

 <p>ISSN NO. 2320-5407</p>	<p>Journal Homepage: - <a href="http://www.journalijar.com">www.journalijar.com</a></p> <h2>INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)</h2> <p>Article DOI: 10.21474/IJAR01/1897 DOI URL: <a href="http://dx.doi.org/10.21474/IJAR01/1897">http://dx.doi.org/10.21474/IJAR01/1897</a></p>	 <p>INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR) ISSN 2320-5407 Journal homepage: <a href="http://www.journalijar.com">http://www.journalijar.com</a> Journal DOI: 10.21474/IJAR01</p>
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### RESEARCH ARTICLE

#### DYSLIPIDEMIA IN ALCOHOLIC LIVER DISEASE.

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#### Manuscript Info

##### Manuscript History

Received: 15 August 2016  
Final Accepted: 22 September 2016  
Published: October 2016

##### Key words:-

fatty liver, hepatitis, cirrhosis, lipid profile

#### Abstract

**Objective:-** Alcohol consumption can lead to several diseases. Depending on the frequency and quantity, the consumption of alcohol may increase the risk of malnutrition, weight-gain, liver failure and cardiovascular diseases. The aim of this study was to study the influence of alcohol intake on lipid profile.

**Method:-** This was a Cross sectional study done at , Pt. B.D. SHARMA, P.G.I.M.S, Rohtak. 50 patients with alcoholic liver disease and 50 healthy controls were enrolled for the study.

**Result:-** Mean triglycerides and VLDL levels showed statistically no significant difference between patients and healthy controls ( $p > 0.05$ ) but cholesterol, HDL and LDL were found to be significantly low in patients as compared to controls.

**Conclusion:-** estimation of serum Lipid Profile allows better assessment of hepatic function and evaluation of prognosis of patients with alcoholic liver disease.

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#### Introduction:-

Alcoholic liver disease (ALD) is a spectrum of liver manifestations of alcohol overconsumption including fatty liver, alcoholic hepatitis and chronic hepatitis with liver fibrosis or cirrhosis. Alcohol remains a major cause of liver disease worldwide. Chronic consumption of alcohol results in the secretion of pro-inflammatory cytokines, oxidative stress, lipid peroxidation and acetaldehyde toxicity. These factors cause inflammation, apoptosis and eventually fibrosis of liver cells.

Alcoholic liver disease has a significant impact on the economy as a result of premature death, illness and disability.<sup>1</sup> Derangement of serum lipid profile is a common observation in liver fibrosis. There is very less known facts about the status of various lipoproteins in patients with alcoholic liver disease. The liver plays a central role in the synthesis, metabolism and degradation of these lipids and lipoproteins. Hence in cirrhosis the concentrations of these lipids and lipoproteins are altered.

This aspect of alcoholic liver disease has been studied extensively worldwide but few studies have been done in India to show the effect of alcohol consumption on function of liver especially the levels of various lipoproteins like cholesterol, HDL, LDL and VLDL. Today large number of specialised tests is available for diagnosing and

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categorising the grades of liver injury. But most of the tests show extent of hepatocellular damage without commenting on synthetic function of liver.

In 1862, Austin Flint had suggested that the blood cholesterol level was affected by the liver diseases.<sup>2</sup> Later on, Neil McIntyre also studied the levels of various plasma lipoproteins in liver diseases.<sup>3</sup>

In present study we had studied and compared the levels of different lipoproteins, serum calcium, serum phosphorous and complete blood count (Hb, TLC and DLC) in alcoholic liver disease cases and healthy controls.

### Material and methods:-

The present study was conducted in the department of Biochemistry in collaboration with Department of Medicine, Pt. B.D. SHARMA, P.G.I.M.S, Rohtak.

### Inclusion Criteria:-

**Group-I:-** This group included 50 clinically diagnosed cases of Alcoholic Liver diseases (ALD) supported with serological tests, ultrasonogram in the age group of 25-60 years.

**Group-II:-** This group included 50 age and sex matched healthy individuals.

### Exclusions Criteria:-

Patients with following disease were excluded from the study

- ❖ Any patient with history of drug intake that are known to be hepatotoxic
- ❖ Diabetes, hypertension and any other long term systemic illness
- ❖ Tuberculosis
- ❖ Acute lymphoid leukemia
- ❖ Chronic viral hepatitis
- ❖ Wilson's disease
- ❖ Hemochromatosis
- ❖ Any malignant disease
- ❖ Infectious mononucleosis

**Sample collection** Under all aseptic precautions fasting 10ml of venous blood sample was collected in Red topped and purple topped vacutainer. Samples in purple topped vacutainer were analysed immediately for complete hemogram. Samples in red topped vacutainer were allowed to stand at room temperature until clotted. Clotted Samples were centrifuged at 3000rpm and serum separated Tests were analysed immediately.

### Routine Investigations were done on Autoanalyser using kits:-

- ❖ Complete blood count- Automated cell counter
- ❖ Haemoglobin (gm%) – Acid hematin method using sahli's haemoglobinometer
- ❖ Lipid profile (mg/dL) – Enzymatic method<sup>87</sup>
- ❖ Serum LDL cholesterol (mg/ dL) – Derived by Friedwald's equation Method<sup>88</sup>
- ❖ Serum calcium (mg/ dL)– Arsenazo III Method<sup>89</sup>
- ❖ Serum phosphorus (mg// dL)- UV Molybdate Method<sup>90</sup>
- ❖ X-ray chest
- ❖ Ultrasonography

### Observations:-

The present study was conducted in the Department of Biochemistry in collaboration with department of Medicine, Pt. B.D. sharma, P.G.I.M.S, Rohtak. A total of 100 subjects were included in the present study. Subjects were divided into two groups. Group I was study group and Group II was control group. Study group included clinically diagnosed cases of alcoholic liver diseases supported with serological tests, ultrasonogram in the age group of 25-60 years. Control group included 50 age and sex matched healthy individuals.

The following were the observations of the present study.

**Age distribution:-**

**Table 1:-** Age distribution

Age range (years)	Group I (n=50)	Group II (n=50)
Upto 30 years	0	2 (4%)
31-40	25 (50%)	23 (46%)
41-50	20 (40%)	19 (38%)
>50	5 (10%)	6 (12%)
Range	32-60	28-56
Mean±SD	42.76±7.76	41.16±6.44

Table I shows age distribution of the study group and control group. In the present study, majority of patients belonged to 31-40 years in both the groups. Mean age was 42.76±7.76 years in group I and 41.16±6.44 years in group II. On statistical comparison, both groups were found to be comparable and thus there was no significant difference ( $p > 0.05$ ).

**Table II:- Sex distribution.**

Sex	Group I (n=50)	Group II (n=50)
Male	50 (100%)	50 (100%)
Female	-	-

Table II shows sex distribution of patients in our study. All the patients as well as control subjects (100%) were male. In our study, no female was found to be alcoholic.

**Routine investigations:-**

**Table III:-** Laboratory Investigations.

Investigations	Group I (n=50)	Group II (n=50)	p value
Hb (gm%)	8.43±2.64	14.28±1.10	<0.001 Highly significant
TLC(cu.mm)	7926±3788	5842±1293	<0.001 Highly significant
APC(cu.mm)	153300±68186	173260±19119	<0.05 Significant

As per above table (Table III) mean haemoglobin of alcoholic liver disease patients was found to be low as compared to healthy individuals i.e. 8.43±2.64 gm% in group I and 14.28±1.10 gm% in group II. Similarly TLC was found to be raised in group I patients as compared to healthy individuals. Also, APC was found to be significantly low as compared to healthy controls as shown in table III. On statistical comparison between group I and group II the results were found to be significant i.e.  $p < 0.001$ ,  $p < 0.001$  and  $p < 0.05$  respectively.

**Table IV:-** Laboratory investigations.

Investigations	Group I (n=50)	Group II (n=50)	p value
S. Calcium (mg/dL)	7.70±0.77	9.15±0.46	<0.001 Highly significant
S. Phosphorous (mg/Dl)	3.3±0.11	3.4±0.10	>0.05 Not significant

In the present study S. calcium was found to be low in alcoholic liver disease patients i.e. mean calcium was 7.70±0.77 mg/dL in group I as compared to 9.15±0.46 mg/dL in group II, the difference between two groups was statistically significant ( $P < 0.001$ ) and mean phosphorous level was 3.3±0.11 mg/dL in group I as compared to 3.4±0.10 mg/dL in group II. S. Phosphorous level was found to be comparable in both the groups ( $p > 0.05$ ).

**Table V:-** Lipid profile

Investigations	Group I (n=50)	Group II (n=50)	p value
Triglycerides (mg/dL)	105.72±80.25	115.04±27.61	>0.05 Not significant
Cholesterol (mg/dL)	119.32±39.37	168.92±27.94	<0.001 Highly significant
HDL (mg/dL)	28.76±10.55	43.52±7.53	<0.001 Highly significant
LDL (mg/dL)	70±25.82	103.16±25.94	<0.001 Highly significant
VLDL (mg/dL)	20.98±16.10	22.78±5.54	>0.05 Not significant

In the present study, we carried out lipid profile of all the patients of alcoholic liver disease as well as healthy controls. Mean triglycerides and VLDL levels showed statistically no significant difference between patients and healthy controls ( $p>0.05$ ) but cholesterol; HDL and LDL were found to be significantly low in patients as compared to controls. In our study, mean cholesterol was  $119.32\pm39.37$  mg/dL in group I and  $168.92\pm27.94$  mg/dL in group II. Similarly, HDL was found to be  $28.76\pm10.55$  mg/dL in group I and  $43.52\pm7.53$  mg/dL in group II and LDL was  $70\pm25.82$  mg/dL and  $103.16\pm25.94$  mg/dL in group I and group II respectively ( $p<0.001$ ).

### Discussion:-

In the present study mean haemoglobin and absolute platelet count (APC) of alcoholic liver disease patients were found to be low as compared to healthy individuals. Hemoglobin (Hb) was  $8.43\pm2.64$  gm% in group 1 and  $14.28\pm1.10$  gm% in group 2. Absolute platelet count (APC) in alcoholic liver disease patients was  $153300\pm68186$ /cu.mm and in control group was  $173260\pm19119$ /cu.mm. But TLC was found to be raised in group I patients as compared to healthy controls. On comparison with control group the results were found to be significant i.e.  $p<0.001$ ,  $p<0.001$  and  $p<0.05$  for Hb, APC and TLC respectively (table III).

Similar studies were reported by Lakshmipathy et al<sup>4</sup>. Another study done by Kumar das et al showed mean of Hb in normal person was  $14.91\pm0.11$  gm% and in alcoholic liver disease was  $12.86\pm0.26$  gm%<sup>5</sup>.

The low level of hemoglobin and platelets indicated that alcohol has a variety of pathological effects on hematopoiesis. It suppresses the blood cell production because of its toxic effects which result in fewer-than-normal or non-functional mature blood cells. As a result alcoholics may suffer from moderate anemia characterized by enlarged, structurally abnormal RBC's; mildly reduced number of WBC's, especially of neutrophils; and moderately to severely reduced numbers of platelets<sup>6</sup>.

Many bone marrow abnormalities occurring in severe alcoholics affect the RBC precursor cells. These abnormalities most predominantly include vacuolated precursors or characteristic iron deposits<sup>6</sup>. In our study calcium was found low in alcoholic liver disease patients, mean calcium was  $7.70\pm0.77$  mg/dL in cases as compared to controls  $9.15\pm0.46$  mg/dL. Mean phosphorous level was  $3.3\pm0.11$  mg/dL in cases as compared to controls  $3.4\pm0.10$  mg/dL and the statistical difference was found in calcium but no significant difference was observed in phosphorous (table VI).

An adequate concentration of calcium in the blood stream is required for proper functioning of nerves and muscle. The body monitors calcium concentration and responds through the action of hormones, vitamins, and local growth factors to regulate the distribution of calcium between blood and bone. Alcohol may disrupt this balance by affecting the hormones that regulate calcium metabolism as well as the hormones that influence calcium metabolism indirectly (e.g. steroid reproductive hormones and growth hormone)<sup>7</sup>.

Further alcoholics normally have low levels of activated vitamin D, along with low levels of the proteins that bind with vitamin D during transport within the blood<sup>8</sup>. The alcohol-induced decrease in activated vitamin D results in decreased absorption of calcium<sup>9</sup>. Another reason may be short-term alcohol consumption increases PTH secretion possibly by causing calcium to leave body fluids (e.g. blood) and flow into cells<sup>10</sup>.

In the present study lipid profile of patients was investigated. Mean triglycerides and VLDL showed no significant difference between patients and healthy controls but cholesterol; HDL and LDL levels were found to be significantly low when compared with controls. In our study, mean cholesterol was low in group I as compared to group II i.e.  $119.32\pm39.37$  mg/dL in group I and  $168.92\pm27.94$  mg/dL in group II respectively. Similarly, HDL and LDL were found to be  $28.76\pm10.55$  mg/dL and  $43.52\pm7.53$  mg/dL in group I and  $70\pm25.82$  mg/dL and  $103.16\pm25.94$  mg/dL respectively in group II (table VII).

Alcohol consumption may contribute to alterations in lipoprotein metabolism involving cholesteryl ester transfer protein, phospholipid transfer protein, lecithin – cholesterol acyltransferase, hepatic lipase, paraoxonase-1, and phospholipases<sup>11</sup>.

Similar findings were also reported by Jagannatha et al in their study HDL level in controls was  $46\pm1.8$  mg/dL as compared to cases of ALD where the level of HDL was  $40\pm1.5$  mg/dL<sup>12</sup>. Similarly total cholesterol in controls was  $186\pm23.1$  mg/dL as compared to cases where level of total cholesterol was  $138\pm12.5$  mg/dL.

Study done by Kumar et al reported total cholesterol was  $141.5 \pm 46.69$  mg/dL, triglycerides was  $120.9 \pm 96.23$  mg/dL, HDL was  $33.50 \pm 12.78$  mg/dL, LDL was  $86.58 \pm 35.63$  mg/dL and VLDL was  $23.53 \pm 15.04$  mg/dL in cases of ALD and in controls total cholesterol was  $192 \pm 21.34$  mg/dL, Triglycerides was  $137.6 \pm 14.36$  mg/dL, HDL was  $41.78 \pm 5.04$  mg/dL, and LDL was  $122.8 \pm 19.29$  mg/dL, and VLDL was  $27.52 \pm 2.87$  mg/dL<sup>13</sup>. The result of their study showed total cholesterol, LDL, VLDL and HDL significantly low in the ALD patients when compared with the control group.

Selimoglu and colleagues in their study showed that with the exception of serum triglyceride level, other variables like serum HDL, LDL level were decreased in alcoholic cirrhotics<sup>14</sup>.

Study done by Phukan et al found marked alteration of serum lipid profile values in patients with alcoholic cirrhosis compared with normal non alcoholic-cirrhotic individual<sup>15</sup>. Another study done by Ghadir et al demonstrated that more severe the liver damage the more decline in lipids levels is detected, especially in LDL and total cholesterol levels<sup>16</sup>. However, no correlation was observed between the serum triglyceride level and the extent of liver damage.

Hypolipidemia is also seen in various other medical conditions like malnutrition, malabsorption, hyperthyroidism, renal failure, malignancy and immunoglobulin disorders. So we excluded patients suffering from these disorders in our study<sup>17</sup>.

In conclusion estimation of serum Lipid Profile allows better assessment of hepatic synthetic function and evaluation of prognosis of patients with alcoholic liver disease..

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