Radiological and Biochemical aspect of Alcoholic Liver Disease: A Prospective study

Siddharth Bhargava¹, Navtej Singh², Prithpal S Matreja³*, Ashwani K Gupta³, Arshdeep Singh⁴

¹Under-graduate, Gian Sagar Medical College and Hospital, Village Ram Nagar, District Patiala, Punjab, India
²Department of Internal Medicine, BPS Government Medical College and Hospital, Khanpur Kalan, District Sonepat, India
³Department of Pharmacology, Gian Sagar Medical College and Hospital, Village Ram Nagar, District Patiala, Punjab, India
⁴Department of Radiodiagnosis, Gian Sagar Medical College and Hospital, Village Ram Nagar, District Patiala, Punjab, India

Keywords: Fatty Liver, Cirrhosis, Alcohol, Ascites, Alcoholic Liver Disease

ABSTRACT

Background: Alcoholic cirrhosis is second leading indication for liver transplantation in United States and Europe. The spectrum of alcohol related liver injury varies from simple steatosis to cirrhosis; patients with alcoholic cirrhosis have high prevalence of complications at the time of cirrhosis diagnosis. So there is a need to study the radiology and underlying biochemical changes for early diagnosis to reduce morbidity and mortality in case of alcoholic liver disease.

Methodology: the patients visiting the OPD of Medicine and suffering from ALD underwent through medical examination and then the severity of ALD was determined by radiological and biochemical findings. Patients who fulfilled the inclusion and exclusion criteria were enrolled in the study if they are willing to give written informed consent.

Results: A total number of 30 male patients were studied, 17 patients had cirrhosis and 9 had fatty liver. Ascites was most common manifestation in both cirrhosis and fatty liver; followed by splenomegaly and portal hypertension in cirrhosis, whereas common bile duct dilatation was seen more in fatty liver. There were derangements in liver function tests associated with different stages of alcoholic liver disease but this was not statistically significant. There seem to be no statistically significant (p>0.05) correlation with the various biochemical parameters.

Conclusions: Though a large number of radiological and biochemical changes are seen in cirrhosis and fatty liver, there seems to be no relation between these two. However the most common manifestation in both these conditions is ascites.

*Corresponding author:
Dr Prithpal S Matreja, Professor, Department of Pharmacology, Gian Sagar Medical College and Hospital, Village Ram Nagar, Tehsil Rajpura, District Patiala, Punjab 140601 India
Phone: +91-9855001847, Fax No.: +91-1762-520024
E-mail: drpsmatreja@yahoo.co.in

This work is licensed under the Creative commons Attribution 4.0 License. Published by Pacific Group of e-Journals (PaGe)
Introduction
ALD (alcoholic liver disease) is damage to liver due to years of heavy drinking. Alcohol causes inflammation in liver, over time, scarring and cirrhosis being the final stage of ALD [1]. Currently, alcoholic cirrhosis is second leading indication for liver transplantation in United States and Europe [2]. Recent epidemiological data suggest consumption of 40g of ethanol per day in men and 10-20 g per day in women for between 10 and 12 years being associated with an increased relative risk of developing liver disease [3]. As per the surveillance report published by National Institute on Alcohol Abuse and Alcoholism showed that liver cirrhosis was 12th leading cause of deaths in United States, with total of 29,925 deaths in 2007, 48% of which were alcohol related with drinking outside mealtime reported to increase the risk of ALD by 2.7 fold [4]. The spectrum of alcohol related liver injury varies from simple steatosis to cirrhosis, they are not necessarily distinct stages of evolution of the disease, but rather, multiple stages that may be present simultaneously in a given individual [5]. An aspartate transaminase/alanine transaminase (AST/ALT) ratio>3 is highly suggestive of ALD [6], imaging studies have been used to diagnose presence of liver disease but do not have role in establishing alcohol as specific etiology of liver disease. However, diagnosis of fatty acid change, established cirrhosis, and hepatocellular carcinoma may be suggested by ultrasound, computerized tomography (CT) scan, or Magnetic Resonance Imaging (MRI) and confirmed by other laboratory investigations [7]. Patients with alcoholic cirrhosis have high prevalence of complications at the time of cirrhosis diagnosis. The presence and type of complications at diagnosis are predictors of mortality, but not of the risk of subsequent complications [8]. These predictors of mortality are often unnoticed and the patient usually presents in hospital with end stage disease. So there is a need to study the radiology and underlying biochemical changes for early diagnosis to reduce morbidity and mortality in case of alcoholic liver disease.

There exist geographical variations regarding intake of alcohol. The burden of alcohol-related disease is the highest in the developed world, where it may account for as much as 9.2 % of all disability-adjusted life years. However, even in the developing regions of the world, alcohol accounts for a major portion of the global disease burden, and is projected to take on increasing importance in those regions over time. Punjab is among the top three regions of alcohol consumption in India. [9, 10]. Abstinence is the most important therapeutic intervention for patients with ALD [11] and has shown to improve the outcome and histological features of hepatic injury, reduce portal pressure and decrease progression to cirrhosis, and improve survival at all stages in patients with ALD [11–14]. The studies done in India are limited, hence this study was designed, to study the radiological and biochemical aspects of ALD.

Methodology
This prospective, cross sectional study was conducted in patients suffering from Alcohol Liver Disease from the Out Patient Department of our hospital. An assessment was done on the basis of AST/ALT from biochemical aspect and features of liver from radiological aspect.

Patients of both sexes, more than 18 years with history of alcoholism, diagnosed with alcoholic liver disease and willing to give written informed consent were included in the study. All patients with Non Alcoholic Fatty Liver, chronic medical, surgical conditions, organic brain syndrome, and chronic mental illness were excluded from the study.

Prior to the enrolment of the patients in the study, approval was obtained from the Institutional Ethics Committee, the patients visiting the OPD of Medicine and suffering from ALD underwent through medical examination and then the severity of ALD was determined by radiological and biochemical findings. Patients who fulfilled the inclusion and exclusion criteria were enrolled in the study if they are willing to give written informed consent.

Statistics: The data was presented as mean ± standard deviation (mean ± SD). The results obtained from the scales were compared using appropriate parametric (Student ‘t’ test, ANOVA) and non parametric tests (Chi-Square, Mann Whitney U, Wilcoxon Sign Rank test) wherever applicable. A p <0.05 was considered statistically significant.

Results
On the basis of procedure described in this study, radiological aspects, biochemical aspects were studied as well as an effort to establish a relation in between them was also made. A total number of 30 patients were studied and the following observations are made.

Out of 30 patients,
- No. of patients of cirrhosis seen = 17
- No. of patients of fatty liver seen = 9
- No. of patients with deranged LFTs but normal radiographic picture = 4

So, incidence of cirrhosis in Alcoholic liver disease =56.66% Incidence of fatty liver disease in Alcoholic liver disease =30%
Fatty liver, alcohol hepatitis, and cirrhosis are the three stages of alcoholic liver disease. An effort to establish the percentages of underlying manifestations with these stages was made and the following results are noted.

Table 1 show the manifestation of patients with cirrhosis of liver. Most of patients with cirrhosis had ascites followed by portal hypertension and splenomegaly.

1. Ascites is seen in 94.10% of cirrhotic patients.
2. Ascites is followed by portal hypertension and splenomegaly. (seen in 70.5% patients)
3. However pleural effusion is seen in very less percentage of patients (5.80%)

Table 2 show the manifestation of patients with fatty liver. Most of patients with fatty liver had ascites followed by common bile duct dilatation.

1. Ascites is seen in 88.88% of fatty liver patients
2. It is followed by manifestations of common bile duct dilatation (seen in 44.44% patients)

3. Manifestations of portal hypertension and cholelithiasis were found to be equal (seen in 11.10% patients)

From the data collected and observed, it is seen that Ascites is most common manifestation in both cirrhosis and fatty liver, however percentages are different in both of them.

**Biochemical findings:** Table 3 shows comparison of the biochemical parameters and demographic parameters in patients with cirrhosis and fatty liver. All the patients enrolled in the study were males. There were seen derangements in liver function tests associated with different stages of alcoholic liver disease. The patients with cirrhosis were of lower age group had higher serum bilirubin, direct bilirubin, higher total proteins, higher aspartate transaminase and alkaline phosphatase levels but this was not statistically significant (p>0.05).

**Correlation**
Estimates of correlation for age with various biochemical parameters was calculated and it was seen that age had no statistically significant (p>0.05) correlation with the various biochemical parameters (Table 4).

Table 3: Demographic and biochemical parameters of patients with cirrhosis and fatty liver

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Cirrhosis (n=17)</th>
<th>Fatty Liver (n=9)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years) (Mean±SD)</td>
<td>48.29±11.64</td>
<td>53.78±12.31</td>
<td>&gt;0.05*</td>
</tr>
<tr>
<td>Serum Bilirubin (Mean±SD)</td>
<td>7.42±9.61</td>
<td>7.39±10.4</td>
<td>&gt;0.05*</td>
</tr>
<tr>
<td>Serum Bilirubin Direct (Mean±SD)</td>
<td>4.17±5.07</td>
<td>3.31±5.11</td>
<td>&gt;0.05*</td>
</tr>
<tr>
<td>Total protein (Mean±SD)</td>
<td>9.89±16.18</td>
<td>6.68±0.90</td>
<td>&gt;0.05*</td>
</tr>
<tr>
<td>Serum Albumin (Mean±SD)</td>
<td>3.21±1.07</td>
<td>3.43±0.85</td>
<td>&gt;0.05*</td>
</tr>
<tr>
<td>Serum Globulin (Mean±SD)</td>
<td>3.74±0.57</td>
<td>3.41±0.44</td>
<td>&gt;0.05*</td>
</tr>
<tr>
<td>Albumin:Globulin Ratio (Mean±SD)</td>
<td>0.91±0.32</td>
<td>0.96±0.35</td>
<td>&gt;0.05*</td>
</tr>
<tr>
<td>Aspartate transaminase (Mean±SD)</td>
<td>133.94±101.63</td>
<td>117±88.14</td>
<td>&gt;0.05*</td>
</tr>
<tr>
<td>Alanine transaminase (Mean±SD)</td>
<td>52.11±22.85</td>
<td>58.44±24.74</td>
<td>&gt;0.05*</td>
</tr>
<tr>
<td>Alkaline phosphatase (ALP) (Mean±SD)</td>
<td>184.71±123.11</td>
<td>156.89±81.94</td>
<td>&gt;0.05*</td>
</tr>
</tbody>
</table>

*no statistically significant difference between groups using student ‘t’ test.
Table 4: Correlation coefficients for age with biochemical parameters among patients in both groups

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cirrhosis (n=17)</th>
<th>Fatty Liver (n=9)</th>
<th>Age</th>
<th>p</th>
<th>Age</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum Bilirubin</td>
<td>0.07</td>
<td>0.87</td>
<td>0.02</td>
<td>0.94</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum Bilirubin Direct</td>
<td>0.08</td>
<td>0.83</td>
<td>0.11</td>
<td>0.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total protein</td>
<td>0.01</td>
<td>0.99</td>
<td>0.20</td>
<td>0.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum Albumin</td>
<td>0.08</td>
<td>0.84</td>
<td>0.22</td>
<td>0.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum Globulin</td>
<td>0.12</td>
<td>0.75</td>
<td>0.18</td>
<td>0.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albumin:Globulin Ratio</td>
<td>0.09</td>
<td>0.82</td>
<td>0.15</td>
<td>0.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGOT</td>
<td>0.09</td>
<td>0.82</td>
<td>0.35</td>
<td>0.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGPT</td>
<td>0.05</td>
<td>0.90</td>
<td>0.31</td>
<td>0.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALP</td>
<td>0.15</td>
<td>0.71</td>
<td>0.17</td>
<td>0.52</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p>0.05 and not statistically significant

Discussion
Ascites is the main complication of cirrhosis [15] and the mean time period to its development is approximately 10 years [16, 17]. Ascites correlated best with early onset cirrhosis as compared to alcoholic hepatitis, even though both were nearly equally (n=5 vs. n=3) distributed in these subset of patients [18]. Similar finding is seen in our study where ascites is seen frequently in cirrhosis patient. Study from Mumbai noted that among 327 patients that were followed up, 41% had cirrhosis while the remaining 31% had noncirrhotic liver disease [17]. The results of our study also reflect figures similar to this.

This study was an attempt to study the radiological and biochemical findings in Alcoholic liver disease. Ascites correlated best with cirrhosis in early stage [18]. Similar finding is observed in our study. Portal hypertension is the underlying cause of cirrhosis in most of the clinical cases and hence increased percentages of ascites in cirrhosis also shows increased percentages of portal hypertension. However this is not as much appreciable in fatty liver. Varices are also most commonly associated with cirrhotic disease. Alcohol acts as a toxic agent (hepatotoxic) and leads to pathological changes in liver. Though 80% of alcohol passes through liver to be detoxified, on chronic consumption of alcohol their occurs secretion of pro inflammatory cytokines (TNF-alpha, Interleukin 8), oxidative stress, lipid peroxidation, acetaldehyde toxicity.

These factors cause inflammation, apoptosis, and eventually fibrosis of liver cells. The final stage is cirrhosis in which fibrosis is seen extensively and it shrinks the liver further damaging the liver. Ultrasonography helps to reveal the morphological changes occurring in liver.

Conclusion
The various radiological and biochemical findings reveals the underlying manifestations associated with them. Though a large number of radiological and biochemical changes are seen it is difficult to establish a relation between these two. However this relation is established by some studies that have used samples of liver biopsy. But we have used limited number of resources and no samples are taken. The findings in this study help us to understand various underlying pathophysiological manifestations related to study and also tell about derangements in LFTs seen in alcoholic liver disease. As Punjab is one of the top three states in name of alcohol abuse there is a need of conducting further studies in relation to this and awaring general population about the various clinical effects and fatality chronic alcohol consumption may cause.

References

http://www.pacificejournals.com/aabs


