Assessment of Cardiac Functions in Chronic Alcoholics

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**ABSTRACT**

The present observational study was conducted to evaluate the cardiologic manifestations in chronic alcoholic in relation with Electrocardiographic and 2-Dimensional Transthoracic Echocardiogram and Doppler findings. In present study we observed most common 2-D echocardiographic finding being Grade 1 Diastolic Dysfunction (i.e. 28.35%), followed by Left ventricular Dysfunction (i.e. 7.87%) being second most common finding, followed by mild Pulmonary Hypertension (i.e. 5.51%). In present study, the observed most common Electrocardiographic finding being sinus rhythm (i.e. 34.6%) followed by second most common finding being atrial fibrillation (i.e. 13.38%) followed by sinus tachycardia (i.e. 11.18%) so most common abnormal electro-cardiographic finding is Atrial fibrillation. The present study was cross-sectional, descriptive, hospital based observational study to assess cardiac function in chronic alcoholic by use of Electrocardiogram and Two Dimensional Transthoracic Echocardiogram and Doppler function. Duration of Study is 18 months and Study Setting is conducted in patients admitted in wards and ICU under Department of Medicine, Krishna Hospital and Medical Research Centre, Karad. There is Study Population is all alcoholic patients admitted in wards and ICU during the period from October 2016 to March 2018 under Department of Medicine, Krishna Hospital and Medical Research Centre Karad with alcohol consumption duration more than 5 years.

**INTRODUCTION**

Alcohol distributes through the body, affecting almost all system and altering nearby every neurochemical process in the brain. Ethanol is likely to exacerbate most medical problems, affect medications metabolized in the liver and temporarily mimic medical and psychiatric conditions (Mark et al., 2015). Ethyl alcohol is most commonly abused drug worldwide. Alcohol is a substance capable of producing pharmacological effects consistent with dose including central nervous system and respiratory depression and induction of euphoria, tolerance and addiction if consumed in large quantity. The life time risk for repetitive alcohol problem is almost 20% for men and 10% for women, regardless of a person's education or income (Laddawala et al., 2015).

Although, low doses of alcohol might have healthful benefits, alcoholism is a major threat to public health all over the world (Mann, 2014). It has been estimated that 5% of adult males in India are alcoholics with dependence symptoms. Today alcohol abuse has become a worldwide social and medical problem needing great deal of attention. The age at which people start alcohol has also declined in this century. It is a chronic disease with genetic, psychosocial and environmental factors influencing its development and manifestations (Mann, 2014; Osiezagha et al., 2013; Parker et al., 2015).
The chronic alcoholism is disease which is often progressive and fatal. It is characterized by impaired control over drinking, preoccupation with the drug alcohol. Dependence may be physical or psychological (Saitz, 2005). Physical dependence is characterized by presence of withdrawal symptoms and tolerance. Withdrawal symptoms include sweating, vomiting, hand tremors. Psychological symptoms include insomnia, anxiety, psychomotor agitation and hallucination (Marc et al., 2015; Patil et al., 2011; Spragg and Tomasesi, 2015).

**Deleterious Effects of Alcohol in Various Systems of Body**

**Nervous System**
Seizures, Wernicke-Korsakoff syndrome, dementia, cerebellar degeneration, central-pontine myelinolysis, polyneuropathy, mononeuropathy, fetal alcohol syndrome, Marchiafava Bignami syndrome, stroke.

**Gastrointestinal Effects**
Gastritis, ulcers, bleeding, diarrhea and constipation, inflammatory bowel syndrome, esophageal varices, malabsorption of food and nutrients Liver Fatty liver, hepatitis, fibrosis, cirrhosis Pancreas. **Pancreatitis Head** Subdural hematoma, skull fractures.

**Genitourinary**
Urinary tract infection, electrolyte imbalance, lack of sexual interest, erectile dysfunction, decreased performance, anorgasmia Muscle: Myalgia, cramps, weakness, myopathy, muscle wasting. **Bone** Suppressed marrow, ischemic necrosis Joint: Arthralgia, inflammation, gout

**Blood** Leucopenia, iron-deficiency anemia, macrocytic anemia, thrombocytopenia

**Skin** Dermatitis, flushing, angiomas, urticaria, bruising, sweating.

**Endocrine**
Altered glucose tolerance, unstable diabetes mellitus, menstrual cycle irregularities, gynecomastia

**Lymph and Immunological**
Impaired immune response, carcinoma of breast, cervix and vagina in female, carcinoma of head and neck, esophagus, stomach, liver, pancreas (Loscalzo, 2013).

**Research Objectives**

| Table 1: Distribution According to Age |
|--------------------------------------|
| Age group (years) | No of patients | Percent |
|------------------|----------------|---------|
| 26-35            | 65             | 51.18%  |
| 36-45            | 30             | 24.39%  |
| 46-55            | 21             | 16.54%  |
| 56-65            | 11             | 08.66%  |
| Total            | 127            | 100%    |

(DF-3; p<0.0001)

| Table 2: Distribution According to Gender |
|------------------------------------------|
| Gender        | No of patients | Percent |
|---------------|----------------|---------|
| Male          | 127            | 100%    |
| Female        | 00             | 00%     |
| Total         | 127            | 100%    |

(DF=1 ; p<0.0001)

| Table 3: Distribution According to Duration of Alcohol Consumption |
|--------------------------------------------------------------------|
| Duration of alcohol consumption (years) | No of patients | Percent |
|----------------------------------------|----------------|---------|
| 5-10                                   | 64             | 50.39%  |
| >10                                    | 63             | 49.61%  |
| Total                                  | 127            | 100%    |

(DF=1, p=0.900, chi square=0.016)

| Table 4: Distribution According to Electrocardiographic Findings |
|------------------------------------------------------------------|
| ECG findings          | No of patients | Percent |
|-----------------------|----------------|---------|
| Normal                | 44             | 34.65%  |
| Abnormal              | 83             | 65.35%  |
| Total                 | 127            | 100%    |

( DF=1, p<0.0001 )

To assess cardiac function in chronic alcoholic by use of Electrocardiogram and 2D Transthoracic Echocardiogram and Doppler Objectives

To study the Electrocardiogram changes in chronic alcoholics To study the 2D Transthoracic Echocardiogram and Doppler changes in chronic alcoholics To correlate Electrocardiogram and 2D Transthoracic Echocardiogram and Doppler findings to duration of consumption in chronic alcoholic

**LITERATURE REVIEW**
A left ventricular analysis involving 204 straight untreated ethanol offenders in a substance addic-
Table 5: Distribution According to Electrocardiographic Findings

| ECG findings                        | n=127 | Percent  |
|-------------------------------------|-------|----------|
| Atrial Fibrillation                 | 17    | 13.38%   |
| SVT                                 | 07    | 05.51%   |
| VPCs                                | 09    | 07.09%   |
| Ventricular bigeminy                | 03    | 02.36%   |
| Ventricular trigeminy               | 01    | 00.79%   |
| RBBB                                | 07    | 05.51%   |
| LBBB                                | 02    | 01.57%   |
| Prolonged QT interval               | 07    | 05.51%   |
| Sinus tachycardia                   | 15    | 11.81%   |
| Low voltage ECG                     | 11    | 08.66%   |
| Sinus bradycardia                   | 03    | 02.36%   |
| S1Q3T3                              | 01    | 00.79%   |
| Sinus-Rhythm                        | 44    | 34.65%   |

Table 6: Distribution According to 2-D Echocardiographic Findings

| 2DECHO findings                    | n=127 | Percent  |
|-------------------------------------|-------|----------|
| Grade 1 diastolic dysfunction       | 36    | 28.35%   |
| LV systolic dysfunction             | 10    | 7.87%    |
| Dilated cardiomyopathy              | 02    | 01.57%   |
| Mild MR                             | 03    | 02.36%   |
| MVP                                 | 05    | 03.94%   |
| Trivial AR                          | 05    | 03.94%   |
| Mild PH                             | 07    | 05.51%   |
| LV Thrombus                         | 01    | 00.79%   |

Table 7: Association of 2-DEchocardiographic Findings and Duration of Alcohol consumption

| 2D ECHO findings                    | Duration of alcohol consumption | 'p' value |
|-------------------------------------|----------------------------------|-----------|
|                                     | <10 Years | >10 Years |          |
| Grade 1 diastolic dysfunction       | 13        | 23        | 0.043    |
| LV systolic dysfunction             | 05        | 05        | 0.979    |
| Dilated cardiomyopathy              | 02        | 00        | 0.157    |
| Mild MR                             | 01        | 02        | 0.550    |
| MVP                                 | 03        | 02        | 0.661    |
| Trivial AR                          | 04        | 01        | 0.177    |
| Mild PH                             | 06        | 01        | 0.055    |
| LV Thrombus                         | 01        | 00        | 0.319    |

(*p<0.05 statistical significance)
tion system. However, the epistemic closure of left ventricular ejection and local wall movement was seen in 19 percent of the patients by radioisotope angiography. Alcoholic cardiac muscle dysfunction (AHMD) exists in people with an elevated drug levels of greater than 80gms of ethanol a day over ten or more years, or through a total consumption of alcohol above 250 kg. Cardiomegaly, left ventricles' expansion and ventricular hypo-contractility are characteristic of AHMD (Gautam et al., 1970).

The disruption to the cardiovascular system induced by alcohol may be exacerbated later in life by prolonged pre-natal access to alcohol. A number of congenital cardiovascular malformations are created by fetal exposure. Nevertheless, this report reflects on four special medical implications of excessive consumption later in life (i.e. coronary disease, heart arrhythmia, elevated blood pressure and stroke) (Adem et al., 2014; Attar et al., 2017).

A study conducted by Attar et al. observed that alcohol consumption in alcoholic more than 8 years being more common (i.e. 68%) followed by alcohol consumption between 5 to 8 years of age group (i.e. 32%) (Wang et al., 2017).

A study conducted by Wang et al. (Swathi et al., 2014) showed in severe alcoholic which defined as alcoholic between 9 to 20 years of chronic alcohol consumption had reduction of ejection fraction associated with reduction of end diastolic volume of 101.14 (±8.79).

A Study conducted by Mahela et al, in chronic alcoholics using 2-Dimensional echocardiography observed that increased thickness of posterior wall and interventricular septum was most common finding i.e. in 15% subjects and reduced ejection fraction in 12.5% subjects (Attar et al., 2017).

The further study showed significant reductions in blood pressure following abstinence among 20 high-volume individuals (10 who have reported having fewer than 2 drinks a day and 10 who mentioned consuming 2-6 drinks a day). Studies of interference also found that three to eight alcoholic beverages a day are consumed by subjects with blood pressure throughout the range or above average (i.e. normotension and hypertension) to constricts blood vessels pressure. The quick-term decline in blood pressure was triggered either by complete abstinence or a decrease to less than one glass a day (Theodore, 2015).

MATERIALS AND METHODS

Study Details
The present study was cross-sectional, descriptive, hospital based observational study to assess cardiac function in chronic alcoholic by use of Electrocardiogram and Two Dimensional Transthoracic Echocardiogram and Doppler function.

Figure 1: Patient’s Age

Figure 2: Patient’s Alcohol Consumption

Figure 3: 2D Echo Finding of Patients

Duration of Study
18 months

Study Setting
The study was conducted in patients admitted in wards and ICU under Department of Medicine, Krishna Hospital and Medical Research Centre, Karad.
Study Population
All alcoholic patients admitted in wards and ICU during the period from October 2016 to March 2018 under Department of Medicine, Krishna Hospital and Medical Research Centre Karad with alcohol consumption duration more than 5 years.

Methodology
Data were collected through interview and review of medical records. Patient with alcohol consumption duration more than 5 years were selected.

1. Nature and purpose of study was explained to subjects and informed consent was obtained from those willing to participate in study.
2. A Pre-Structured Proforma was used to record personal details.
3. Patient’s present and past medical history was recorded.
4. Patient was grouped on basis of alcohol consumption duration.
5. Patient was followed up until they are discharged.
6. 12 lead ECG was taken in lying down position.

Patient’s vitals such as pulse rate in radial artery, blood pressure in supine position with use of mercury sphygmomanometer was recorded. Following investigation has been performed,

Lead ECG
12 lead ECG using Magic R-12 channel electrocardiograph designed by Medline team

2-Dimensional Echocardiography

All subjects underwent resting transthoracic 2-dimensional echocardiography and Doppler imaging.

1. Electrocardiographer was not aware of this study to avoid bias in interpretation.
2. A transthoracic 2-dimensional echocardiogram (TTE) with pulsed Doppler evolution of transmitral inflow and tissue Doppler imaging (TDI) and
3. 2D echocardiography was performed to minimize the errors in assessing cardiac function. Echocardiography was performed by harmonic imaging mode by Accuson –Siemens –X300 echocardiography machine (5-1 MHz multi frequency probe) according to standard protocol.

RESULTS AND DISCUSSION
Patient’s Age
It was observed that majority of patients were in age group 26-35 years (51.18%) followed by 36-45 years (24.39%), 46-55 years (16.54%) and 56-65 years (08.66%). The mean age of the patients was 38.96 (±10.16) years (see Table 1 and Figure 1).

Distribution according to gender
All patients enrolled in study were males (100%) in Table 2.

Distribution of patients according to duration of alcohol consumption
The study revealed that 50.39% patients were with duration of alcohol consumption between 5 to 10 years followed by 49.61% with >10 years. The mean duration of alcohol consumption was 10.30 (±3.59) years (Tables 3 and 4 and Figures 2 and 3).

Electrocardiographic findings among patients
The ECG changes in patients were sinus rhythm (34.65%) followed by Atrial fibrillation (13.38%), Sinus tachycardia (11.81%), Low Voltage (08.66%), Ventricular Premature Complexes (07.09%), Right Bundle Branch Block (5.51%), Supraventricular tachycardia (4.51%), Prolonged QT interval (5.51%), Sinus bradycardia (2.36%), Ventricular Bigeminy (2.36%), Left Bundle Branch Block (01.57%), Ventricular Trigeminy (00.79%), S1 Q3 T 3 (00.79%). Most common ECG abnormality being Atrial fibrillation (13.38%) in Table 5 and Figure 4.

2-D Echocardiographic findings among patients
The Echocardiographic changes in patients were Grade 1 diastolic dysfunction (28.35%), left ventricular dysfunction (7.87%), mild PH (5.51%), followed by MVP (3.94%), trivial AR (3.94%), mild MR
(2.36%), dilated cardiomyopathy (1.57%) and left ventricular thrombus in 1 (0.79%) patient. Most common abnormal 2D ECHO finding is Grade 1 diastolic dysfunction (28.35%) (Table 6).

**Association of 2-D Echocardiographic findings and duration of alcohol consumption**

Grade 1 diastolic dysfunction (p value <0.043) was significantly associated with duration of alcohol consumption. It was observed that mild PH, MVP, trivial AR, mild MR, dilated cardiomyopathy and left ventricular thrombus showed no significant association with duration of alcohol consumption (Table 7).

**CONCLUSIONS**

All the patients enrolled in present study were male. Majority of the patients were middle aged with duration of alcohol consumption was between five to ten years. The most common abnormal electrocardiographic findings were atrial fibrillation & sinus tachycardia. The least common electrocardiographic findings were ventricular trigeminy. The Diastolic dysfunction was the most common echocardiographic abnormality while Left ventricular thrombus and dilated cardiomyopathy were the least common echocardiographic abnormalities. In Present study we observed most common 2-D echocardiographic finding being Grade 1 Diastolic Dysfunction (i.e. 28.35%), followed by Left ventricular Dysfunction (i.e.7.87%) being second most common finding, followed by mild Pulmonary Hypertension (i.e. 5.51%). The duration of alcohol consumption was significantly associated with presence of electrocardiographic and echocardiographic abnormalities.

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**Conflict of Interest**

I hereby declare that there is no conflict of interest related to this manuscript.

**REFERENCES**

Adem, A., Abebe, S., Hailu, A., Feleke, B., Berhe, M., Atsibeha, M., Davilla, V. G. 2014. Heart diseases in north ethiopia pattern of echocardiographic abnormalities among adult cardiac patients - an experience from ayder hospital of mekelle university. *Ethiopian Medical Journal*, 52(4):173–183.

Attar, H. D. A., Saleem, H. B., Irfan, S. D., Aman 2017. Electrocardiographic and Echocardiographic Abnormalities in Chronic Alcohols. *Al Ameen J. Med. Sciences*, 10(1):10–15.

Gautam, M. P., Gautam, U. G., Dwivedi, S., Rijal, S. 1970. Echocardiographic abnormalities in non-moderate drinking of alcohol for prolonged duration. *Journal of College of Medical Sciences-Nepal*, 6(1):18–28.

Laddawala, N. K., Stevenson, L. W., Loscalzo, J. 2015. Cardiomyopathy and myocarditis. *Harrison's Principal of Internal Medicine*, 19:1553–1553.

Loscalzo, J. 2013. *Harrison’s Cardiovascular Medicine*. McGraw-Hill Education

Mann, D. L. 2014. Getting Pumped about Heart Failure.

Marc, G., Ghanny, J. H., Hoornagle 2015. Approach to patient with ALD. *Harrison’s Principal of Internal Medicine*, 19:2052–2075.

Mark, A., Schuckit, Kasper, D., Fauci, A., Hauser, S., Longo, D., Jameson, J. L., Loscalzo 2015. Alcohol and alcoholism. *Harrison's Principal of Internal Medicine*, 19:1439–1500.

Osiezagha, K., Ali, S., Freeman, C., Barker, N. C., Jabeen, S., Maitra, S., Olagbemiro, Y., Richie, W., Bailey, R. K. 2013. Thiamine deficiency and delirium. *Innovations in Clinical Neuroscience*, 10(4):26–32.

Parker, S. L., McGirt, M. J., Bekelis, K.,olland, C. M., Davies, J., Devlin, C. J., Atkins, T., Knightly, J., Groman, R., Zying, I., Asher, A. L. 2015. The National Neurosurgery Quality and Outcomes Database Qualified Clinical Data Registry: 2015 measure specifications and rationale. *Neurosurgical Focus*, 39(6):E4–E4.

Patil, V. C., Shah, K. B., Vasani, J. D., Shetty, P., Patil, H. V. 2011. Diastolic dysfunction in asymptomatic type 2 diabetes mellitus with normal systolic function. *Journal of Cardiovascular Disease Research*, 2(4):213–222.

Saitz, R. 2005. clinical practice:Unhealthy alcohol use. *New English journal of medicine*, 352(6):596–607.

Spragg, D. D., Tomasselli, G. F. 2015. Cardiac Bradyrhythmia. *Harrison’s Principal of Internal Medicine*, 19:1470–1470.

Swathi, K., Ahamed, N., R 2014. Study ECG Effects in Alcoholic and Normals. *J. Pharmacology Sciences & Research*, 6(7):263–265.

Theodore, A. 2015. Kotchen. Hypertension. Har-
rison’s Principal of. Internal Medicine, 19:1611–1611.

Wang, Y., Shan, G., Shen, J., Zhou, Q., Tan, B., Liu, Y., Luo, R., Zhao, S., Bi, W., Yao, F., Li, G. 2017. Assessment of left ventricular function in chronic alcoholics by real-time three-dimensional echocardiography. Medicine, 96(5):e6033–e6033.