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Original Research

A Descriptive Observational Study of Lipid Profile in Alcoholic and Non-Alcoholic Patients of Chronic Liver Disease at an Urban-based Tertiary Care Centre

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Abstract
Introduction: Liver is crucial for metabolism of lipids. It synthesizes & clears lipoproteins. Alcohol has significant effects on lipid metabolism. As the lipoprotein synthesis is impaired, total cholesterol & triglycerides are reduced in chronic liver disease.
Aim: To study lipid profile parameters in alcohol associated liver disease & chronic liver disease due to other causes at Sawai Man Singh Hospital, Jaipur.
Methods: Descriptive cross-sectional observational study conducted at Department of Internal Medicine, Sawai Man Singh Medical College & Hospital, Jaipur from January 2023 to April 2024 on total sample size of 150 patients (50 patients of alcohol associated liver disease, 50 patients of chronic liver disease due to etiology other than alcoholism & 50 healthy controls).
Results: In present study the mean total cholesterol, high density lipoproteins, low density lipoproteins, very low density lipoproteins & triglycerides were significantly low in chronic liver disease patients than healthy controls.
Conclusion: Future larger multicenter studies on effects of alcohol on lipid profile in chronic liver disease should be conducted to validate the results of present study which can provide us further information on treatment & prognosis of alcohol associated liver disease in future.

Introduction

Chronic liver disease is increasingly common in middle age population having substantial impact on global economy due to significant morbidity, disability & mortality. The Liver is crucial for metabolism of lipids. It synthesizes & clears lipoproteins. [(1)] Alcohol has significant effects on lipid metabolism like inhibition of oxidation of fatty acids in liver & inducing synthesis of new fatty acids. Most common lipid profile derangement in population with long tern alcohol consumption is increased triglycerides. [(2)] Long term alcohol consumption results in significant derangement in lipid transport due to alcohol affecting lipid metabolism in hepatic & extra hepatic tissues as well as significant liver function derangement. [(3)]

Total cholesterol & triglycerides are often found to be reduced in chronic liver disease from multiple etiology as the lipoprotein synthesis is impaired. [(4)]

Globally alcohol associated liver disease is increasingly common cause of morbidity, disability & mortality. Alcoholism leads to alcohol associated fatty liver disease, steatohepatitis, fibrosis & cirrhosis. [(5)]

Alcoholism is gradually increasing as an important etiology for cirrhosis. In USA, deaths due to alcohol associated liver disease comprises about 48% of deaths due to chronic liver disease & are also significantly

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contributes to morbidity, disability & mortality due to chronic liver disease in various countries. [6]

Most of the studies were done only on lipid profile in alcohol associated liver disease. There are very few studies on chronic liver disease due to etiology other than alcoholism & more so in this part of the world. With this study, we intend to compare lipid profile in alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism which can further guide us in disease management.

Aim & Objectives

To study lipid profile parameters in alcohol associated liver disease & chronic liver disease due to other causes at Sawai Man Singh Hospital, Jaipur. To compare lipid profile in alcohol associated & non-alcohol associated patients of chronic liver disease. To detect relationship between lipid profile & other variables like age of patients & duration of alcohol intake in patients of alcohol associated liver disease.

Materials & Method

In this descriptive cross-sectional observational study conducted at Department of General Medicine, Sawai Man Singh Medical College & Hospital, Jaipur from January 2023 to April 2024, a total sample size of 150 patients (50 patients of alcohol associated liver disease, 50 patients of chronic liver disease due to etiology other than alcoholism & 50 healthy controls) was taken.

Results

Current study shows patients' mean age as 49.50±5.94 years as presented in Table 1 & Chart 1. The mean age in alcohol associated liver disease, chronic liver disease due to etiology other than alcoholism & healthy controls was 49.56 ± 5.99 years, 49.74 ± 6.17 years & 49.20 ± 5.74 years respectively. Application of t test shows that there were no significant differences between the three groups on parameter of age.

In present study out of 150 patients, 50 patients belonged to alcohol associated liver disease, 50 patients belonged to chronic liver disease due to etiology other than alcoholism & 50 patients belonged to healthy controls. Out of 150 patients 26 were female 15 were females & 124 were males as presented in Table 2. Out of 50 patients of alcohol associated liver disease 2 were females & 48 were males. Out of 50 patients of chronic liver disease due to etiology other than alcoholism 11 were females & 39 were males & out of 50 patients of healthy controls 13 were females & 37 were males. Application of t test shows that there are significant differences in between the three groups on parameter of sex.

Current study shows patients' mean total cholesterol as 145.23 ± 15.00mg/dL as presented in Table 3 & Chart 2. The mean total cholesterol in alcohol associated liver disease, chronic liver disease due to etiology other than alcoholism & healthy controls was 135.72 ± 8.63, 136.18 ± 8.20 & 163.80 ± 3.90 respectively. Application of t test shows that there are significant differences between the three groups on parameter of total cholesterol. Current study shows patients' mean HDL as 37.25 ± 7.09mg/dL as presented in Table 4 & Chart 3. The mean HDL in alcohol associated liver disease, chronic liver disease due to etiology other than alcoholism & healthy controls was 32.34 ± 3.26, 34.16 ± 4.26 & 45.26 ± 4.91mg/dL respectively & application of t test shows that there are significant differences between the three groups on parameter of HDL.

Current study shows patients' mean LDL as 78.33 ± 10.05mg/dL as presented in Table 5 & Chart 4. The mean LDL in alcohol associated liver disease, chronic liver disease due to etiology other than alcoholism & healthy controls was 71.36 ± 3.20, 71.94 ± 3.39 & 91.68 ± 3.47 mg/dL respectively & application of t test shows that there are significant differences in between the three groups on parameter of LDL.

Current study shows patients' mean VLDL as 24.47 ± 3.53mg/dL as presented in Table 6 & Chart 5. The mean VLDL in alcohol associated liver disease, chronic liver disease due to etiology other than alcoholism & healthy controls was 22.24 ± 1.84, 22.46 ± 1.91 & 28.72 ± 1.80mg/dL respectively & application of t test shows that there are significant differences in between the three groups on parameter of VLDL.

Current study shows patients' mean triglycerides as 126.82 ± 12.48mg/dL as presented in Table 7 & Chart 6. The mean serum triglycerides in alcohol associated liver disease, chronic liver disease due to etiology other than alcoholism & healthy controls was 117.18 ± 3.23, 119.72 ± 4.09 & 143.56 ± 3.75mg/dL respectively & application of t test shows that there are significant differences in between the three groups on parameter of serum triglycerides.

Table 1: Classification of Categorical data based on Age

Parameter	Categories				P Value
	Alcoholic Cirrhosis	Non-Alcoholic Cirrhosis	Healthy	Total	
	Mean SD	Mean SD	Mean SD	Mean SD	
Age (years)	49.56 ± 5.99	49.74 ± 6.17	49.20 ± 5.74	49.50 ± 5.94	0.927

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Table 2: Sex based categorization of categorical data

Parameter		Categories								P Value
		Alcoholic Cirrhosis		Non-Alcoholic Cirrhosis		Healthy		Total		
		No.	%	No.	%	No.	%	No.	%	
Gender	Female	2	7.7%	11	42.3%	13	50.0%	26	17.3%	0.008
	Male	48	38.7%	39	31.5%	37	29.8%	124	82.7%	
	Total	50	33.3%	50	33.3%	50	33.3%	150	100%	

Table 3: Classification of Categorical data based on Total Cholesterol

Parameter	Categories				P Value
	Alcoholic Cirrhosis	Non-Alcoholic Cirrhosis	Healthy	Total	
	Mean SD	Mean SD	Mean SD	Mean SD	
Total Cholesterol (mg/dL)	135.72 ± 8.63	136.18 ± 8.20	163.80 ± 3.90	145.23 ± 15.00	<0.001

Table 4: Classification of Categorical data based on HDL

Parameter	Categories				P Value
	Alcoholic Cirrhosis	Non-Alcoholic Cirrhosis	Healthy	Total	
	Mean SD	Mean SD	Mean SD	Mean SD	
HDL Cholesterol	32.34 ± 3.26	34.16 ± 4.26	45.26 ± 4.91	37.25 ± 7.09	<0.001

Table 5: Classification of Categorical data based on LDL levels

Parameter	Categories				P Value
	Alcoholic Cirrhosis	Non-Alcoholic Cirrhosis	Healthy	Total	
	Mean SD	Mean SD	Mean SD	Mean SD	
LDL Cholesterol (mg/dL)	71.36 ± 3.20	71.94 ± 3.39	91.68 ± 3.47	78.33 ± 10.05	<0.001

Table 6: Classification of Categorical data based on VLDL

Parameter	Categories				P Value
	Alcoholic Cirrhosis	Non-Alcoholic Cirrhosis	Healthy	Total	
	Mean SD	Mean SD	Mean SD	Mean SD	
VLDL Cholesterol	22.24 ± 1.84	22.46 ± 1.91	28.72 ± 1.80	24.47 ± 3.53	<0.001

Table 7: Classification of Categorical data based on Serum Triglycerides levels

Parameter	Categories				P Value
	Alcoholic Cirrhosis	Non-Alcoholic Cirrhosis	Healthy	Total	
	Mean SD	Mean SD	Mean SD	Mean SD	
Serum Triglyceride	117.18 ± 3.23	119.72 ± 4.09	143.56 ± 3.75	126.82 ± 12.48	<0.001

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Chart 1: Bar Chart of Mean Age of Categorical data

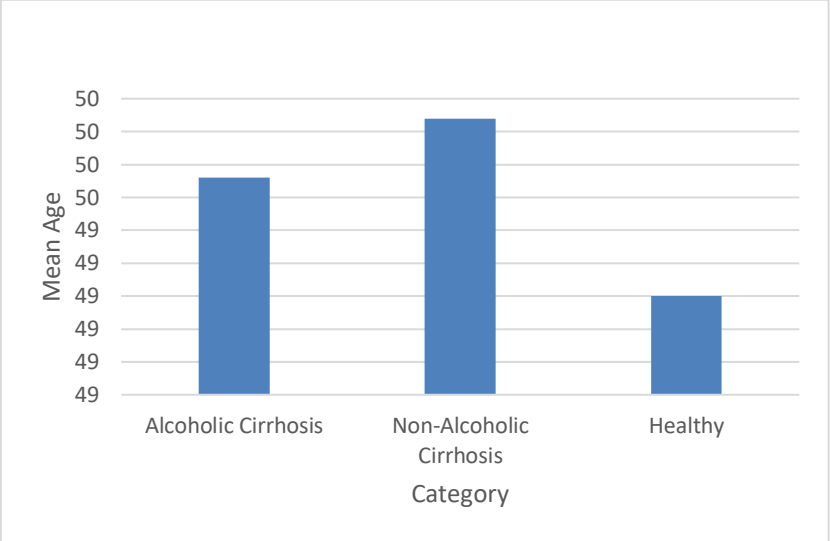

Chart 2: Bar Chart of Mean Total Cholesterol levels of Categorical data

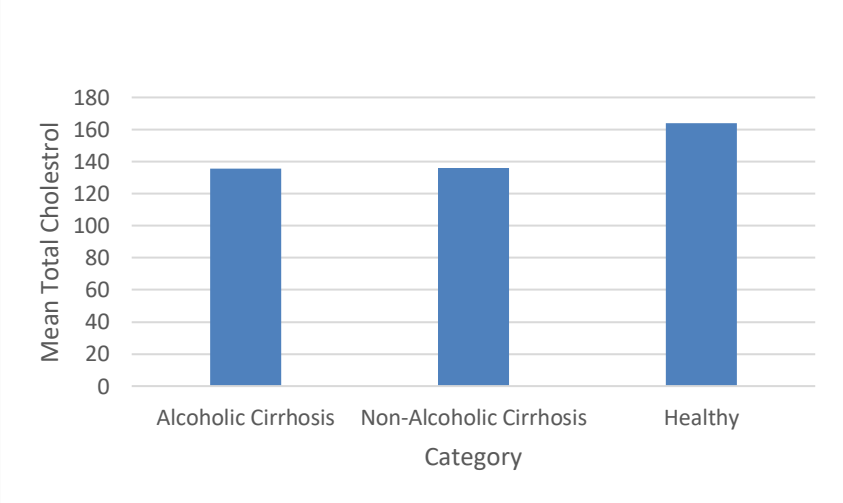

Chart 3: Bar Chart of Mean HDL levels of Categorical data

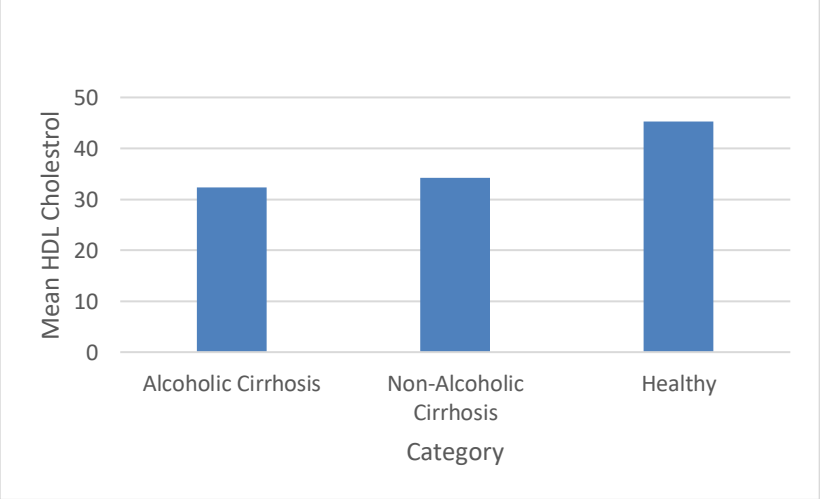

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Chart 4: Bar Chart of Mean LDL of Categorical data

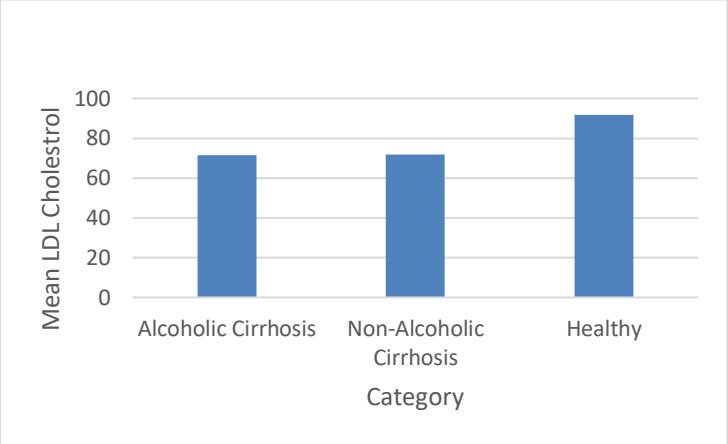


Chart 5: Bar Chart of Mean VLDL of Categorical data

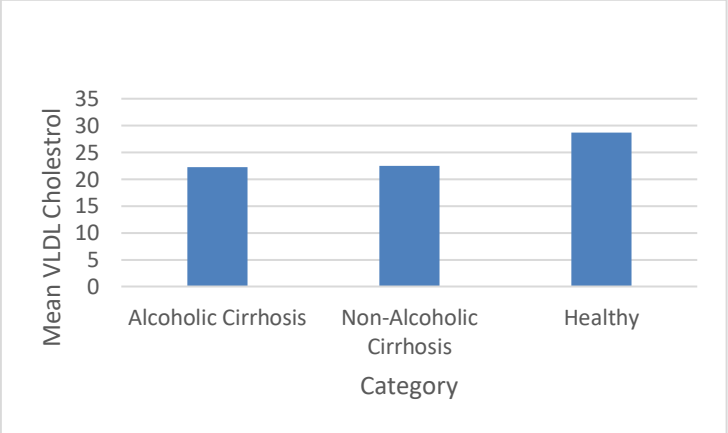
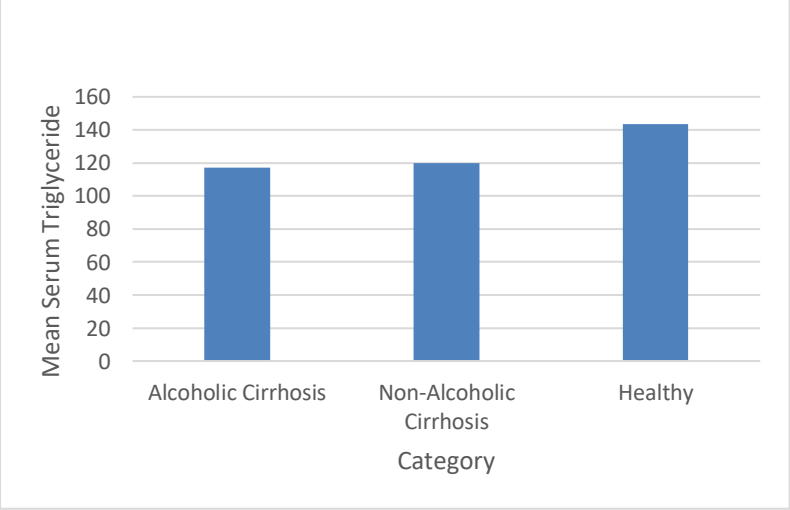


Chart 6: Bar Chart of Mean Serum Triglycerides levels of Categorical data



Discussion

Impaired total cholesterol is commonly found in patients with chronic liver disease. This is due to the fact that lipoprotein synthesis is impaired in liver dysfunction to reduced activity of enzymes involved in lipid metabolism like lecithin cholesterol acyltransferase, lipoprotein lipase & hepatic triglyceride lipase. Total cholesterol, HDL & LDL were significantly reduced in alcohol associated liver

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disease as well as in chronic liver disease due to etiology other than alcoholism. [7]

Comparison of Lipid Profile in Study Groups

All parameters of lipid profile were significantly deranged in alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism on comparison with control group, but on comparison between alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism, only HDL was significantly different.

Total Cholesterol in Study Group

The total cholesterol was significantly lower in alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism on comparison with control group. **Cicognani et al. (1997)** reported significant reduction in total cholesterol in patients with chronic liver disease in comparison with controls. [8] **Kackar et al. (2004)** reported reduction in total cholesterol with progression of alcohol associated liver disease. [9] **Kunal Som et al. (2018)** reported total cholesterol significantly reduced in patients with chronic liver disease (alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism) as compared to control group in accordance to current study results. [10]

Triglycerides in study groups

Triglycerides were significantly lower in patients with alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism on comparison with control group. **Ahenaku et al. (1992), Jarikre A.E. et al. (1996), Varghese et al. (2007) & Mandal et al. (2013)** reported significantly reduced triglycerides in patients with chronic liver disease than control group which is in accordance to current study results. [11] [12] [13] [14] **Kunal Som et al. (2018)** reported triglycerides to be significantly reduced in patients with chronic liver disease (alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism) as compared to control group in accordance to current study results. [10]

LDL in study groups

LDL was significantly lower in patients with alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism on comparison with control group. **Ahenaku et al. (1992), Varghese et al. (2007) & Mandal et al. (2013)** reported significantly reduced LDL in patients with chronic liver disease on comparison with control group in accordance to current study results. [11] [13] [14] **Kunal Som et al. (2018)** reported LDL to be significantly lower in in patients with chronic liver disease (alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism) as compared to control group in accordance to current study results. [10]

HDL in study groups

HDL was significantly lower in patients with alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism on comparison with control group. HDL is reduced in patients with chronic liver disease due to reduction in HDL synthesis by liver due to lecithin cholesterol acyltransferase deficiency as liver is the only source of lecithin cholesterol acyltransferase enzyme which is reduced in hepatic dysfunction. Reduced lecithin cholesterol acyltransferase enzyme causes impaired conversion of incipient HDL to mature HDL.[15] **Ahenaku et al. (1992), Jarikre AE et al. (1996) & Mandal et al. (2013)** reported HDL significantly reduced in patients with chronic liver disease in accordance to current study results. [11] [12] [14] **Kunal Som et al. (2018)** reported HDL to be significantly low in patients with chronic liver disease (alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism) as compared to control group in accordance to current study results. [10]

VLDL in study groups

VLDL was significantly lower in patients with alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism on comparison with control group**. Ahenaku et al. (1992) & Jarikre AE et al. (1996)** reported VLDL to be reduced significantly in patients with chronic liver disease on comparison with control group in accordance to current study results. [11] [12] **Kunal Som et al. (2018)** reported VLDL to be significantly low in patients with chronic liver disease (alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism) as compared to control group in accordance to current study results. [10]

Conclusion

Therefore, we can conclude total cholesterol, high density lipoproteins, low density lipoproteins, very low density lipoproteins & triglycerides were significantly low in chronic liver disease patients than healthy controls. The difference between total cholesterol, lipoproteins, low density lipoproteins, very low density lipoproteins & triglycerides were not statistically significant between patients with alcohol associated liver disease & chronic liver disease due to etiology other than alcoholism but the difference between high density lipoproteins was statistically significant. Therefore, larger multicenter studies on effects of alcohol on lipid profile in chronic liver disease can provide us with further information on treatment & prognosis of alcohol associated liver disease in future.

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