

Electrocardiographic and Echocardiographic Abnormalities in Chronic Alcoholics

H.D. Attar*, A. Aboobaker, Md. Saleem, H.B. Irfan and S.D. Aman

Department of Medicine, Al Ameen Medical College and Hospital, Athani Road, Vijayapur-586108 Karnataka, India

Abstract: *Objective:* Alcohol is most commonly abused drug worldwide. It has been shown to produce toxic effects in almost every organ system in the body. Many of these medical conditions can be attributed to direct effects of alcohol whereas others are indirect sequelae that may result from nutritional deficiencies or predisposition to trauma. Alcohol consumption has been associated with a variety of cardio vascular disorders this study was thus undertaken to know the Electrocardiographic and Echocardiographic abnormalities in asymptomatic chronic alcoholic patients. *Materials and Methods:* 50 Patients attending the out-patient clinic & who were admitted in Al Ameen Medical College Hospital and District hospital, Bijapur 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 37% in our study. Most common ECG changes are sinus tachycardia (18%), and Non specific ST-T changes (9%). Most common 2D ECHO changes was increased posterior wall thickness (11%) and followed by increased interventricular septum thickness and decreased ejection fraction (<40%). 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 Alcoholics, Alcoholic Cardiomyopathy, Electrocardiography, Echocardiography

Introduction

Ethanol is most commonly abused drug worldwide. It has been shown to produce toxic effects in almost every organ system in the body. Many of these medical conditions can be attributed to direct effects of alcohol whereas others are indirect sequelae that may result from nutritional deficiencies or predisposition to trauma. Almost 30% to 40% admissions in hospitals are alcoholic related [1]. Patients with acute alcohol intoxication often present with pathological electrocardiographic (ECG) changes. The changes are more frequent and prognostically more significant in chronic alcoholics, in patients with ischaemic heart disease (IHD), in alcohol cardiomyopathy or another organic heart disease [2]. Chronic alcohol intake is known to cause cardiac dysfunction, most notably as congestive cardiomyopathy [3-7]. Approximately 20 to 30%

of patients admitted to a hospital are alcohol abusers. Cardio vascular effects of alcohol are directly proportional to alcohol consumption, age and genetic factors may also contribute. Alcohol damage to the heart is evident if alcohol consumption exceeds 90 to 100 g/d. Heavy alcohol consumption leads to increased risk for sudden cardiac death and cardiac arrhythmias. In patients with coronary heart disease, alcohol use was associated with increased mortality [8].

Prolonged alcohol consumption in the absence of evident malnutrition resulted in demonstrable intraventricular conduction abnormalities and morphologic alterations which were related to duration of ingestion, consistent with a cumulative toxic effect of ethanol [9]. The typical ECG changes in

alcoholic intoxication are disturbances of heart rate having the nature of electric impulse generation disorder or of impulse conduction pathology. In persons without clinical evidence of heart disease, they are classified as 'holiday heart syndrome' [2]. Several mechanisms are theorized to be responsible for the arrhythmogenicity of alcohol leading to cardiac dysarrhythmias [10].

The most common rhythm disorder is atrial fibrillation, which usually converts to normal sinus rhythm within 24 hours [11] less frequent but prognostically much more significant is torsades de pointes (TdP) polymorphous ventricular tachycardia. Among bradyarrhythmias, the most significant is alcohol-induced sinus bradycardia which may be manifested by recurrent syncope. The incidence of conduction disturbances increases with higher levels of blood alcohol concentration sometime even leading to sudden cardiac deaths [2].

Echocardiography changes like left ventricular mass, left ventricular dimensions, septal and left ventricular wall thicknesses, and left atrial dimension have been observed in persons with prolonged exposure to alcohol [12]. If stopped early alcoholic effects of heart can be stalled and even reversed. 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 during October 2012 to September 2014 in 100 chronic alcoholic patients 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 by medical professional. Diabetes was ruled out by history and by measuring plasma glucose levels. 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 two groups one with duration 5-8 years (32%) and >8 years (68%) and based on age 20-30 years (34%) and 31-40 years (66%).

Electrocardiographic and Echocardiographic was done. ECG changes like tachycardia, atrial fibrillation, poor 'R' wave progression, RBBB, ventricular premature contractions etc were noted in all patients. Cardiac abnormalities on 2 D Echo like increase in wall thickness, reduced ejection fraction, increase in end systolic and end diastolic diameters were also studied. The results obtained were evaluated.

Results

Table-1: Age distribution (N=100)

Age in years	No. of patients (N)	Percentage (%)
20-30	34	34
31-40	66	66

Table-2: Sex distribution (N=100)

Gender	No of patients (N)	Percentage (%)
Males	98	98
Females	2	2

The sample size was 100 in which 34% were in age group of 21-30 years and 66% in age group of 31-40 (Table 1). 98 % of study participants were males and 2 % were females (Table 2). Among the total number of study participants 32% had 5-8 years and 68 % had > 8 years history of alcohol consumption (Table 3).

Table-3: Duration of alcohol consumption (N=100)

Duration of alcohol consumption in years	Number of cases	Percentage (%)
5-8	32	32
>8	68	68
Total	100	100

Table-4: ECG changes in study group (N=100)

ECG changes	No of patients	Percent age (%)
Sinus tachycardia	18	18.00
Atrial fibrillation	1	1.00
Atrial premature contractions	1	1.00
Ventricular premature contractions	1	1.00
Nonspecific ST-T changes	9	9.00
Left ventricular hypertrophy	3	3.00
RBBB	2	2.00
Poor R wave progression	1	1.00
Total	36	36.00

Varied ECG changes were seen in study subjects, majority being sinus tachycardia of about 18% and Non specific ST-T changes of 9% (Table 4). The most common ECG changes in patients who consumed alcohol for 5-8 yrs and those who consumed alcohol for >8yrs was sinus tachycardia. Other ECG changes in patients who consumed alcohol for >8yrs were Non specific ST-T changes and Left ventricular hypertrophy (Table 5).

The most common 2D ECHO changes were increased posterior wall thickness(11%) and followed by increased interventricular septum and ejection fraction (<40%) (Table 6). The most common 2D ECHO changes in patients who consumed alcohol for >8yrs was increased posterior wall thickness. Other 2D ECHO changes in patients who consumed alcohol for>8yrs were increased interventricular septum and Ejection fraction (<40%) (Table 7).

Table-5: ECG changes in relation to duration of alcohol consumption in study group

ECG changes	Duration of alcohol 5-8yrs N=32	Percentage (%)	Duration of alcohol > 8yrs N=68	Percentage (%)
Sinus tachycardia	5	15.50	13	19.12
Atrial fibrillation	0	0	1	1.47
Atrial premature contractions	0	0	1	1.47
Ventricular premature contractions	0	0	1	1.47
Nonspecific ST-T changes	1	3.11	8	11.77
Left ventricular hypertrophy	0	0	3	4.41
RBBB	1	3.11	1	1.47
Poor R wave progression	0	0	1	1.47
Total	7	21.80	29	42.67

Echocardiographic changes	No of cases	Percentage (%)
Increased Posterior wall thickness	11	11.00
Increased Interventricular septum thickness	8	8.00
Ejection fraction (<40%)	8	8.00
Increased Left ventricular end systolic diameters	5	5.00
Increased Left ventricular end diastolic diameters	5	5.00
Total	37	37.00

Echocardiographic changes	Duration of alcohol 5-8 yrs N=32	Percentage (%)	Duration of alcohol >8 yrs N=68	Percentage (%)
Increased Posterior wall thickness	2	6.24	9	13.23
Increased Interventricular septum thickness	2	6.24	6	8.82
Ejection fraction (<40%)	1	3.12	7	10.29
Increased Left ventricular end systolic diameters	1	3.12	4	5.88
Increased Left ventricular end diastolic diameters	1	3.12	4	5.88
Total	7	21.87	30	44.11

Discussion

Alcohol is most commonly abused drug worldwide. It has been shown to produce toxic effects in almost every organ system in the body. Alcohol consumption has been associated with a variety of cardio vascular disorders. Observations during the second half of 19th century described heart failure symptoms in persons who had consumed excessive amounts of alcohol and cardiac enlargement was seen at autopsy. Alcohol use has also been shown to have numerous effects on the cardio vascular system other than heart failure. It has been associated with arrhythmia e.g.: atrial fibrillation, atrial and ventricular ectopics. It also causes hypertension and sudden death.

This study was done to know the prevalence of cardiovascular abnormalities in patients of alcoholism with varying duration and in different age groups. The mean age in present study (35.25 ± 7.2) is correlating with Mahela et al [13] (38.85 ± 3.3) and Lazarevic et al [14] (32.85 ± 4.3). Out of 100 cases of chronic alcoholic patients, males are 98 and females are 2. Lower percentage of female cases in this study could be due to Indian culture (the incidence of females taking alcohol is less in India). In this study most of the patients belong to age group 31-40 years (66%). only 34% patients were in 20-30 years age group. Most common Electrocardiographic abnormality observed in patients is sinus-

tachycardia (18%). Of these patients 11% between 31-40 years age group, 7% of patients in 20-30 years age group.

Sinus-tachycardia is the most commonly observed ECG abnormality in chronic alcoholics; study done by Ryan and Howes [15]. In this study 20% of cases have sinus-tachycardia. Another study was done by Mahela et al [13] showed 25% sinus tachycardia. Next most common abnormality observed in ECG is non-specific ST-T changes. A study done by Mahela et al [13] showed non specific ST-T changes in 17.5% chronic alcoholic patients. In our study 9% of patients have non specific ST-T changes. Ectopics are also common in chronic alcoholics. Most commonly observed ectopics are atrial premature contractions and ventricular premature contractions. In our study 1% patients have APC and 1% patients have VPC. Atrial fibrillation is most common rhythm abnormality observed in chronic alcoholics. It is usually spontaneously subsided. Predisposed by binge drinking of alcohol also called holiday heart syndrome.

In our study 1% patients have atrial fibrillation. In one study done in western population 5-10% cases of new onset atrial fibrillation explained by alcohol consumption. Right bundle branch block was observed in 2% of patients, there was one study done in JLN Medical College in AJMER Mahela et al [13] observed RBBB in 5% of case. Another study done by Krasniqi A et al. [16] observed RBBB in >5% of cases. Poor R wave progression was observed in 1% patients. Most of the ECG abnormalities were found in 31-40 years of age group. So increasing age with alcohol consumption produces more number of abnormalities. The pattern of alcohol consumption as it relates to clinical outcomes and changes in cardiovascular risk has been examined in the Framingham cohort study. The study showed increased cardiovascular abnormalities with increased duration of alcohol consumption and in advanced age group. More number of ECG abnormalities observed in chronic alcoholics is correlated with duration of alcohol consumption. Increased duration of alcohol consumption is directly related to the ECG abnormalities.

In our study 21.80% ECG abnormalities observed in patients with 5-8 years of alcohol consumption and 42.67% ECG abnormalities in more than 8

years of duration. Echocardiographic changes observed commonly in our study are increased Posterior wall thickness in 11%, increased Interventricular septum thickness in 8%, decreased Ejection fraction in 8%. Of these, decreased Ejection fraction patients have increased left ventricular end systolic diameter and end diastolic diameters. Most of these patients are in 31-40 years age group. Two different studies done in different places. Mahela et al [13] in JLN Medical College, observed 15% with increased thickness of Posterior wall and Interventricular septum, 12.5% showed Decreased ejection fraction with 5-8 years duration of alcohol consumption. Another study by MP Gautam et al [17] showed similar increase in left ventricular echocardiographic parameters. Echocardiographic abnormalities observed are 17.89% in males and 20% in females. This high incidence in females is due to more cardiotoxicity. Echocardiographic changes correlated with duration of alcohol intake. In our study echocardiographic abnormalities was 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.

Conclusion

- The prevalence of cardiovascular abnormalities in patients of chronic alcoholism is 37% in our study.
- Majority of patients were between the age group of 31-40 yrs (66%),
- Out of 100 patients 98% were males and 2% were females.
- Majority of patients (68%) were found to consume alcohol for > 8yrs.
- Most common ECG changes are sinus tachycardia (18%), and Non specific ST-T changes (9%),
- Most common 2D ECHO changes was increased posterior wall thickness (11%) and followed by increased interventricular septum and ejection fraction (<40%).
- The prevalence of cardio vascular abnormalities are more with increased duration of alcohol consumption and also high in advanced age group.

References

1. Lodgson JE. "Ethanol." In J.I. Kroschwitz (Ed.) Encyclopedia of Chemical Technology, 4th ed. *New York: John Wiley & Sons.*1994; 9: 820.
2. Trejbal K, Mitro P. ECG changes in alcoholic intoxication. *Vnitr Lek.* 2008; 54(4): 410-4.
3. Alexander CS. Idiopathic heart disease I) Analysis of 100 cases, with special reference to alcoholism. II) Electron microscopic examination of myocardial biopsy specimens in alcoholic heart disease. *Am J Med* 1966; 41: 213.
4. Perloff JK. The cardiomyopathies-current perspectives. *Circulation* 1971; 44:942.
5. Regan TJ, Levinson GE, Oldewurtel HA, Frank MJ, Weisse AB, Moschos CB. Ventricular function in noncardiacs with alcoholic fatty liver: role of ethanol in the production of cardiomyopathy. *J Clin Invest* 1969; 48:387.
6. Burch GE, DePasquale NP. Alcoholic cardiomyopathy. *Am J Cardiol* 1969; 23: 723.
7. Gould L, Zahir M, Shariff M, Diliato M. Cardiac hemodynamics in alcoholic heart disease. *Ann Intern Med* 1969; 71:543.
8. Spies CD et al. Effects of alcohol on the heart. *Curr Opin Crit Care.* 2001; 7(5): 337-43.
9. Ettinger PO, Lyons M, Oldewurtel HA, Regan TJ. Cardiac conduction abnormalities produced by chronic alcoholism. *Am Heart J.* 1976; 91(1):66-78.
10. Guarnieri T, Lakatta EG. Mechanism of myocardial contractile depression by clinical concentrations of ethanol. A study in ferret papillary muscles. *J Clin Invest* 1990; 85(5):1462-7.
11. Harcombe AA, Ramsay L, Kenna JG et al. Circulating antibodies to cardiac protein-acetaldehyde adducts in alcoholic heart muscle disease. *Clin Sci (Colch)* 1995; 88(3):263-8.
12. Mathews EC Jr, Gardin JM, Henry WL, Del Negro AA et al. Echocardiographic abnormalities in chronic alcoholics with and without overt congestive heart failure. *Am J Cardiol.* 1981; 47(3):570-8.
13. Mahela et al. Electrocardiographic and Echocardiographic Abnormalities in Chronic alcoholic patients. *JAPI.* 2003; 51(132):1187.
14. Lazarevic et al. Cardiac Abnormalities in Chronic Alcoholic Patients. *JACC.* 2000; 35(6):1599-606.
15. Ryan JM and Howes LG. Relations between alcohol consumption, heart rate, and heart rate variability in men. *Heart.* 2002; 88(6): 641-642.
16. Krasniqi A, Bostaca I, Dima-Cosma C, Crişu D, Aursulesei V. Arrhythmogenic effects of alcohol. *Rev Med Chir Soc Med Nat Iasi.* 2011; 115(4): 1052-6.
17. MP Gautam et al. Echocardiographic abnormalities in non-moderate drinking of alcohol for prolonged duration. *Journal of College of Medical Sciences-Nepal.* 2010; 6(1):18-28.

*All correspondences to: Dr. Habibulla D. Attar, Assistant Professor, Department of Medicine, Al Ameen Medical College and Hospital, Athani Road, Vijayapur-586108 Karnataka, India. E-mail: f.dibru@yahoo.com