Vol 8 | Issue 2 | 2018 | 90-93.

e-ISSN 2248 – 9142
print-ISSN 2248 – 9134

International Journal of
Current Pharmaceutical & Clinical Research

www.ijcpcr.com

Anaesthesia

AN IMPACT OF CARDIOVASCULAR CHANGES IN CHRONIC LIVER DISEASE ON ELDERLY POPULATION

Prashanth A B*

Assistant Professor, Sri Lakshmi Narayana Institute of Medical Science Medical College & Hospital, Puducherry, 605502, India.

ABSTRACT

Multifactorial pathogenic mechanisms take part in cardiovascular changes in chronic liver disease and them Include neurohumoral and vascular dysregulations. Evidences advocate that cirrhotic liver sickness associated cardiovascular abnormalities result in the pathogenesis of severa fatal complications which includes ascites, hepatorenal syndrome, hepatopulmonary syndrome, gastro esophageal varices and spontaneous bacterial peritonitis. The reasons for persistent hepatitis are numerous. It can be infective as in viral like Hepatitis B, Hepatitis C, Hepatitis D, additionally other viruses like Cytomegalovirus, Epstein Barr virus. Autoimmune situations like Primary biliary cirrhosis and primary sclerosing cholangitis. Other causes are non-alcoholic fatty liver disorder, alcoholic liver ailment and drug caused hepatitis, Cryptogenic & metabolic or hereditary disorders like Wilson's ailment, Haemochromatosis, alpha-1 antitrypsin deficiency also make a contribution to liver cirrhosis.The most commonplace reasons for cirrhosis of these are persistent hepatitis C, alcohol associated liver disorder, non-alcoholic fatty liver disorder (NAFLD), non-alcoholic steatohepatitis (NASH) and chronic hepatitis B. Primary Biliary associated cirrhotic liver is rare as compared to the others.

Key words: Ascites, Hepatorenal syndrome, Hepatopulmonary syndrome, Gastro esophageal varices, Spontaneous bacterial peritonitis.

INTRODUCTION

In this segment represents introduction of this research work. Sinusoidal portal hypertension is categorized by rise in confrontation to blood flow of hepatic sinusoids. This has two components; one is fibrotic disruption of liver architecture and another due to contractility changes of the stellate cells of the liver. In addition, changes in the hepatic sinusoidal myofibroblasts are also seen. Sensitivity of the hepatic sinusoidal cells to vasoactive mediators like nitric oxide (NO), prostaglandins and endothelins develops. The production of sinusoidal NO is impaired due to increased expression of caveolin (caveolin are intracellular lipid particle, they transports lipids among organelles, regulate vesicular trafficking of endothelium and signal transduction) in cirrhotic patients14, 15. In contrast to it, there is elevated level of NO in the splanchnic arterial circulation that causes vasodilation, along with other mediators like endogenous cannabinoids and carbon monoxide (CO) especially seen in patients with cirrhosis[10,11]. In persons with cirrhosis, the hyperdynamic state is normal due to the compensatory mechanisms of initial vasodilatation in the splanchnic arterial movement.

In cirrhosis, expansion of blood volume occurs before formation of ascites. The redistribution of increased blood volume progresses with hepatic decompensation, with expansion of the splanchnic bed and relatively compromised central circulation[1,2]. There is predominant sodium (Na+) and water retention, despite increased blood volume, which will be increase with the severity of cirrhosis. In the presence of arterial vasodilatation, the blood volume and the space it requires to occupy is disproportionate.[3,4].

Corresponding Author **:- Dr. Prashanth A B** Email:- prasananthu@gmail.com

In these articles represents sector 2 of these 3 presents the materials and methods adopted and section 4 presents the particulars of the experimentations and discussions. Finally segment 5 accomplishes the articles by allocation our implications and upcoming strategies.

RELATED WORKS

In this segment represents focuses the related works of this research work. Five sub types of muscarinic receptors are known of which M1, M3 and M5 receptors are found to be seen in vascular endothelial cells and they trigger phospholipase C, on the other hand M2 and M4 acetylcholine receptor sub types works against adenyl cyclase.[5] The muscarinic cells are represent in greater number in the atria and lesser in the ventricles. They are seen more in the endocardium than in the surface of the epicardium. The muscarinic receptors are found on the T tubules in coronary arteries, cardiomyocytes and capillary endothelial cell membranes. They are seen in very large number on atrioventricular and sinoatrial nodal cells.[6] The opposing action of beta-adrenergic stimulation against muscarinic receptors are well noted in ventricular cardiomyocytes. The functional changes of plasma membrane in cirrhosis.[7]

In cirrhosis when there is change in plasma membrane activity it may alter post-receptor functions of the cardiomyocyte system especially that which involves cyclic AMP. The most essential role of M1 and M3 muscarinic receptors is yet to be proved in cirrhotic cardiomyopathy.[8]

The fall in the level of cytoplasmic triphosphate and less activity as a "brake" which was non-voltage-dependent activates the potassium channels of the ventricles, to modify the myocyte excitation[5]. Stimulation of K+ channels is important for both initial and late phase of repolarisation. The K+ channel activators (like adenosine, calcitonin gene-related peptide, etc) stimulate hyperpolarization and relaxation, while inhibitors (like angiotensin II, 5-hydroxytryptamine, noradrenaline, neuropeptide Y, endothelin-1, etc) leads to depolarization and contraction. The current density of all the three types of K+ channels(Ca2+-independent transient outward K+ current, delayed rectifying K+ current, and inward rectifying K+ current) in isolated ventricular myocytes was found to be reduced in a rat model of bile duct ligated cirrhotic rats[6]. When there was a decrease in the density of K+, it was noticed that the baseline action potential of cirrhotic rats was longer compared to sham-operated rats[9]. This explains the reason for QT-interval prolongation in cirrhotic patients.

Calcium dependent current reduces immediately when there is a rapid change from short to long action potential. Thus, cardiomyocyte maintains in a contracted state when there is a significant prolongation of action potential. The main ionic current which sets the resting membrane potential in mammalian heart cells is K+ current.[10] It also has an effect in the last phase of repolarisation. Thus, it can be suggested that K+ current might have an effect on the inotropy of cardiac myocytes which is based on the concentration of calcium, a major driver of cardiac contractility.[11]

MATERIALS AND METHODS

In this segment represents the materials and methods of this research work. In many studies it is found that structural and functional changes have been noted in the left heart, but not on the right. Left atrial dilatation and left ventricular dilatation or hypertrophy has been observed. This is reflected a hyperdynamic state where in there is increased pulse rate and decreased cardiac output in the initial stages where the patient is asymptomatic [12].

STUDY AREA AND SETTING

Patients admitted in Medical Wards at RVS Institute of Medical Sciences, RVS Nagar, Chittoor, Andhra Pradesh.

STUDY DESIGN

The study was designed as a cross sectional study.

INCLUSION CRITERIA

1. Patients with chronic liver disease.
2. Patients aged above 18 years.
3. Patients who agreed to give consent for the study.

EXCLUSION CRITERIA:

1. Patients with acute liver disease.
2. Patients aged below 18 years.
3. Patients with congenital and acquired heart disease.
4. Patients with chronic kidney disease.
5. Patients with active infection.
6. Patients not willing to be included in the study.

STUDY DURATION

This study is done from January 2018 to January 2019

SAMPLE SIZE

Fifty (100) patients who were diagnosed with chronic liver disease, and admitted in the wards under the Department of General Medicine participated in this study.

MEASUREMENT OF STUDY VARIABLES

Clinical profile (history and clinical examination)
Age (years)
Gender
History of alcohol intake
Duration of alcohol intake (years)
Duration of liver disease (years)
Presence of diabetes mellitus
Pallor
Icterus
Edema

Splenomegaly
Ascites (mild, moderate or severe)
Encephalopathy (presence or absence)

Investigations
Platelet count
Liver Function test
PT/INR
Electrocardiography
Cardiac markers
Echocardiography
Serology (HIV, HBsAg, Anti HCV)
Renal Function Tests
Electrolytes (Na+, K+)

In the second compensatory phase the patient becomes clinically apparent with palpitations, tachycardia. At this point there is worsening hyperdynamic state. If untreated the patient progresses to the third phase of cardiac failure where the patient might present with signs and symptoms of cardiac failure. This includes pulmonary oedema. A variety of cardiac changes occur in CCM, that can be looked upon as high-output cardiac changes, the series of these events is not fully clear.

RESULTS AND DISCUSSIONS

In this section focuses the results and discussions of this research work. The baseline parameters along with physical examination characteristics, laboratory parameters and cardiovascular parameters were analysed to obtain the relationship between chronic liver disease and cardiac function.

BASELINE CHARACTERISTICS

The baseline parameters like age, sex, alcohol intake and alcohol duration, diabetes mellitus and duration of liver disease were taken.

Table 3:Descriptive analysis of baseline characteristics in the study group (N=100)

S.No.	Param-eter		Mean ± SD / Frequency	Percentage
1.	Age (years)		46.48 11.51	
		Male	84	84
2.	Sex	Female	16	16
3.	History of alcohol intake	Present	68	68
		Absent	32	32
4.	Duration of alcohol intake (years)		15.20 9.171	
5.	Duration of liver disease (years)		10.19 ± 8.29	
6.	Type 2 Diabetes Mellitus		26	26

The mean age was 46.48 ± 11.51(years) in study population. The proportion of male participants were 84 (84.0%) and female were 16 (16.0%) in the study population. The proportion of participants who reported alcohol intake was 68 (68.0%) and 32 (32.0%) people did not report with alcohol intake in the study population. The mean alcohol duration was 15.20 ± 9.171(years) in study population. The average duration of liver disease was 10.19 ± 8.29 (years) in the study group. The proportion of participants who had reported with Type 2 Diabetes Mellitus were 26 (26.0%) [13]

One of the late complications of liver cirrhosis is cirrhotic cardiomyopathy which presents as abnormal and dampened response of the heart to physiological, pathological and molecular level stress, although it reacts normally to upsurge in cardiac output and cardiac contractility at rest. This can be diagnosed with cardiac investigations like ECG, ECHO, serum cardiac markers (Troponin I, CK MB, NT pro BNP).

This study was done to measure the cardiovascular compromise in patient with liver cirrhosis. Hence, a cross sectional study with 50 adult patients diagnosed with cirrhosis admitted in the medical wards under the department of general medicine, RVS Institute of Medical Sciences, RVS Nagar, Chittoor, Andhra Pradesh from June 2017 to August 2018 was undertaken.

Patients with chronic liver disease were subjected to detailed history, examination, preliminary as well as specific investigations for cardiovascular system like cardiac serum markers (troponin I, CK MB, NT pro BNP), ECG and ECHO, and were studied [14,15].

Of the 50 subjects, the mean age was 46.48 years, 84% subjects were male and 16% were female, those with positive history of alcohol intake were 68% and who did not take alcohol were 32%.

ECG was taken for all patients no abnormality in QTc prolongation were observed. ECHO parameters (EF and RWMA) did not show any significant changes.

Troponin I in the study subjects were 24% when comparing the severity of liver cirrhosis using Child Pugh (p= 0.001) and MELD with average of 18 +/- 3 scoring (p= 0.015). Although CK MB showed a decreasing trend with severity of liver disease it was statistically insignificant and had no studies approving it, to the best of our knowledge.

NT pro BNP showed positive correlation when compared to Child Pugh categories - 20 subjects (40%) (P=0.001) and Meld score with a mean of 17.19 +/- 3.9 showed positive (P=0.022) which were statistically significant.

CONCLUSION

Finally this work concludes, In the present study an prominent troponin I was seen in 12 patients (24%), higher values were acquired in severe liver cirrhosis as demonstrated by Child Pugh score as well as Meld score. This was statistically significant (P= 0.001) elevated serum value of troponin I in 10 cirrhotic patients (33%), especially in those with alcoholic cirrhosis. This indicates linear co-relation of sub-clinical myocardial injury in severe liver cirrhosis classified similar co-relation of myocardial injury with higher Meld score were observed. Other marker of cardiac disease that have not been evaluated in the study includes 1) cardiac wall thickness, 2) vasodilator serum markers such as Nitric oxide, 3)vasoconstrictor serum markers such as Angiotensin due to limitation in availability of resources. The sample size of the study was not adequately motorized to detect a noteworthy alteration in the QTc, RWMA and CK MB levels, hence a larger population may need to be studied.

CONFLICT OF INTEREST

Authors declared no conflict of interest.

FUNDING SUPPORT

None

ACKNOWLEDGEMENT

The authors are thankful to all who have extended their constant support for the completion of the work.

REFERENCES

1. Liu H, Ma Z, Lee SS. Contribution of nitric oxide to the pathogenesis of cirrhotic cardiomyopathy in bile duct–ligated rats. Gastroenterology. 2000 May 31;118(5):937-44.
2. Herring N, Danson EJ, Paterson DJ. Cholinergic control of heart rate by nitric oxide is site specific. Physiology. 2002 Oct 1;17(5):202-6.
3. Seddon M, Shah AM, Casadei B. Cardiomyocytes as effectors of nitric oxide signalling. Cardiovascular research. 2007 Jul 15;75(2):315-26.
4. Liu H, Ma Z, Lee SS. Contribution of nitric oxide to the pathogenesis of cirrhotic cardiomyopathy in bile duct–ligated rats. Gastroenterology. 2000 May 31;118(5):937-44.
5. Gow AJ, Farkouh CR, Munson DA, Posencheg MA, Ischiropoulos H. Biological significance of nitric oxide-mediated protein modifications. American Journal of Physiology-Lung Cellular and Molecular Physiology. 2004 Aug 1;287(2):L262-8.
6. Mani AR, Ippolito S, Ollosson R, Moore KP. Nitration of cardiac proteins is associated with abnormal cardiac chronotropic responses in rats with biliary cirrhosis. Hepatology. 2006 Apr 1;43(4):847-56.
7. Anselmi A, Gaudino M, Baldi A, Vetrovec GW, Bussani R, Possati G, Abbate A. Role of apoptosis in pressure-overload cardiomyopathy. Journal of Cardiovascular Medicine. 2008 Mar 1;9(3):227-32.
8. Kerkela R, Force T. p38 mitogen-activated protein kinase: a future target for heart failure therapy?. Journal of the American College of Cardiology. 2006 Aug 1;48(3):556-8.
9. Parsons CJ, Takashima M, Rippe RA. Molecular mechanisms of hepatic fibrogenesis. Journal of gastroenterology and hepatology. 2007 Jun 1;22(s1):S79-84.
10. Ren J, Zhang S, Kovacs A, Wang Y, Muslin AJ. Role of p38 MAPK in cardiac apoptosis and remodeling after myocardial infarction. Journal of molecular and cellular cardiology. 2005 Apr 30;38(4):617-23.
11. Saurin AT, Martin JL, Heads RJ, Foley C, Mockridge JW, Wright MJ, Wang Y, Marber MS. The role of differential activation of p38-mitogen-activated protein kinase in preconditioned ventricular myocytes. The FASEB Journal. 2000 Nov 1;14(14):2237-46.
12. Sabio G, Arthur JS, Kuma Y, Peggie M, Carr J, Murray-Tait V, Centeno F, Goedert M, Morrice NA, Cuenda A. p38 regulates the localisation of SAP97 in the cytoskeleton by modulating its interaction with GKAP. The EMBO journal. 2005 Mar 23;24(6):1134-45
13. Ma Z, Lee SS. Cirrhotic cardiomyopathy: getting to the heart of the matter. Hepatology. 1996 Aug 1;24(2):451-9.
14. Liu H, Lee S. Cardiopulmonary dysfunction in cirrhosis. Journal of gastroenterology and hepatology. 1999 Jun 1;14(6):600-8.
15. Liu H, Song D, Lee SS. Cirrhotic cardiomyopathy. Gastroenterologie clinique et biologique. 2002 Oct;26(10):842-7.