Original Research Article

Study of Electrocardiographic and 2d Echocardiographic Changes & Its Correlation with Fibroscan in Chronic Alcoholics

Janki Punekar[1],Ruchir Khare[2],Thevya R[3], Pankaj Asati[4]

[1]Associate Professor, Department of Medicine, Netaji Subhash Chandra Bose Medical College Jabalpur, Madhya Pradesh, India

[2]Associate Professor, Department of Biochemistry, NetajiSubhash Chandra Bose Medical College Jabalpur, Madhya Pradesh, India

[3]PG Resident Department of Medicine, Netaji Subhash Chandra Bose Medical College, Jabalpur,Madhya Pradesh, India

[4]Associate Professor, Department of Medicine, Netaji Subhash Chandra Bose Medical College, Jabalpur, Madhya Pradesh, India

Received: 19-04-2021 / Revised: 20-06-2021 / Accepted: 16-07-2021

Abstract

Objective: Alcohol is a widely used psychoactive substance with dependence producing properties. Excess alcohol consumption over a long period can be associated with variety of cardiovascular disorders. Thus, the study was undertaken to evaluate the Electrocardiographic and Echocardiographic abnormalities in chronic alcoholics and also to evaluate UGI Endoscopy and Fibro scan findings in asymptomatic alcoholic patients. **Materials and Methods** :50 chronic alcoholics and 50 age and sex matched controls attending the outpatient in N.S.C.B. Medical College and Hospital, Jabalpur were selected for the study. It was a prospective case-control study designed in age group 20-60 years, having history of chronic alcoholism. Patients with known diabetic, hypertension and cardiovascular disorders were excluded from the study.

Results: The Prevalence of Cardiovascular disorders in patients of chronic alcoholism was 42% in our study. Most common ECG changes are Sinus Tachycardia (12%) followed by Non-specific ST-T wave changes (10%). Most common 2D Echo changes are increased posterior wall thickness (16%) followed by increased interventricular thickness (10%) and diastolic dysfunction (10%). The prevalence of cardiovascular abnormalities is found to be increased with increased duration of alcohol consumption. The most common UGI endoscopy findings in chronic alcoholics were Antral Gastritis (6%), Duodenitis (6%) and Moderate PHG (4%). The Mean LSM of chronic alcoholics in Fibro scan is ≤5.8.

Conclusions: This study concludes that cardiovascular changes occur in chronic alcoholics prior to development of symptomatic cardiac disorders; which are early changes and are reversible and can be easily detected with noninvasive investigations like ECG and 2D Echo.

Keywords: Chronic alcoholics, Electrocardiography, Echocardiography, Fibroscan.

Introduction

Alcohol (French alcool/; Arabic al-kuhl) refers to the intoxicating constituent of various beverages consumed in almost all societies in India. The term is used interchangeably with ethanol or ethyl alcohol (C2H5OH). The use of alcohol as a social lubricant is ubiquitous in human societies since ancient times. It has also long been recognized that alcohol produces undesirable cardiovascular effects, especially when imbibed in excess. Numerous studies have reported a causal relationship between alcohol and arrhythmias, as well as sudden cardiac death. [1]Alcohol consumption may result in both deleterious and beneficial cardiovascular effects. Chronic heavy alcohol consumption can lead to systolic and diastolic dysfunction and left ventricular dilatation culminating in severe alcoholic cardiomyopathy.[2]According to the definition of the World Health Organization (WHO), alcoholism is sub grouped in two categories: alcohol abuse and alcohol dependence. Alcohol abuse describes the Psychological dependence on ethanol for adequate functioning together with occasional heavy consumption, while alcohol dependence is defined as an increased alcohol tolerance together with physical symptoms upon withdrawal. [3] Data from numerous epidemiologic studies over the last two decades have revealed complex associations between alcohol use and cardiovascular (CV) conditions such as hypertension (HTN), coronary heart disease (CHD), stroke, peripheral arterial disease (PAD), and cardiomyopathy.[4]Regardless of the type and dose of beverage involved, alcohol facilitates the development of gastroesophageal reflux disease by reducing the pressure of the lower esophageal sphincter and esophageal motility. Fermented and no distilled alcoholic beverages increase gastrin levels and acid secretion. Succinic and maleic acid contained in certain alcoholic drinks also stimulate acid secretion. Low alcohol doses accelerate gastric emptying, whereas high doses delay emptying and slow bowel motility. Alcohol facilitates the development of superficial gastritis and chronic atrophic gastritis--though it has not been shown to cause peptic ulcer. [5]The direct contact of alcoholic beverages with the mucosa that lines the upper GI tract can induce numerous metabolic and functional changes. These alterations may lead to marked mucosal damage, which can result in a broad spectrum of acute and chronic diseases, such as acute gastrointestinal bleeding, diarrhea,

**Correspondence*
Dr. Pankaj Asati
Associate Professor, Department of Medicine N S C B Medical College Jabalpur,India
E-mail: drpankajasati88@gmail.com

malnutrition and weight loss. Alcohol-induced mucosal injuries—especially in the upper small intestine—allow large molecules, such as endotoxin and other bacterial toxins, to pass more easily into the blood or lymph. These toxic substances can have deleterious effects on the liver and other organs. [6]Chronic alcohol abuse may result in demonstrable intraventricular conduction abnormalities and morphologic alterations which were related to duration of consumption.[7] Sinus Tachycardia or a Supra ventricular arrhythmia, commonly atrial fibrillation and Non-specific ST-T changes are observed in alcoholics.[8] Prolonged alcohol consumption alters calcium homeostasis and other mechanisms resulting in impaired myocardial function. Clinical features of the consequences of prolonged and excessive ethanol consumption encompass defects in myocardial contractility and derangement of cellular architecture, including disarray of the contractile elements. [9]Epidemiological studies suggest that a threshold dose of alcohol must be consumed for serious liver injury to become apparent. For men, this dose amounts to 600 kilograms (kg) taken chronically over many years, a summing approximately 72 ounces (oz) of beer, 1 liter of wine, or 8 oz distilled spirits (i.e., 5–6 standard drinks1) daily for 20 years. Heavy long-term alcohol consumption clearly plays a major role in the development of alcohol-related liver damage. No more than one-half of heavy drinkers develop alcoholic hepatitis or cirrhosis. [10]Because cirrhosis is a continuum of fibrosis from compensated to decompensated disease, Transient Elastography (TE) is proposed as a noninvasive test to assess liver fibrosis in asymptomatic alcoholics and to assess severity of cirrhosis. Fibro scan is effective to assess liver fibrosis in alcoholic patients. Instant screening of liver fibrosis in heavy drinkers is feasible without liver biopsy. [11]

The main purpose of our study is to evaluate preclinical left ventricular dysfunction, arrhythmias, cardiomyopathies in chronic alcoholics and also to evaluate UGI Endoscopy and Fibro scan findings in these patients.

Materials and Methods

The study was carried out during February 2018-August 2019 in 50 asymptomatic alcoholics in the age group of 21-60 years with daily alcohol intake of >80g/day for >5 years and compared with age and sex matched controls. Patients with history of Diabetes, hypertension and coronary artery diseases are not included in this study. Alcoholics who satisfied the criteria for alcohol abuse or dependence according to DSM-IV criteria were selected and underwent clinical examinations and routine blood investigations. Study participants were compared with controls and also divided into two groups according to their duration of alcohol consumption. ECG, 2D Echo, Fibro scan and UGI endoscopy had been done in all participants. The results obtained were evaluated with the help of available version of SPSS at that time and data were expressed in the form of percentage, mean and SD.

Results

Table 1:Age wise distribution of cases and controls

S.No.	Age(years)	No. of Patients(N)	Percentage (%)	No of Controls(N)	Percentage (%)
1	21 – 30	13	26	11	22
2	31-40	24	48	16	32
3	41-50	8	16	19	38
4	51-60	5	10	4	8

Table 2: Sex wise distribution of cases and controls

S.No.	Sex	No. of Patients(N)	Percentage(%)	No of Controls (N)	Percentage(%)
1	Male	48	96	48	96
2	Female	2	4	2	4

Table 3:Duration of alcohol consumption in cases

S.No.	Duration of alcohol consumption(in years)	Number of cases	Percentage (%)
1	5 to 8 years	22	44
2	>8 years	28	56
Total		50	100

Mean age of presentation was 37±6 years of age. Out of 50 patients studied 48% were in the age group of 31-40 years and 26% were in the age group 21-30 (Table no-1). Of the participants studied 96% were males and 4% were females. (Table no-2). Among the participants 56% had >8 years and 44% had 5 to 8 years history of duration of alcohol consumption. (Table No-3).

Table 4:ECG changes in the cases

S.No.	ECG changes	No of Patients	Percentage(%)
1	Sinus tachycardia	6	12
2	Atrial fibrillation	1	2
3	Atrial premature contractions	1	2
4	Ventricular premature contractions	1	2
5	Nonspecific ST-T changes	5	10
6	Left ventricular hypertrophy	3	6
7	Incomplete RBBB	1	2
8	Poor R wave progression	0	0
9	No changes	32	64
Total		50	100

Table 5:ECG changes in relation to duration of alcohol consumption in cases

S.No.	ECG changes	Duration 5-8yrs N= 22	Percentage (%)	Duration ≥8yrs N= 28	Percentage (%)
1	Sinus tachycardia	1	4.5	5	18
2	Atrial fibrillation	0	0	1	3.6
3	Atrial premature contractions	0	0	1	3.6
4	Ventricular premature contractions	0	0	1	3.6
5	Nonspecific ST-T changes	2	9	3	10.8

6	Left ventricular hypertrophy	1	4.5	2	7.2
7	RBBB	0	0	1	3.6
8	Poor R wave progression	0	0	0	0
9	No changes	18	82	14	50
Total		22	100	28	100

Of the ECG changes observed, most common being Sinus Tachycardia (12%) followed by Non-specific ST-T changes (10%) and Left Ventricular Hypertrophy (6%). (table no-4) The most changes are observed with participants having more than 8 years duration of alcohol consumption. (table no-5)

Table 6:ECHO changes in cases

S. No.	Echocardiographic changes	No of cases	Percentage (%)
1	Increased Posterior wall thickness	8	16
2	Increased Inter ventricular septal thickness	6	12
3	Ejection fraction (<40%)	1	2
4	Increased Left ventricular end systolic diameters	0	0
5	Increased Left ventricular end diastolic diameters	0	0
6	Diastolic dysfunction	6	12
7	No changes	29	58
Total		50	100

Table 7:Correlation of 2D ECHO changes in relation with duration of alcohol consumption in cases

S.No.	Echocardiographic changes	Duration 5-8 yrs N=22	Percentage (%)	Duration >8 yrs N= 28	Percentage (%)	Chi2	P value
1	Increased Posterior wall thickness	1	4.5	7	24.4	8.70	<0.0001
2	Increased Interventricular septum thickness	1	4.5	5	18	10.25	0.006
3	Ejection fraction (<40%)	0	0	1	3.6	1.33	0.857
4	Diastolic dysfunction	2	9.0	4	14.4	6.97	0.031
5	No changes	18	78	11	39.6		
Total	22	100	28	100			

Most Echo changes observed were of increased posterior wall thickness (16%) followed by increased septal thickness (12%) and diastolic dysfunction (12%) (table-6). These echo changes were more common with >8 years duration of alcohol consumption (60.4%). (table-7).

Table 8:UGI Endoscopy in cases

S. No.	Findings	Duration of alcohol consumption				Total
		>8 years (N=28)	Percentage (%)	5 to 8 years (N=22)	Percentage (%)	
1	Antral Gastritis	3	10.7	1	4.5	4 (8%)
2	Duodenitis	2	7.2	1	4.5	3 (6%)
3	Gastropathy	1	3.6	0	0	1(2%)
4	GERD	1	3.6	0	0	1(2%)
5	Mod PHG	2	7.2	0	0	2(4%)
6	No changes	19	68.4	20	91	39(78%)
Total	28	100	22	100	50(100%)	

The common endoscopic changes found were Antral Gastritis (8%), Duodenitis (6%), Moderate Porto Hypertensive Gastropathy (4%), GERD (2%) and Gastropathy (2%). There was no significant correlation with duration of alcohol consumption.

Table 9: LSM (Liver Stiffness Measurement) in FIBRO SCAN

S.No.	LSM (kPa)	F0(≤5.8)	F1(5.9-7.7)	F2(7.8-10.9)	F3(11.0-19.4)	F4(>19.5)
1	No of Patients	44(88%)	6(12%)	0	0	0

Table 10:LSM in fibro scan

S. No.	LSM	Duration of alcohol				Total
		5-8years	Percentage (%)	>8 years	Percentage (%)	Percentage (%)
1	F0	20	90.9	24	85.7	44 (88%)
2	F1	2	9.1	4	14.3	6 (12%)
3	F2	0	0	0	0	0
4	F3	0	0	0	0	0
5	F4	0	0	0	0	0
Total		22	100	28	100	50(100%)

Out of 50 participants studied, the median value of LSM obtained was 4.78±1.16 and most cases i.e., 88% were having LSM value ≤ 5.8 kPa. There were no significant changes with duration of alcohol consumption.

Discussion

Alcohol use has complex effects on cardiovascular (CV) health. The associations between drinking and CV diseases such as hypertension, coronary heart disease, stroke, peripheral arterial disease, and cardiomyopathy have been studied extensively. Although many behavioral, genetic, and biologic variants influence the interconnection between alcohol use and CV disease, dose and pattern of alcohol consumption seem to modulate this most.[12]

This study was done to know the prevalence of cardiovascular abnormalities in chronic alcoholics with different age groups and duration of alcohol consumption. The mean age in present study was 37.06± 6.4 and it was correlating and consistent with study done by

H.D.Attar et al [13] in which themean age was 35.25±7.2 In this study most cases i.e. 24 cases (48%) were in the age group 31-40 years followed by 26% in the age group 21-30 years. In our study, out of 50 cases chronic alcoholic patients, 48(96%) were males and 2 (4%) were females and was comparable with study done by H.D.Attar et al [13] in which 98% of them were males.

Sinus Tachycardia (12%) was the most common abnormality observed and comparable with the study done by H.D.Attar et al who haveshowed 18% sinus tachycardia. The study conducted by J M Ryan et al[14] concluded that the association between alcohol intake and decreased heart rate variability may be mainly secondary to an increase in heart rate rather than a central or peripheral effect of alcohol on cardiac vagal nerve activity.Next most common abnormality observed in this study in ECG was Nonspecific ST-T changes (10%) was comparable and was correlating with the study done by H.D.Attar et alin which Non-specific ST-T wave changes were found in 17.5% of chronic alcoholics. Left Ventricular Hypertrophy was observed 6 % of patients which is comparable with study by H.D.Attar et alwhere 4.4% of study patients had Left Ventricular hypertrophy. In this study, 2% of patients had atrial fibrillation.Ethanol consumption might be associated with intra myocardial as well as adrenal release of catecholamines, abnormal autonomic nervous system discharges or electrophysiological consequences of acetaldehyde (the metabolite of ethanol). Other likely causes of arrhythmias in the setting of acute alcohol intoxication are deranged plasma electrolytes, particularly low potassium and magnesium. High serum alcohol levels may interfere with sodium, potassium and calcium ion channels in the heart. Moreover, alcohol may also lead to instabilities in autonomic regulation of cardiac rhythm, thereby causing arrhythmias.[15]In our study 2% of patient had APC's and 2% had VPC's. This observation was correlating with study by H.D.Attar et alin which 1% had APC's and VPC's. RBBB was observed in 2% of cases. This observation was comparable with study by Mahela et al [16] observed RBBB in 5% of cases. While in another study done by Kransniqi A et al [17] observed RBBB in >5% of cases.In our study 22% ECG abnormalities observed in patients with 5-8 years of alcohol consumption and in 50.4% of cases with more than 8 years duration of alcohol consumption. This was comparable with study done by H.D.Attar et al who have concluded that 42.5% of patients with >8 years duration of alcohol had ECG changes. Electrocardiographic changes observed in our study were increased Posterior wall thickness in 16%, increased septal wall thickness in 12% of patients, diastolic dysfunction in 12% and reduced Ejection Fraction in 2% and was correlating with study done by H.D.Attar et al in whichthey had observed increased posterior wall thickness in 11% patients, increased inter ventricular thickness in 8% patients and decreased ejection fraction in 4% of patients. These abnormalities were observed in 8% patients with duration of alcohol consumption between 5-8 years, 34% patients with duration of alcohol consumption more than 8 years duration. This was comparable with study done by H.D.Attar et alwhere 48.6% of patients had echocardiographic abnormalities with more than 8 years duration of alcohol consumption. In UGI Endoscopy, out of 50 cases studied, most common findings were Antral Gastritis in 3 cases (10.7%), followed by Duodenitis in 7.2% which were not statistically significant and was not correlating with duration of consumption. In Fibro scan most i.e.,44 cases (88%) had LSM value ≤5.8 kPa (F0) and there was no correlation found with duration of alcohol in patients who had undergone Fibro scan for estimation of Liver stiffness. Unidimensional transient elastography (TE) is a noninvasive technique, which has been increasingly used in the assessment of diffuse liver diseases. The presence and progression of hepatic fibrosis towards cirrhosis is a main prognostic variable, impacting the survival of people with alcoholic liver disease. The results may be influenced by factors other than the degree of fibrosis present in the liver, mainly acute alcoholic hepatitis. [18]

Conflict of Interest: Nil Source of support:Nil

Conclusion

Our study concluded that alcohol consumption is related with the various heart related disorders. Fibro scan is a useful noninvasive modality to assess the gastric conditions in alcoholic patients though the larger cohort is required to reach any conclusion in which duration of alcohol consumption, amount and type of alcohol consumed should be correlated with the findings of fibro scan. This study also concluded that cardiovascular changes occur in chronic alcoholics prior to development of symptomatic cardiac disorders; which are early changes and are reversible and can be easily detected with noninvasive investigations like ECG and 2D Echo.

References

1. George A. Alcohol and arrhythmias: a comprehensive review. Journal of Cardiovascular Medicine. 2010; 11(4):221-228
2. Brunner S, Drobesch C, Herbel R, Sinner MF. Effects of acute alcohol consumption on cardiac excitation, conduction, and repolarization: results from the Munich Beer Related Electrocardiogram Workup Study (MunichBREW) Clinical Research in Cardiology, 2021, 1-3p
3. BMaisch B. Alcoholic cardiomyopathy the result of dosage and individual predisposition Herz.2016; 41:484–493
4. Piano MR. Alcohol's Effects on the Cardiovascular System Alcohol Research: Current Reviews. 38(2):219-241
5. Bujanda L. The effects of alcohol consumption upon the gastrointestinal tract.Am J Gastroenterol. 2000; 95(12):3374-82
6. Bode C, Bode JC. Alcohol's Role in Gastrointestinal Tract Disorders Alcohol Health & Research World. 1997; 21(1): 76-83
7. Ettinger OP et al. Arrhythmias and the "Holiday Heart": Alcohol associated cardiac rhythm disorders American Heart Journal. 1978; 95(5):555-562
8. Klatsky AL. Alcohol, Coronary Disease, And Hypertension Annu. Rev. Med. 1996; 47:149–60
9. Preedy VR et al.Alcohol and the heart: biochemical alterations Cardiovascular Research. 1996; 31:139-I47
10. Maher JJ. Exploring Alcohol's Effects on Liver Function Alcohol Health & Research World. 1997; 21(1):5-12
11. Khac EN et al. Assessment of asymptomatic liver fibrosis in alcoholic patients using fibroscan: prospective comparison with seven non-invasive laboratory tests Aliment PharmacolTher. 2008; 28:1188–1198
12. Piano MR. Alcohol's Effects on the Cardiovascular System Alcohol Research: Current Reviews. 2016; 382(2):219-241
13. Attar HD et al. Electrocardiographic and Echocardiographic Abnormalities in Chronic Alcoholics Al Ameen J Med Sci. 2017; 10(1):10-15
14. Ryan M, Howes LG. Relations between alcohol consumption, heart rate, and heart rate variability in men Heart. 2002; 88:641-642
15. Raheja H et al. Electrocardiogram Changes with Acute Alcohol Intoxication: A Systematic Review The Open Cardiovascular Medicine Journal. 2018; 12:1-6
16. Mahela et al. Electrocardiographic and Echocardiographic abnormalities in chronic alcoholic patients. JAPI. 2003; 51(132):1187
17. Krasniqi A, Bostaca I, Dima-cosma C, Crisu D, Aurulesei V. Arrythmogenic effects of alcohol. Rev Med ChirSoc Med Nat Iasi. 2011; 115(4):1052-6.
18. Platon ML,Badea R. Noninvasive assessment of alcoholic liver disease using unidimensional transient elastography (Fibro scan®)World J Gastroenterol.2015;21(42):11914-11923.