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# E.C.G. AND 2D ECHO CHANGES IN CHRONIC ALCOHOLICS

General Medicine

**Dr. Prashant Bhokate*** Junior Resident, Department Of General Medicine, Dr.vaishampayan Memorial Government Medical College, Shri Chhatrapati Shivaji Maharaj General Hospital, Solapur, Maharashtra, India *Corresponding Author

**Dr. Mallikarjun Jamadar** Associate Professor, Department Of General Medicine, Dr.vaishampayan Memorial Government Medical College, Shri Chhatrapati Shivaji Maharaj General Hospital, Solapur, Maharashtra, India

## ABSTRACT

Alcohol is most commonly abused drug worldwide. It has been shown to produce toxic effects in almost every organ system in the body [1]. Excessive consumption has long been associated with cardiovascular disorders, including cardiomyopathy, hypertension, coronary artery disease, and stroke [2]. This study was designed to precisely evaluate the cardiovascular system in a group of patients with chronic liver disease cirrhosis based on clinical examination, electrocardiography, and 2-dimensional echocardiography. Materials and Methods: 50 Patients of chronic alcoholic liver disease who were admitted in Dr. Vaishampayan Memorial Govt. Medical College and SCSM General Hospital, Solapur were selected for the study. It was a prospective study design subjects in age group 20-40, having history of chronic alcoholism as defined, for more than 5 years were evaluated by electrocardiography and echocardiography. Patients with known diabetics, hypertensive and cardiovascular disorders were excluded from the study group. Results: The prevalence of cardiovascular abnormalities in patients of chronic alcoholism is 32% in our study. Most common ECG changes are low voltage complexes (24%) and sinus tachycardia (18%) followed by prolonged QTc interval (14%). Most common 2D ECHO changes was global hypokinesia & Dilated chambers (32%), reduced ejection fraction (12%) and severe PAH (4%). The prevalence of cardio vascular abnormalities are more with increased duration of alcohol consumption and also high in advanced age group. Conclusions: This study confirms that many electrocardiographic as well as echocardiographic changes occur prior to symptomatic cardiac disorders established to be caused by chronic alcohol intake such as alcoholic cardiomyopathy, which probably are early indicators of ongoing effects of alcohol and are reversible during the early stages detected by non-invasive investigations like Electrocardiography and Echocardiography that later proceeds to alcoholic dilated cardiomyopathy.

## KEYWORDS

Chronic alcoholism, alcoholic cardiomyopathy, 2d echo.

## INTRODUCTION

Alcohol is most commonly abused drug worldwide. It has been shown to produce toxic effects in almost every organ system in the body. Alcohol is consumed at some time by up to 80% of the population. Approximately 20% of patients have alcoholism. Acutely, alcohol decreases myocardial contractility and causes peripheral vasodilatation, with a resulting mild decrease in blood pressure and a compensatory increase in cardiac output. These acute effects have little clinical significance for the average healthy drinker but can be problematic when persisting cardiac disease is present. The main problem with chronic alcoholism is that many of its effects on body systems are usually irreversible. Chronic alcoholism is often complicated by dilated cardiomyopathy. The pathogenesis of cardiomyopathy has been related to the total lifetime dose of alcohol. This dose-response relationship suggests a toxic effect of alcohol on cardiac myocardium. Chronic heavy drinkers carry an increased risk for cardiomyopathy through direct effects of alcohol on heart muscle. Symptoms of which include unexplained arrhythmias, left ventricular impairment, heart failure, hypocontractility of heart muscle, and dilation of all four heart chambers with associated mural thrombi and mitral valve regurgitation [1].

The prevalence of alcoholic cardiomyopathy remains unknown at present. Features include structural, histological, electrophysiological, systolic and diastolic dysfunction. Diastolic dysfunction is present in the vast majority of patients with alcoholic cardiomyopathy, and can be detected by echocardiography. Therefore is the best available screening test for diagnosing cardiac dysfunction [3]. Alcoholic heart disease is reversible condition during the early stages detected by non-invasive investigations like electrocardiography and echocardiography.

## MATERIAL AND METHODS

This study was carried out in 50 patients of chronic alcoholic liver disease in the age group of 21-40 years with daily alcohol intake of > 80 g/day for > 5 years. Patients with known history of diabetes, hypertension and coronary heart diseases were not included in the study. All subject history was taken including duration of alcoholism. Selected subjects underwent clinical examination. CBC, LFT, RFT and other routine investigations were done for study participants to rule out any other underlying diseases which could have an impact on the results of the study. Based on history of alcohol consumption study participants were divided into three groups one with duration 5-10 years (48%), one with 11-15 years (40%) and 16-20 years (12%).

Electrocardiographic and Echocardiographic was done. ECG changes like low voltage complexes, sinus tachycardia, QTc prolongation, arrhythmias, nonspecific ST-T changes, RBBB, etc were noted in all patients. Cardiac abnormalities on 2 D Echo like global hypokinesia, left ventricular diastolic dysfunction and severe pulmonary hypertension were also studied. The results obtained were evaluated.

## OBSERVATION AND RESULTS

The study group included 50 patients. There were 42 (84%) male and 8 (16%) female patients. The ratio of male to female is 5.25:1. 14 (28%) were aged between 21-30 years and 36 (72%) were aged 31-40 years (Table 1). Among the total number of study participants 48% had 5-10 years. 40% had 11-15 years and 12% had 16-20 years history of alcohol consumption (Table 2).

Table 1. Age & Sex distribution

| SEX | 21-30 years | 31-40 years | Total |
|---|---|---|---|
| Male | 14 | 28 | 42 |
| Female | - | 8 | 8 |
| Total | 14 | 36 | 50 |

Table 2: Duration of alcohol consumption

| Duration of alcohol consumption in years | Number of cases | Percentage (%) |
|---|---|---|
| 5-10 years | 24 | 48 |
| 11-15 years | 20 | 40 |
| 16-20 years | 6 | 12 |

Varied ECG changes were seen in study subjects, majority being low voltage complexes of about 24% and sinus tachycardia of about 18% followed by prolonged QTc interval of about 14% (Table 3).

Most common ECG changes in patients who consumed alcohol for 5-10 years was sinus tachycardia (16.67%) and QTc prolongation (16.67%) while those who consumed alcohol for 11-15 years or more than 15 years was low voltage complexes followed by sinus tachycardia.

Other ECG changes seen were arrhythmias, nonspecific ST-T changes and RBBB. QTc Interval prolongation was observed in 14% of patients

with 12.5% patients with alcohol consumption for 5-10yrs, 15% patients with alcohol consumption for 11-15 years and 16.67% patients with alcohol consumption for >15 years (Table 4).

Table 3. ECG findings in study group

| ECG findings | Number of Patients | Percentage of Patients (%) |
|---|---|---|
| Low voltage complexes | 12 | 24% |
| Sinus Tachycardia | 9 | 18% |
| Prolonged QTc Interval | 7 | 14% |
| Nonspecific ST T changes | 4 | 8% |
| RBBB | 2 | 4% |
| Atrial Fibrillation | 1 | 2% |
| Atrial Premature Contractions | 1 | 2% |
| Ventricular Premature Contractions | 1 | 2% |
| Atrioventricular Blocks | 0 | 0% |
| Total | 37 | 74% |

Table 4. ECG changes in relation to duration of alcohol consumption in study group

| ECG findings | Duration of alcohol consumption 5-10 years (N=24) | Duration of alcohol consumption 11-15 years (N=20) | Duration of alcohol consumption 16-20 years (N=6) |
|---|---|---|---|
| Low voltage complexes | 0 | 6 (30%) | 6 (100%) |
| Sinus Tachycardia | 4 (16.67%) | 3 (15%) | 2 (33.33%) |
| Prolonged QTc Interval | 3 (12.5%) | 3 (15%) | 1 (16.67%) |
| Nonspecific ST T changes | 0 | 3 (15%) | 1 (16.67%) |
| RBBB | 0 | 1 (5%) | 1 (16.67%) |
| Atrial Fibrillation | 0 | 1 (5%) | 0 |
| Atrial Premature Contractions | 0 | 1 (5%) | 0 |
| Ventricular Premature Contractions | 1 (4.16%) | 0 | 0 |
| Atrioventricular Blocks | 0 | 0 | 0 |
| Total | 8 (33.33%) | 18 (90%) | 11 (183.33%) |

In this study majority 68% had normal study on 2D ECHO, 32% had global hypokinesia & Dilated chambers, 12% had ejection fraction<40% and 4% had severe PAH (Table 5).

The most common 2D ECHO changes in patients who consumed alcohol for 5-10 years was increased posterior wall thickness, for 11-15 years was and for 16-20 years was (Table 6)

Table 5. Frequency table of Echocardiography findings

| ECHO changes | Number of Patients | Percentage of Patients (%) |
|---|---|---|
| Global hypokinesia & Dilated chambers | 16 | 32% |
| Decreased EF <40% | 6 | 12% |
| Pericardial effusion | 6 | 12% |
| LV dysfunction | 6 | 12% |
| Severe PAH | 2 | 4% |

Table 6. ECHO changes in relation to duration of alcohol consumption in study group

| ECHO changes | Duration of alcohol consumption 5-10 years (N=24) | Duration of alcohol consumption 11-15 years (N=20) | Duration of alcohol consumption 16-20 years (N=6) |
|---|---|---|---|
| Global hypokinesia & Dilated chambers | 0 | 10 (50%) | 6 (100%) |
| Decreased EF <40% | 0 | 2 (10%) | 6 (100%) |
| Pericardial effusion | 0 | 2 (10%) | 4 (66.67%) |
| LV dysfunction | 0 | 2 (10%) | 2 (33.33%) |
| Severe PAH | 0 | 1 (5%) | 1 (16.67%) |
| Total | 0 | 17 (85%) | 19 (316.67%) |

## DISCUSSION

The functioning of the liver and the heart interact mutually. Often liver induced cardiac disease goes underdiagnosed due to its complex pathophysiology. We found that there is a significant coexistence between the functioning of the liver and heart, a liver disease affecting the heart, and vice versa [4]. Excessive and chronic alcohol consumption is one of the main reasons of lifestyle diseases. The heart is the most affected organ in the patient with chronic alcoholism, alcohol being main etiology of a myocardial dysfunction called clinically as alcoholic cardiomyopathy. Clinically, alcoholic cardiomyopathy leads to increased ventricular dilation, ventricular dysfunction and ventricular wall thinning.

This condition has a bad prognosis, diagnosed by the presence of heart failure, arrhythmias and stroke. The etiopathogenesis of alcoholic cardiomyopathy is not know well yet, but variable and mostly involving the generation of oxidative stress, inter-related pathologic mechanisms, myocyte apoptosis, dysfunction in fatty acids metabolism and transport and impaired mitochondrial bioenergetics. Diagnosing alcoholic cardiomyopathy includes cardiac imaging like electrocardiography and echocardiography first and second is laboratory tests [5]. Cardiac imaging is done to characterize myocardial abnormalities and laboratory tests like liver function tests and ECG abnormalities leads for detection of excess alcohol consumption leading to cardiac abnormalities [6].

The aim of the present study is to evaluate structural, functional and electrophysiological changes of heart in patients with alcoholic liver cirrhosis. Of the 50 cases included in this study, 42 (84%) were males and 8 (16%) were females. Of the 42 males, 14 had features of alcoholic cardiomyopathy. And out of 8 females, 2 had features of alcoholic cardiomyopathy ('p'=0.82). This study showed there is no significant correlation between sex and incidence of features of alcoholic cardiomyopathy. 34% of the cases were between age group of 21-30 years and 66% between 31-40 years. Majority (52%) had duration of alcohol consumption more than 10 years and 48% had less than 10 years ('p'=0.00015). Study by Attar H. D. et al. [7] showed that majority 68% had duration more than 8 years. It also showed that echocardiographic abnormalities were observed in 21.87% patients with duration of alcohol consumption between 5-8 years, 44.11% abnormalities with more than 8 years duration of alcohol consumption. Most of the ECG abnormalities were found in 31-40 years of age group. Hence increasing age with alcohol consumption produces a greater number of ECG abnormalities ('p'=0.0029). Same results are seen in our study with echocardiographic abnormalities seen in 61.5% patients with duration of alcohol consumption more than 10 years. It is, hence, implied that the presence of alcoholic cardiomyopathy is influenced by age; as the mean age increases, the duration of exposure to alcohol increases and hence the risk of alcoholic cardiomyopathy is more prevalent in older individuals.

Most common Electrocardiographic abnormality observed in patients is low voltage complexes (24%) followed by sinus tachycardia (18%) and non-specific ST-T changes (8%). In a study by Ryan and Howes [8], 20% of cases had sinus tachycardia, while another study by Mahela et al. [9] showed 25% of cases having sinus tachycardia and 17.5% showed non- specific ST-T changes. Atrial fibrillation is most common rhythm in our study, with 2% having atrial fibrillation, 2% having atrial premature contractions and another 2% having ventricular premature contractions. Right bundle branch block was observed in 4% of patients in our study. In study by Mahela et al. [9] RBBB was seen in 5% of cases and in another study by Krasniqi A et al. [10] RBBB was seen in >5% of cases. The QTc interval was prolonged in 7 cases (14%) and correlated with the severity of liver damage.

In this study majority, 32% had significant left ventricular diastolic dysfunction, 12% had ejection fraction <40% and 4% had severe pulmonary artery hypertension. 34 patients had normal study on 2D ECHO out of which 17 patients had duration of alcohol consumption less than 10 years and 17 patients had duration of alcohol consumption more than 10 years; 16 patients had significant LVDD, all with duration of alcohol consumption more than 10 years; 6 patients had ejection fraction < 40%, all had duration of alcohol consumption more than 10 years, with 4 patients having severe pulmonary artery hypertension.

Almost half of chronic alcoholic patients admitted for the treatment of alcoholic cirrhosis suffered from alcoholic cardiomyopathy. The results of this study indicate that alcoholic cardiomyopathy and cirrhosis often coexist ('p'=0.048).

The main purpose of this study is to highlight the prevalence of alcoholic cardiomyopathy in chronic alcoholics. In this study of seventy cases of chronic alcoholics, cardiomyopathy was noted in 16 patient this amount to prevalence of 32%.

## CONCLUSION

Following results were concluded from our study:

- Alcoholic Cardiomyopathy is prevalent in one-third of chronic alcoholic patients.
- About 32% of patients under study had diastolic dysfunction. These parameters form the basic tools for the diagnosis of Alcoholic Cardiomyopathy in patients with liver cirrhosis.
- Diastolic dysfunction is the most common abnormal cardiac manifestation in patients with chronic liver disease.
- The result of this study clearly shows that large number of patients with alcoholic liver cirrhosis are asymptomatic (68%) with regard to cardiovascular system and don't have evidence of cardiac involvement in electrocardiography and echocardiography.
- Electrocardiographic abnormalities include low voltage complexes and nonspecific T wave abnormalities.
- Cardiomyopathy, pericardial effusion and PAH are the Echocardiographic abnormalities detected in this study.
- Cardiac evaluation is a pre-requisite in patients with cirrhosis undergoing stress like surgery because the presence of cardiac involvement adds to the morbidity and mortality.
- Electrocardiographic changes include low voltage complexes and sinus tachycardia in majority.
- QTc prolongation is a frequent finding in patients with liver disease and is significantly correlated with the severity of liver damage.

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