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ORIGINAL RESEARCH

Incidence Of QT Prolongation Among Patients With Cirrhosis Of Liver

[1]Dr. Ishandeep Singh, [2]Dr. Tirth Pareshbhai Patel, [3]Dr. Priyanka Bharat bhai Prajapati, [4]Dr. Patel Trupal Shailesh bhai, [5]Dr. Prashant Obed reddy dundi, [6]Dr. Arleth Castillo Aguilar, [7]Dr. Viraj Shah

[1]MBBS, Dayanand Medical College and Hospital, Ludhiana, Punjab, India
[2]MO, S.S Hospital, Petlad, Anand, Gujarat, India
[3]Medical Officer, CHC Sabarkantha, Gujarat, India
[4]Medical Officer, CHC Sankheda, Gujarat, India
[5]MBBS, Karnataka Institute of Medical Sciences, Karnataka, India
[6]Medical Facultad de Medicina, Universidad Autonoma del Estado de Morelos Mexico
[7]Final year MBBS, Seth GS Medical College, Mumbai, India

Corresponding author
Dr. Ishandeep Singh
MBBS, Dayanand Medical College and Hospital, Ludhiana, Punjab, India
Email: Ishandeep.singh@ymail.com

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ABSTRACT

Background: To assess the incidence of QT prolongation among patients with cirrhosis of the liver.

Materials & methods: A total of 100 patients with cirrhosis of the liver were enrolled. Complete demographic details of all the patients were obtained. Blood samples were obtained, and the serum renal profile was evaluated. The categorization of patients with the cirrhosis of liver was done according to the Child-Pugh score (CPS) into Grade A, Grade B and Grade C. ECHO and ECG were done on all the patients. Relevant findings were recorded. Incidence of QT prolongation was recorded and correlated with the severity of the cirrhosis of the liver.

Results: The mean age of the patients was 45.3 years. QT prolongation was seen in 43 percent of the patients. Significant findings were obtained when examining the relationship between QT prolongation and the severity grading of liver cirrhosis.

Conclusion: The cardiac profile significantly deteriorates in patients with cirrhosis of the liver.

Keywords: Cirrhosis, Liver, QT prolongation.

INTRODUCTION

Cirrhosis represents a late stage of progressive hepatic fibrosis, characterized by distortion of the hepatic architecture and the formation of regenerative nodules, and occurs as a result of chronic injury to the liver parenchyma by a etiological factors such as alcohol and chronic viral hepatitis B/C. In addition to its manifestations of portal hypertension and hepatocyte dysfunction, cirrhosis may have multisystem manifestations, including involvement of major organs such as the kidneys, central nervous system, and cardiovascular system.

Cardiovascular and circulatory alterations are frequently observed in the late stages of cirrhosis. [1-3]

Cirrhosis can affect many organs and systems of the body, including the cardiovascular and autonomic nervous systems (ANS). Among the cardiovascular manifestations often encountered in cirrhotic patients, the most common are increased baseline cardiac output, attenuated systolic and diastolic function, blunted ventricular response to stimuli, and electrophysiological abnormalities, comprising a group of phenomena, commonly referred to as "cirrhotic cardiomyopathy.".[4-6] Due to the close interrelationship between the two systems, abnormal cardiovascular and ANS function in cirrhotic patients has been shown to be reflected in several cardiac- and vascular-related parameters such as QT interval prolongation, heart rate variability (HRV), and arterial pressure changes, all components of the so-called cardiac autonomic neuropathy (CAN). [7-9] A prolonged QT interval leads to malignant ventricular tachy arrhythmias. This has a high impact on the patient's activity, work, quality of life, life expectancy, and the economic burden it constitutes. Several studies have shown that cirrhosis is associated with a prolonged QT interval. [10] Hence; the present study was conducted to evaluate the incidence of QT prolongation among patients with cirrhosis of the liver.

MATERIALS & METHODS

The present study was conducted to evaluate the incidence of QT prolongation among patients with cirrhosis of the liver. A total of 100 patients with cirrhosis of the liver were enrolled. Complete demographic details of all the patients were obtained. Blood samples were obtained, and the serum renal profile was evaluated. The categorization of patients with cirrhosis of the liver was done according to the Child-Pugh score (CPS) into Grade A, Grade B, and Grade C. ECHO and ECG were done on all the patients. Relevant findings were recorded. The incidence of QT prolongation was recorded and correlated with the severity of cirrhosis of the liver. All the results were recorded and analyzed using SPSS software.

RESULTS

Out of 100 patients with cirrhosis of the liver, 64 percent were male and 36 percent were female. According to CPS, 39 percent, 42 percent and 19 percent of the patients were of Grade A, grade B and grade C respectively. The mean age of the patients was 45.3 years. QT prolongation was seen in 43 percent of the patients. Significant results were obtained while assessing the correlation of QT prolongation with severity grading of cirrhosis of liver.

Table 1: Demographic and clinical details

Variable		Number	Percentage
Mean age (years)		45.3 years	
Gender	Males	64	64
	Females	36	36
Child Pugh Score grading	Grade A	39	39
	Grade B	42	42
	Grade C	19	19

Table 2: Incidence of QT prolongation

QT prolongation	Number	Percentage
Present	43	43
Absent	57	57
Total	100	100

Table 3: Correlation of QT prolongation with severity of cirrhosis of liver

Child Pugh score grading	QT prolongation		
	present	Absent	Total
Grade A	10	29	39
Grade B	21	21	42
Grade C	12	7	19
Total	43	57	100
p- value	0.0000 (Significant)		

DISCUSSION

Cirrhosis is the final stage of progressive fibrosis of the liver, which can also affect other organs such as the lungs, kidneys, and heart simultaneously through poorly understood interactions. The prevalence of electrocardiographic QT interval prolongation in patients with cirrhosis ranges between 30% and 70%. In fact, the seminal paper by Kowalski and Abelmann that launched the modern era of cardio-hepatology in 1953 already reported a prolonged QT interval in eight of the 22 subjects. Bernardi et al. performed a detailed study of QT prolongation in cirrhosis and found a significant correlation between the rate-corrected QT (QTc) interval and the Child-Pugh score, and that QTc prolongation may be associated with poor outcomes, including mortality. [11, 12]

Out of 100 patients with cirrhosis of the liver, 64 percent were male and 36 percent were female. According to CPS, 39 percent, 42 percent and 19 percent of the patients were of Grade A, grade B and grade C respectively. The mean age of the patients was 45.3 years. QT prolongation was seen in 43 percent of the patients. Bernardi M et al. conducted a similar study in which they assessed the prevalence of prolonged Q-T interval in a large population of unselected cirrhotic patients and the relationship between abnormal Q-T, etiology, severity of liver disease, and patient mortality. Ninety-four patients with cirrhosis without overt heart disease and 37 control subjects with mild chronic active hepatitis were enrolled. The rate-corrected Q-T interval (Q-Tc) was assessed along with routine liver tests, the Child-Pugh score, serum bile salts, electrolytes, and creatinine, plasma renin activity, aldosterone, norepinephrine, atrial natriuretic factor, and, gonadal hormones. Q-Tc was longer in patients with cirrhosis than in controls and prolonged in 44 patients (46.8%) and 2 controls. Q-Tc length was not influenced by the etiology of cirrhosis and correlated with the Child-Pugh score, liver tests such as prothrombin activity, serum concentrations of albumin and bilirubin, plasma bile salts, and plasma norepinephrine. [12]

Significant results were obtained while assessing the correlation of QT prolongation with severity grading of cirrhosis of liver. In a previous study, Kosar F. et al. investigated the relationship between QTd and disease severity and determined its prognostic value in cirrhotic patients. Thirty-three consecutive patients with cirrhosis and 35 sex- and age-matched healthy subjects were studied. QT intervals and QT dispersions were measured on admission, and all intervals were corrected for heart rate according to Bazett's formula. The Child-Pugh classification is used to assess liver function in cirrhosis. Corrected QT (QTc) prolongations were found in 32% of patients with cirrhosis and 5.7% of the healthy controls ($p < 0.001$). The prevalence of increased (>70 ms) corrected QT dispersion (QTcd) was 45% in patients with cirrhosis. According to Child-Pugh criteria, QTd, the maximum QT interval (QTmax), corrected QTmax (QTcmax), and QTcd in class C were significantly higher than those of class A and B. [13] In a Romanian study to look for factors associated with a prolonged QT interval in liver cirrhosis patients, Mozos et al. showed that liver disease severity measured by the Child-Pugh score, alcoholic aetiology, and serum uric acid level were

significant factors associated with QTc prolongation. Josefsson et al. conducted a retrospective analysis to study the prevalence and predictors of ECG changes in patients with cirrhosis undergoing liver transplantation and to define the risk of post-transplant cardiac events. The severity of cirrhosis, aetiology, older age, and presence of systemic hypertension were associated with the presence of ECG abnormalities. They also suggested a significant relationship between a prolonged QTc interval and post-transplant cardiac events. [14, 15]

CONCLUSION

Cirrhotic liver patients have a significantly worse cardiac profile.

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