

## THE STUDY OF HEART MUSCLE IN CHRONIC ALCOHOLICS

Girish M<sup>1</sup>, K. Mohan Pai<sup>2</sup>, Francis N. P. Monteiro<sup>3</sup>, Arun Pinchu Xavier<sup>4</sup>

<sup>1</sup>Associate Professor, Department of General Medicine, Kasturba Medical College, Mangalore, Manipal University.

<sup>2</sup>Professor, Department of General Medicine, A. J. Institute of Medical Sciences and Research Centre, Mangalore.

<sup>3</sup>Professor, Department of Forensic Medicine and Toxicology, A. J. Institute of Medical Sciences and Research Centre, Mangalore.

<sup>4</sup>Postgraduate cum Tutor, Department of Forensic Medicine and Toxicology, A. J. Institute of Medical Sciences and Research Centre, Mangalore.

---

### ABSTRACT

---

#### BACKGROUND

Alcohol affects many organs, especially the liver, pancreas and brain. Although, the beneficial effects of mild or moderate ethanol consumption have been implied with respect to coronary artery disease, excessive ethanol consumption can result in Alcoholic Heart Muscle Disease (AHMD).

#### AIMS

Alcohol consumption, mainly arrack, is common social problem in Mangalore. This study has been undertaken to assess the effects of alcohol on cardiovascular system.

#### MATERIALS AND METHODS

Thirty patient with history of consumption of about 6 units of alcohol per day for at least 5 days a week for at least 5 years who were admitted to Government Wenlock Hospital, Attavar K.M.C. and University Medical Centre, Mangalore, were selected as case and studied.

#### RESULTS

Alcohol intake is predominantly observed in males, majority of alcoholic had high blood pressure, serum levels of CPK-MB and LDH are elevated in chronic alcoholic patients, left ventricular hypertrophy, premature ventricular contraction and sinus tachycardia were common findings in the electrocardiograms of chronic alcoholic patients and development of alcoholic heart muscle disease is directly proportional to the quantity and duration of alcohol intake.

#### CONCLUSION

Overall, the present study has found high morbidity from chronic alcohol consumption highlighting the need for preventive measures to tackle this preventable hazard.

#### KEYWORDS

Alcohol, Cardiomyopathy, Cardiovascular Heart, Muscle Morbidity.

---

**HOW TO CITE THIS ARTICLE:** Girish M, Pai KM, Monteiro FNP, et al. The study of heart muscle in chronic alcoholics. J. Evid. Based Med. Healthc. 2016; 3(73), 3973-3976. DOI: 10.18410/jebmh/2016/849

**INTRODUCTION:** Alcohol has numerous physiological effects and is one of most commonly abused drug in our society. Its abuse is associated with considerable morbidity, a not insignificant mortality and potentially devastating effects on family and social life. Alcohol affects many organs, especially the liver, pancreas and brain.<sup>1</sup> Although, the beneficial effects of mild or moderate ethanol consumption have been implied with respect to coronary artery disease. Excessive ethanol consumption can result in Alcoholic Heart Muscle Disease (AHMD). The latter is characterised by feature consistent with dilated

cardiomyopathy with concomitant ventricular dysfunction and histopathological abnormalities.

By definition, no other cause for the abnormalities in AHMD is demonstrated other than excessive alcohol consumption. About 1% of chronic alcoholics develop cardiac failure, a condition best referred as "alcoholic heart muscle disease" and there is evidence that this can be reversed with abstinence of alcohol. Since, alcohol consumption mainly arrack is common social problem in Mangalore. This study has been undertaken to assess the effects of alcohol on cardiovascular system.

**MATERIALS AND METHODS:** Thirty patient with history of consumption of about 6 units of alcohol per day for at least 5 days a week for at least 5 years, 40 who were admitted to government Wenlock Hospital, Attavar K.M.C. and University Medical Centre, Mangalore, were selected as case and studied after due permission from institution and informed consent from the patients. Each unit alcohol

---

*Financial or Other, Competing Interest: None.*  
*Submission 19-08-2016, Peer Review 27-08-2016,*  
*Acceptance 09-09-2016, Published 10-09-2016.*

*Corresponding Author:*

*Dr. Girish M,*  
*Associate Professor, Department of General Medicine,*  
*Kasturba Medical College, Mangalore, Manipal University.*

*E-mail: drgirish3@rediffmail.com*

*DOI: 10.18410/jebmh/2016/849*



amounts to 1/2 pint of beer; 1 glass of wine; 45 mL of whisky; 8-10 gm of ethanol or 30-40 mL of arrack.

**Exclusion Criteria:** Considered for the study included patients with established cases of congenital, valvular and ischaemic heart disease. Other causes which can give rise to increased LDH were excluded from study by doing simple blood test like CBP, LFT, etc. Similarly, 15 patients who were admitted to hospital with various complaints without any history of alcohol intake and without heart disease were taken as control. Detailed history including quantity, frequency of intake, duration of intake, nature of drinks, morning drinking and experience of withdrawal symptoms of alcoholism were taken and detailed clinical examination with particular emphasis on cardiovascular system was done. Blood pressure was recorded one day after hospital admission to overcome the anxiety effects of hospital admission on blood pressure and serum levels of CPK-MB, LDH were assessed. ECG, chest x-ray and echocardiography were done to look for cardiomegaly, conduction abnormalities, arrhythmias, ventricular hypertrophy/enlargement and left ventricular function by ejection fraction. In this study, the patient who had all three of the following were considered as having alcoholic heart muscle disease, i.e. arrhythmias, left ventricular enlargement and left ventricular ejection fraction less than 50%.

**RESULTS:** Out of 30 patient in study group, there were 3 females and the rest males. All of them between 30-60 years age [mean age was 50.86±6.19]. Among the patient in control group, 2 were females and all were between 30-60 years [mean age was 48.33±3.99]. This is illustrated in Table 1 and 2.

Sex	Cases		Control	
	Number	%	Number	%
Male	27	90%	13	88.9%
Female	3	10%	2	11.1%

**Table 1: Sex Distribution of Cases and Control**

Age	Cases		Control	
	Number	%	Number	%
30-45	6	20%	4	26.7%
45-60	24	80%	11	73.3%

**Table 2: Age Distribution of Cases and Control**

All patients in study gave a history of taking more than 6 units of alcohol per day and all of them were consuming alcohol regularly for last 9-30 years [mean duration 17.16±5.2 years] with occasional heavy bouts. All the patients in control group were nonalcoholic. This was depicted in Table 3.

No. of Units of Alcohol	Cases	
	Number	%
6-10 units	24	80.0%
>10 units	6	20%

**Table 3: Quantity of Alcohol Intakes**

**Blood Pressures is Categorised into 2 Groups:** Those with blood pressure ≤140/90 mm of Hg and those with blood pressure >140/90 mm of Hg as depicted in Table 4 and mean systolic and diastolic blood of cases were 145.933±20.27 mm of Hg and 87.33±5.9 mm of Hg, respectively and mean systolic and diastolic blood pressure of control were 138.26±6.18 and 83.86±5.2 mm of Hg, respectively.

Blood Pressure	Cases		Control	
	Number	%	Number	%
≤140/90	11	36.7%	12	80%
>140/90	19	63.3%	3	20%

**Table 4: Blood Pressure in Cases and Control Group**

Table 5 describes electrocardiogram changes in alcoholic subjects and control group. Several patients had more than one arrhythmias.

ECG Changes	Cases		Control	
	Number	%	Number	%
Atrial fibrillation	2	6.7%	-	-
Premature ventricular Contraction	11	36.7%	2	13.3%
Left ventricular hypertrophy	16	53.3%	2	13.3%
Sinus tachycardia	2	20%	1	6.7%
Supraventricular tachycardia	2	6.7%	-	-
LBBB	2	6.7%	-	-

**Table 5: ECG Findings of Cases and Control**

The study group and control categorised into these with cardiothoracic ratio <50% and those with minimal cardiomegaly with cardiothoracic ratio 50-66% and those with gross cardiomegaly with cardiothoracic ratio of >66% as depicted in Table 6.

Chest X-Ray	Cases		Control	
	Number	%	Number	%
Cardiothoracic Ratio <50	5	16.7%	14	93.3%
Cardiothoracic Ratio 50-66%	18	60%	1	6.7%
Cardiothoracic Ratio >66%	7	23.3%	-	-

**Table 6: Cardiomegaly Based on Chest X-Ray in Both Cases and Control**

Table 7: Illustrates ejection fraction of alcoholic cases and control group by echocardiography.

Ejection Fraction	Cases		Control	
	Number	%	Number	%
<25	8	26.7%	-	-
25-50	4	13.3%	-	-
50-65	16	53.3%	4	26.7
>66	2	6.7%	11	73.3

**Table 7: Ejection Fraction of Both Cases and Control**

In the group with elevated level of CPK-MB, more than 2 folds seen in 5 patients i.e. 16.7%; but none of control group had level more than 2 folds. In the group with elevated LDH level: more than 2 folds seen in 11 patients i.e. 36.7%; but none of control group had elevated LDH level more than 2 folds. Tabulation of CPK-MB and LDH is explained in Table 8 and 9.

CPK-MB	Cases		Control	
	Number	%	Number	%
Normal	9	30%	14	93.3%
Elevated level	21	70%	1	6.7%

**Table 8: CPK-MB**

Serum LDH Level	Cases		Control	
	Number	%	Number	%
Normal	6	20%	10	66.7%
Elevated level	24	80%	5	33.3%

**Table 9: Serum LDH Level**

Table 10 Shows the number of patient with and without alcoholic heart disease and their percentage.

	Number	%
Patient with Alcoholic Heart Muscle Disease	12	40%
Patient without Alcoholic Heart Muscle Disease	18	60%

**Table 10: Alcoholic-Heart Muscles Disease**

**DISCUSSION:** Many studies have been conducted in the past to describe the effects of alcohol on the cardiovascular system. Each of these studies has added greatly to the understanding of various effects of alcohol on heart. This is a comparative study done on 45 patient [30 chronic

alcoholics and 15 nonalcoholics] with respect to cardiac status without known causes of heart disease who admitted to Govt. Wenlock Hospital, K.M.C. Hospital Attavar and University Medical Centre, Mangalore.

In this study group, 27 patients were males. This can explained by the fact that incidence alcohol intake is more among males. In this study group, 6 patients (20%) were in the age group of 30-45 years: and the remaining 24 patients (80%) were in the age group 45-60 years and men age of cases is 50.86±6.19. We have selected patients who used to least 6 units of alcohol per day for at least 5 days a week for at least 5 years. This was then quantity and duration suggested by Manuel D. Cerqueira et al in his study of preclinical alcoholic cardiomyopathy in chronic alcoholics.<sup>2</sup> All the patients in our study used to consume arrack. None of our patients in this study had past history of hypertension. It was found that 19 patients (63.3%) had blood pressure more than 140/90 mm of Hg. This was only 20% in control group. Saunders J.B. et al studied blood pressure of 132 alcoholic patients<sup>3</sup> at the time of presentation blood pressure exceeded 140/90 mm of Hg in 51.5% of patients.

In our study: mean difference in systolic pressure of case and control was 7.673 mm of Hg and in a study by Arthor L., Klatsky M. D. et al showed that the magnitude of increased systolic blood pressure was 9.61 mmHg when compared to nondrinkers.<sup>4</sup> Mean difference in diastolic pressure was 3.47 mm of Hg and the study by Arthor. L. Klatsky et al showed that magnitude of increased diastolic pressure was 4.46 mm of Hg when compared to nondrinkers.<sup>4</sup> In the Los Angeles Heart Study, a prospective investigation of 432 men who were chronic alcoholics and 703 men who were nondrinkers showed a significant increase in both systolic and diastolic blood pressure.<sup>4</sup> High blood pressure in alcoholics maybe because of possible acute effects or maybe because of withdrawal effects. Alcohol promotes the secretion of adrenaline by the adrenal medulla.<sup>5</sup>

Chest x-ray showed cardiomegaly in 25 patients (83.3%). John G. Demakis et al did a prospective study of 57 patients who were diagnosed as having alcoholic cardiomyopathy and observed cardiac enlargement in all patients.<sup>6</sup> The commonest electrocardiographic abnormality observed in electrocardiographic analysis of our patients were left ventricular hypertrophy in 16 patients (53.3%) followed by premature ventricular contractions in 11 patients (36.7%).

Name of study	Total No. of Cases	Atrial Fibrillation No. (%)	APCS No. (%)	SVT No. (%)	VPC No. (%)	VT No. (%)
Bashour et al 1975 <sup>7</sup>	65	8 (12.3)	11 (17)	-	24 (37.1)	2 (3)
Ettinger et al 1976 <sup>8</sup>	24	12 (50)	4 (16.67)	4 (16.67)	6 (25)	1 (4.17)
Present Study	30	2 (6.7)	-	2 (6.7)	11 (36.7)	-

**Compares the Incidence of Arrhythmia in Previous and Present Study**

\*Several Patients Had More than One Arrhythmias.

Masaya Kino et al studied the electrocardiograms of 145 alcoholics without known causes of heart disease and observed left ventricular hypertrophy in 13.8%, left axis deviation in 53.5%, premature ventricular contractions in 2.1% and atrial fibrillation in 0.7% of the patients.<sup>9</sup> Atrial fibrillation caused by alcohol is probably due to a combination of a direct effects of alcohol and indirect effects through catecholamine release. Left ventricular ejection fraction by echocardiography was less than 50% seen in 12 patient (40%) in our study and those with ejection fraction <25% were 8 (26.7%). Marquez et al observed that alcoholics had a significant lower mean ejection fraction (59%) as compared to control (67%) and mean ejection fraction of our study was 48%.<sup>10</sup> In a study by P. J. Richardson et al of 38 patients, alcoholic cardiomyopathy, the mean ejection fraction was 42.6% and 12 patient (32%) had ejection fraction <20%.<sup>10</sup>

The serum level of CPK-MB was elevated in 21 patients (70%) and serum enzyme LDH was elevated in 24 patients (80%). More than two fold elevation above normal level of CPK-MB was seen in 5 patients (16.7%) and of LDH in 11 patient (36.7%). None of the control group had two fold elevation of enzyme CPK-MB and LDH above normal. P. J. Richardson et al studied 38 chronic alcoholic patients with alcoholic cardiomyopathy and observed that the serum level of CPK-MB, LDH enzyme were higher in heavy drinkers.<sup>11</sup> The increase in myocardial enzyme activity could be adaptive and may reflect chronic exposure to alcohol. Alternatively, the enzyme changes maybe secondary to myocardial tissue damage caused by an unrelated mechanism. 12 patients (40%) in our study were diagnosed as having alcoholic heart muscle disease. It was observed that all these 12 patients used to take three or more drinks per day for than 20 years. From this observation, it is likely that the development of alcoholic heart muscle maybe directly related to the quantity and duration of alcohol consumption.

**CONCLUSION:** Following conclusions were drawn from present study:

- Alcohol intake is predominantly seen in male society.
- Majority of alcoholic have high blood pressure.
- Alcohol effects mainly systolic than diastolic blood pressure.
- Serum levels of CPK-MB and LDH are elevated in chronic alcoholic patients.

- Left ventricular hypertrophy, premature ventricular contraction and sinus tachycardias were common findings in the electrocardiograms of chronic alcoholic patients.
- Patients with alcoholic heart muscle disease have a decreased left ventricular ejection fraction.
- Development of alcoholic heart muscle disease is directly proportional to the quantity and duration of alcohol intake.

## REFERENCES

1. Cowie M. Alcohol and cardiac risk. *J Appl Med* 1995;443-445.
2. Cerqueira MD, Harp GD, Ritchie JL, et al. Rarity of preclinical alcoholic cardiomyopathy in chronic alcoholics less than 40 years of age. *Am J Cardiol* 1991;67(2):183-187.
3. Sounders JB, beavers OG, Paton A. Alcohol induced hypertension. *Lancet* 1981;2(8248):653-656.
4. Klatsky AL, Friedman GD, Siegelab AB, et al. Alcohol consumption and blood pressure. Kaiser permanente multiphasic health examination. *N Engl J Med* 1977;296:1194-1200.
5. Sereny G. Effects of Alcohol on the electrocardiogram. *Circulation* 1971;44(4):558-564.
6. Demakis JG, Proskey A, Rahimtoola RH, et al. The natural course of alcoholic cardiomyopathy. *Ann Intern Med* 1974;80(3):293-297.
7. Bashour TT, Fahdul H, Cheng TO, et al. Electrocardiographic abnormalities in alcoholic cardiomyopathy: a study of 56 patients. *Chest* 1975;68(1):24-27.
8. Ettinger PO, Lyons J, Oldewurtel HA, et al. Cardiac conduction abnormalities produced by chronic alcoholism. *Am Heart J* 1976;91(1):66-78.
9. Kino M, Imamitchi H, Morigutchi M, et al. Cardiovascular status in asymptomatic alcoholics, with reference to the level of ethanol consumption. *Br Heart J* 1981;46(5):545-551.
10. Urbano-Marquez A, Estruch R, Navarro-Lopez F, et al. the effects of alcoholism on skeletal and cardiac muscle. *N Engl J Med* 1989;320(7):409-415.
11. Richardson PJ, Wodak AD, Atkinson L, et al. Relation between alcohol intake, myocardial enzyme activity and myocardial function in dilated cardiomyopathy. *Br Heart J* 1986;56(2):165-170.