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ORIGINAL ARTICLE

Frequency of Dyslipidemia and its Associated Factors in patients of Chronic Liver Disease

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ABSTRACT

Background: Chronic liver disease (CLD) refers to a group of liver conditions in which normal liver tissue is gradually replaced by fibrotic tissue. Various metabolic disturbances often accompany CLD, including lipid abnormalities, clotting factor deficiencies, and sometimes venous thromboembolism due to reduced anticoagulant factors. Dyslipidemia is one such disturbance and occurs when there is an imbalance in lipids or lipoproteins. Due to the variability in findings from earlier studies, the present study aimed to find out the frequency of dyslipidemia and its associated factors in chronic liver disease patients.

Methods: A descriptive, cross-sectional study was conducted at the department of medicine, Bahawal Victoria Hospital, Bahawalpur during February to August 2023. Total 195 patients were included in the study. After taking informed written consent, 5 ml blood sample of each patient was sent to the institutional pathology laboratory for measurement of lipid profile and presence or absence of dyslipidemia. All the data was entered and analyzed by using Statistical Package for Social Science (SPSS) version 22. Anova with Post-hoc Tuckey test was used to find out the association of effect modifiers with lipid profile. P-value ≤0.05 was considered as significant.

Results: The mean age of the study participants was 39.44 ± 9.91 years. About 82.05% were male and 17.94% were females and majority (56.92%) were having BMI in between 25-30kg/m^2. Mean duration of disease was 1.67 ± 0.72 years. About 28.2% participants were known case of hypertension while 36.41% were diagnosed case of diabetes. Looking over the serum lipid profile the mean with standard deviation of HDL, LDL, cholesterol and triglycerides were 37.34 ± 4.12mg/dL, 77.24 ± 22.97 mg/dL, 152.31 ± 24.59 mg/dL and 101.58 ± 24.48 mg/dL, respectively. The mean with standard deviation of HDL, LDL, cholesterol and triglycerides were having statistically non-significant association with the factors like age, gender, BMI, disease duration, history of hypertension and diabetes but severity of disease, as per Child-Pugh classification, showed significant association with the mean values of all variables of lipid profile.

Conclusion: A considerable proportion of patients with chronic liver disease demonstrated dyslipidemia, and its occurrence varied according to disease severity as assessed by the Child-Pugh classification. Current data indicate that lipid parameters may play a significant role in the risk assessment and therapeutic planning of CLD patients.

Keywords: Chronic liver disease, Dyslipidemia, Child-Pugh Classification.

INTRODUCTION

Chronic liver disease (CLD) refers to a group of liver conditions in which normal liver tissue is gradually replaced by fibrotic tissue[(1)]. Various metabolic disturbances often accompany CLD, including lipid abnormalities, clotting factor deficiencies, and sometimes venous thromboembolism due to reduced anticoagulant factors[(2)]. Dyslipidemia is one such disturbance and occurs when there is an imbalance in lipids or lipoproteins[(3)]. Lipoproteins transport fat-soluble vitamins, dietary cholesterol, and long-chain fatty acids, while lipids are essential components of cell membranes and help regulate cellular functions. The liver controls both exogenous and endogenous lipid metabolism and produces apolipoproteins, which activate enzymes involved in lipoprotein metabolism and allow lipoproteins to bind to their receptors[(4, 5)].

In liver cirrhosis, disturbances in serum lipoprotein levels often occur, commonly leading to reduced low-density lipoprotein (LDL) and high-density lipoprotein (HDL)[(6,7)]. Dyslipidemia seen in CLD is distinct from other secondary causes because the composition, appearance, serum levels, and mobility of lipoproteins are altered[(3,8)]. Research by Ress and Kaser shows that impaired liver function disrupts lipid metabolism, causing lipid droplet accumulation inside hepatocytes. Abnormal secretion of very-low-density lipoprotein (VLDL) further contributes to hepatic steatosis[(9)].

One previous study reported that total cholesterol was significantly decreased in 15% of patients. Overall, 82.5% of patients had hypocholesterolemia, while 2.5% showed hypercholesterolemia. Low triglyceride levels were observed in 63.13% of patients, reduced LDL in 88.13%, and elevated LDL in 4.38% (10). Another study found that 69.09% of patients had low total cholesterol, with no cases of hypercholesterolemia, and 12.72% showed reduced triglycerides[(11)].

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Early identification of these lipid abnormalities may help clinicians improve patient outcomes and enhance survival. Due to the variability in findings from earlier studies, the present study aimed to find out the frequency of dyslipidemia and its associated factors in chronic liver disease patients.

MATERIAL AND METHODS

A descriptive, cross-sectional study was conducted at the department of medicine, Bahawal Victoria Hospital, Bahawalpur during February to August 2023. Total 92 patients were included in the study. Non-probability, consecutive sampling technique was used. The inclusion criteria were i) Patients with chronic liver disease having duration >3 months ii) Patients with any child pugh class iii) age from 20-60 years of either gender. Those patients were excluded who were i) having hypertension, diabetes mellitus or ischemic heart disease (assessed on history) ii) taking lipid lowering drugs iii) taking hepatotoxic drugs iv) having chronic renal disease v) not willing to be included in the study.

After approval from ethical review committee, total 92 patients of chronic liver disease fulfilling inclusion and exclusion criteria were enrolled. After taking informed written consent, 5 ml blood sample of each patient was sent to the institutional pathology laboratory for measurement of lipid profile and presence or absence of dyslipidemia. All data was recoded on a preformed proforma.

All the data was entered and analyzed by using Statistical Package for Social Science (SPSS) version 22. Age, duration of disease, height, weight, BMI, levels of HDL, LDL, cholesterol and triglyceride were presented as mean and standard deviation (SD). Frequencies and percentages were calculated for categorical variables like gender, Child-Pugh class (A/B/C) and dyslipidemia (present/absent). Anova with Post-hoc Tuckey test was used to find out the association of effect modifiers like age, gender, Child-Pugh class (A,B,C), duration of disease and BMI with levels of HDL, LDL, cholesterol and triglycerides. P-value ≤0.05 was considered as significant.

RESULTS

The mean age of the study participants was 53.44 ± 9.91 years. Majority of the patients (54.35%) were between 20 to 40 years of age. Out of the 195 patients, 82.05% were male and 17.94% were females with male to female ratio of 1.3:1 and majority (56.92%) were having BMI in between 25-30kg/m^2. Mean duration of disease was 1.67 ± 0.72 years. About 28.2% participants were known case of hypertension while 36.41% were diagnosed case of diabetes. History of smoking and alcoholism were positive in 57.94% and 26.66%, respectively as mentioned in Table 1. Figure 1 presented the distribution of patients according to Child Pugh Class. Looking over the serum lipid profile the mean with standard deviation of HDL, LDL, cholesterol and triglycerides were 37.34 ± 4.12mg/dL, 77.24 ± 22.97 mg/dL, 152.31 ± 24.59 mg/dL and 101.58 ± 24.48 mg/dL, respectively as mentioned in Table 2.

Table 1 Characteristics of study participants

Variables	n=195	%
Age (in years)		
20-40	106	54.35
41-60	89	45.64
Gender		
Male	160	82.05
Female	35	17.94
BMI		
20-25 kg/m^2	84	43.07
25-30 kg/m^2	111	56.92
Duration of disease		
6 months- 1year	77	39.48
≥ 1 year	118	60.51
History of smoking	113	57.94
History of alcoholism	52	26.66
History of hypertension	55	28.20
History of diabetes	71	36.41

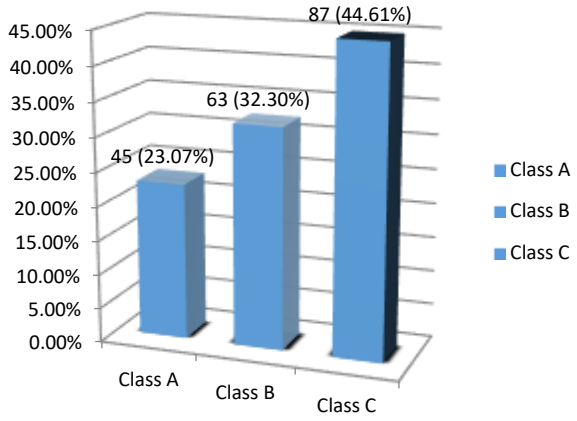

Figure 1 Distribution of patients according to Child Pugh Class (n=195)

Table 2 Serum lipid profile of study participants

Lipid Profile	Serum levels (Mean ± SD)
HDL (mg/dL)	37.34 ± 4.12
LDL (mg/dL)	77.24 ± 22.97
Cholesterol (mg/dL)	152.31 ± 24.59
Triglycerides (mg/dL)	101.58 ± 24.48

The mean with standard deviation of HDL, LDL, cholesterol and triglycerides were having statistically non-significant association with the factors like age, gender, BMI, disease duration, history of hypertension and diabetes. On the other hand, severity of disease, as per Child-Pugh classification, showed significant association with the mean values of all variables of lipid profile as presented in Table 3.

Table 3 Factors associated with the dyslipidemia in patients of chronic liver disease

Variables	HDL	LDL	Cholesterol	Triglycerides
Age (in years)				
20-40	38.95 ± 2.81	74.78 ± 22.85	145.25 ± 27.54	98.34 ± 15.13
41-60	38.10 ± 5.42	76.26 ± 25.41	149.11 ± 29.27	106.75 ± 24.32
p-value	0.851	0.567	0.751	0.351
Gender				
Male	38.42 ± 4.87	75.28 ± 22.50	145.89 ± 25.21	101.47 ± 26.45
Female	39.88 ± 7.15	79.10 ± 24.63	145.72 ±24.86	100.20 ± 29.56
p-value	0.482	0.548	0.857	0.638
BMI				
20-25 kg/m^2	38.54 ± 4.13	75.13 ± 23.25	146.23 ± 26.23	101.21 ± 27.13
25-30 kg/m^2	37.89 ± 5.10	79.35 ± 24.78	148.96 ± 26.72	101.46 ± 23.21
p-value	0.341	0.459	0.385	0.874
Duration of disease				
6 months- 1year	39.46 ± 5.27	75.94 ± 24.10	145.56 ± 28.12	100.37 ± 28.40
≥ 1 year	38.65 ± 6.18	78.23 ± 25.62	145.45 ± 27.37	98.61 ± 25.27
p-value	0.495	0.582	0.871	0.580
Child-Pugh Class				
Class A	49.11 ± 4.01	109.79 ± 19.12	176.12 ±19.24	123.27 ± 19.10
Class B	42.37 ± 3.82	98.68 ± 15.32	165.51 ± 15.98	104.35 ± 23.27
Class C	37.23 ± 3.65	75.32 ± 6.18	132.48 ± 23.35	97.27 ± 22.42
p-value	0.000	0.000	0.000	0.000
History of hypertension	38.71 ± 5.35	79.82 ± 25.57	147.54 ± 24.76	105.23 ± 21.73
p-value	0.575	0.582	0.961	0.642
History of diabetes	38.89 ± 6.23	77.85 ± 27.47	145.23 ± 25.42	99.86 ± 24.35
p-value	0.857	0.821	0.348	0.512

DISCUSSION

Chronic liver disease (CLD) is characterized by liver injury that persists for six months or longer and may result from infectious, inflammatory, toxic, or hereditary causes. One of the systemic manifestations of CLD is dyslipidemia. The liver's reparative response to ongoing injury leads to hepatic fibrosis[12]. Impaired hepatic function disrupts protein synthesis, bilirubin excretion, and lipid metabolism, underscoring the need for targeted management to support metabolic recovery. Although lipid profile assessment is not routinely performed in our hospital for patients with CLD, emerging evidence indicates that lipid levels correlate with disease severity and should therefore be considered in clinical evaluation[13].

In current study, the mean age of patients with CLD was 53.44 ± 9.91 years. Comparable age ranges have been reported in several regional studies: Ali et al. noted an average age of 52±9 years in Mirpurkhas[14], while Hussain et al. documented an average age of 51.12±6.03 years in Lahore[15]. International data also reflect comparable age distributions, with mean ages of 55.03±12.05 years in Iranian cohorts[16] and 51.4±7.6 years in Brazilian patients[17]. In contrast, studies from India by Bhattacharyya et al. (2016) reported younger mean ages of 45.8±10.45 years[18]. A male predominance (1.3:1) was observed in current study population. This aligns with earlier reports by Ali et al. and El-Feki et al., who documented similar ratios in Pakistan and Egypt[14,19], whereas Achakzai et al. reported a female predominance in Karachi[20].

The mean BMI in our study was 26.89 ± 1.9 kg/m², similar to the mean BMI of 26.2±3.8 kg/m² reported by Zou et al. among Chinese patients with CLD (21). Disease staging using the Child-Pugh classification revealed that 23.07% of patients were Class A, 32.30% Class B, and 44.61% Class C. These findings are consistent with results from Naqvi et al. who showed similar frequencies at a tertiary centre in Karachi and Shaikh et al. who reported nearly identical distribution patterns[20,22].

Hypertension and diabetes were present in 28.2% and 36.41% of patients, respectively. The proportion of diabetic patients closely matches the frequencies reported by Arshad et al. in Lahore (33.5%)[23], as well as international rates of 30.8% in the United States and 30.0% in Mexico[24]. Likewise, the prevalence of hypertension is comparable to the 23.6% rate documented by Unger et al. in Australia[25].

We identified a significant reduction in serum LDL, HDL, total cholesterol, and triglycerides with increasing Child-Pugh severity. These findings support the observations of Subhan et al. (2012) in Peshawar and Ghadir et al. (2010) in Iran, both of whom reported progressive declines across these lipid parameters with worsening liver dysfunction[26,27].

Strengths of our study included a relatively large sample size, rigorous exclusion criteria, and stratified analysis to reduce confounding. A notable limitation was the inability to assess lipid profile changes in relation to treatment outcomes or mortality, which could have provided further insight into the prognostic value of lipid abnormalities in CLD.

CONCLUSION

A considerable proportion of patients with chronic liver disease demonstrated dyslipidemia, and its occurrence varied according to disease severity as assessed by the Child-Pugh classification. These findings highlight the need for routine lipid profile monitoring in this population to enable early detection and appropriate management, which may contribute to improved clinical outcomes. Our data indicate that lipid parameters may play a significant role in the risk assessment and therapeutic planning of CLD patients, underscoring the importance of further research on this subject.

REFERENCE

1. Tauseef A, Zafar M, Rashid B, Thirumalareddy J, Chalfant V, Farooque U, et al. Correlation of fasting lipid profile in patients with chronic liver disease: a descriptive cross-sectional study in tertiary care hospital. Cureus. 2020;12(10).
2. Sultan MO, Farooque U, Khan MI, Karimi S, Cheema O, Jaan A, et al. Frequency of venous thromboembolism in patients with liver cirrhosis. Cureus. 2020;12(8).
3. Karim I, Zardari AK, Shaikh MK, Baloch ZAQ, Shah SZA. DYSLIPIDEMIA;: HELICOBACTER PYLORI INFECTED PATIENTS. The Professional Medical Journal. 2014;21(05):956-9.
4. Mehboob F, Ranjha F. Dyslipidemia in chronic liver disease. Pak J Med Sci. 2007;1:103-5.
5. Ponziani FR, Pecere S, Gasbarrini A, Ojetti V. Physiology and pathophysiology of liver lipid metabolism. Expert review of gastroenterology & hepatology. 2015;9(8):1055-67.
6. Phukan JP, Sinha A, Deka JP. Serum lipid profile in alcoholic cirrhosis: A study in a teaching hospital of north-eastern India. Nigerian Medical Journal. 2013;54(1).
7. Privitera G, Spadaro L, Marchisello S, Fede G, Purrello F. Abnormalities of lipoprotein levels in liver cirrhosis: clinical relevance. Digestive diseases and sciences. 2018;63(1):16-26.
8. Luo L, Pu X, Wang Y, Xu N. Impaired plasma lipid profiles in acute hepatitis. Lipids in health and disease. 2010;9(1):5.
9. Ress C, Kaser S. Mechanisms of intrahepatic triglyceride accumulation. World Journal of Gastroenterology. 2016;22(4):1664.
10. Nemes K, Åberg F, Gylling H, Isoniemi H. Cholesterol metabolism in cholestatic liver disease and liver transplantation: From molecular mechanisms to clinical implications. World Journal of Hepatology. 2016;8(22):924.
11. Qazi F, Khan SB, Umar A, Choudhry F. Changes in serum lipid profile among patients suffering from chronic liver disease secondary to hepatitis C. Open Journal of Gastroenterology. 2016;6(11):333.
12. Younossi ZM, Stepanova M, Afendy M, Fang Y, Younossi Y, Mir H, Srishord M. Changes in the prevalence of the most common causes of chronic liver diseases in the United States from 1988 to 2008. Clinical gastroenterology and hepatology. 2011 Jun 1;9(6):524-30.
13. Ress C, Kaser S. Mechanisms of intrahepatic triglyceride accumulation. World Journal of Gastroenterology. 2016 Jan 28;22(4):1664.
14. Ali M, Abbas SZ, Sultana F, Akhtar W, Shaw S, Abbas SQ. Non-B, non-C hepatitis as a cause of advanced chronic liver disease requiring medical admission at a rural centre in Pakistan. PAKISTAN JOURNAL OF MEDICAL SCIENCES. 2008 Apr 1;24(2):278.
15. Hussain A, Nadeem MA, Nisar S, Tauseef HA. Frequency of gallstones in patients with liver cirrhosis. Journal of Ayub Medical College Abbottabad. 2014 Sep 1;26(3):341-3.
16. Mansour-Ghanaei F, Mehrdad M, Mortazavi S, Joukar F, Khak M, Atrkar-Roushan Z. Decreased serum total T3 level in hepatitis B and C related cirrhosis by severity of liver damage. Annals of hepatology. 2012 Sep 1;11(5):667-71.
17. Penteado KR, Coelho JC, Parolin MB, Matias JE, FREITAS AC. The influence of end-stage liver disease and liver transplantation on thyroid hormones. Arquivos de gastroenterologia. 2015;52(2):124-8.
18. Bhattacharyya M, Barman NN, Goswami B. Clinical profile of cirrhosis of liver in a tertiary care hospital of Assam, North East India. IOSR-JDMS. 2016 Jan;15(1):21-7.
19. El-Feki MA, Abdalla NH, Atta MI, Ibrahim AA. Serum level of thyroid hormones in patients with chronic hepatitis C virus infection. Open Journal of Endocrine and Metabolic Diseases. 2016 Mar 17;6(3):126-34.
20. Naqvi IH, Mahmood K, Naeem M, Vashwani AS, Ziaullah S. The heart matters when the liver shatters! Cirrhotic cardiomyopathy: frequency, comparison, and correlation with severity of disease. Gastroenterology Review/Przegląd Gastroenterologiczny. 2016 Feb 16;11(4):247-56.
21. Zou D, Qi X, Zhu C, Ning Z, Hou F, Zhao J, Peng Y, Li J, Deng H, Guo X. Albumin-bilirubin score for predicting the in-hospital mortality of acute upper gastrointestinal bleeding in liver cirrhosis: A retrospective study. Turkish Journal of Gastroenterology. 2016;27(2):180-6.
22. Shaikh S, Abro M, Qazi I, Yousfani A. Frequency of cirrhotic cardiomyopathy in patients with cirrhosis of liver: A tertiary care hospital experience. Pakistan Journal of Medical Sciences. 2011 Jul 1;27(4).
23. Arshad MF, Butt Z, Mushtaq K, Salaria O. Impact of diabetes mellitus on frequency and severity of hepatic encephalopathy in liver cirrhosis. InEndocrine Abstracts 2016 Oct 14 (Vol. 44). Bioscientifica.
24. Garcia-Compean D, Jaquez-Quintana JO, Gonzalez-Gonzalez JA, Maldonado-Garza H. Liver cirrhosis and diabetes: risk factors, pathophysiology, clinical implications and management. World journal of gastroenterology: WJG. 2009 Jan 21;15(3):280.
25. Unger LW, Forstner B, Schneglberger S, Muckenhuber M, Eigenbauer E, Scheiner B, Mandorfer M, Trauner M, Reiberger T. Patterns and prevalence of dyslipidemia in patients with different etiologies of chronic liver disease. Wiener klinische Wochenschrift. 2019 Sep;131(17):395-403.
26. Subhan F, Khan I, Arif R, Khan A, Khan A. Serum lipid profile as an indicator of the severity of liver damage in cirrhotic patients. Rawal Medical Journal. 2012 Oct;37(4):387-9.
27. Ghadir MR, Riahin AA, Havaspour A, Nooranipour M, Habibinejad AA. The relationship between lipid profile and severity of liver damage in cirrhotic patients. Hepatitis monthly. 2010 Dec 1;10(4):285.

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