterizes liver cirrhosis, ranging from the subtle subclinical alterations of pre-ascitic stages to the hyperkinetic syndrome observed when de-compensation develops[9,10]. A prolongation of QT interval has been shown in patients with cirrhosis[11] and represents the most common electrocardiographic findings. Accordingly, altered ventricular repolarization is considered as part of the definition of the so-called "cirrhotic cardiomyopathy"[12].

A prolonged QT interval is associated with a higher risk of sudden death and cardiac mortality in patients with inherited and acquired forms of long-QT syndrome, after myocardial infarction and even in healthy individuals[13]. A relationship between prolonged QT interval and overall mortality in subjects with liver failure has been suggested[11], although clear evidence showing a significant increase in the incidence of sudden cardiac death in this population is still lacking. Episodes of " Torsade de pointes" in patients with liver disease have been reported, but in most cases they occurred concomitantly with the administration of drugs known to induce QT interval prolongation[14].

We recorded majority of the patients between 41-60 years of age 143(59.59%), mean age was 43.54+4.35 years, male were 161(7.08%) while 79(32.92%) were females. Frequency of QTc prolongation in our study population revealed 53(22.08%).The findings of frequency of QTC prolongation are in agreement with Zuberi BF6 who compared QTc duration and Heart Rate (HR) in patients with cirrhosis with non-cirrhotic controls and reported 19.2% of the patients with QTc prolonged duration in chronic liver disease. Kosar F and colleagues investigated the relation between QTc and severity of the disease and determine its prognostic value in cirrhotic patients and recorded QT (QTc) prolongations were found in 32% of patients with cirrhosis and 5.7% of the healthy controls ($p < 0.001$)[15]. Another study by Henriksen JH, A invested the relation between electrical and mechanical systole in patients with different degrees of severity of cirrhosis and reported that prolonged QTc (above 0.440 s(1/2)) was found in 37% of the cirrhotic patients vs. 5.9% in the controls ($P=0.03$)[16]. The limitation of our study was that we did not include control group to determine the frequency of prolongation of QTC interval but the previous literature is evident that prolongation of QTC is increased in patients with cirrhosis.

However, early recognition of prolonged QTc interval and avoidance of factors known to prolong QTc interval, may be a novel therapeutic approach for patients of chronic liver disease. Moreover, the significance of the current study was its larger sample size which was not done in previous studies in Pakistan.

CONCLUSION

The frequency of QTC prolongation is high among patients with chronic liver disease. So, it is recommended that every patient who present with chronic liver disease, should be sort out for QTc interval prolongation. However, it is also required that every setup should have their surveillance in order to know the frequency of the problem.

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