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Original Article

Evaluation of Dyslipidaemia in Patients with Chronic Viral Hepatitis in a Lower Socio-Economic Country

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ABSTRACT

Patients having chronic viral hepatitis do have disturbances in their serum lipid profiles, still the monitoring of dyslipidemia is not a routine part of management in low socio economic countries. **Objective:** To investigate the status of lipid profile among patients with chronic hepatitis and compare them with non-infected individuals. **Methods:** A cross-sectional study was done in a Tertiary Care Hospital of Karachi, from 5th September 2022 to 31st May 2023. Patients with chronic hepatitis B and C, diagnosed within two years with a body mass index (BMI) of 25-29.9 kg/m2 were included. Their comparison was done with non-infected individuals of the same BMI. All patients were evaluated with different parameters of lipid profile along with haemoglobin, alanine aminotransferase, albumin and international normalized ratio. **Results:** Among 521 participants of the study, the grouping was almost equal. The age range was 12-75 years, with an increased number of females in each group. In comparing the different statuses of lipid profile, each parameter including cholesterol, triglycerides, high-density lipoprotein, low-density lipoprotein, all were significantly much less in patients with chronic viral hepatitis as compared to controls with a p-value of 0.000 in all. **Conclusions:** It was concluded that Dyslipidaemia is not common among chronic viral hepatitis patients' despite being overweight, particularly among patients with child's class A.

INTRODUCTION

Dyslipidaemia is a common illness among the general population and one of the main risk factors in the development of cardiovascular illness. Aggressive treatment of dyslipidaemia leads to a reduction in mortality and morbidity of cardiovascular illness [1]. The liver metabolises various lipid-lowering agents, in addition to being the primary source of cholesterol and other lipids. Thus, it is always questionable to start these medications in patients with liver disease. Both chronic viral hepatitis, Hepatitis B and C, chronically infect 240 million and 170 million people respectively worldwide [2, 3]. Like every other reason leading to chronic liver disease, chronic viral hepatitis is associated with the development of end-stage liver disease, cirrhosis, hepatocellular carcinoma and may need liver transplantation if not treatable by medications [4, 5]. Hepatitis C virus (HCV) replication infects hepatocytes via interlinking with circulating lipoproteins. Both acute and chronic HCV leads to a decrease in serum low density lipids (LDL) and total cholesterol levels [5]. There are several mechanisms of hepatitis C replication which affects lipid metabolism. Interaction of the virus with lipoproteins with the help of LDL receptors may infect hepatocytes. Further interacts with host cytosolic lipid droplets inside the hepatocytes causing HCV core protein formation and used synthesis pathway of cholesterol for replication. Despite having decreased LDL risk of

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cardiovascular disease among HCV-infected patients remains higher when matched with control subjects. It may also get increased after spontaneous or treatment-induced clearance of HCV [6]. Hepatitis B viral infection like HCV also interferes with the metabolism of lipids, especially cholesterol. The binding of hepatitis B virus (HBV) with polypeptide leads to impairment of bile acid uptake, leading to increased bile acid synthesis and thus conversion to cholesterol [7]. Liver damage is due to the immune response exerted by the virus into the hepatocytes. Alteration of plasma lipid levels is a consequence of pro-inflammatory cytokines exhibited by chronic hepatitis B infection. Although not much work has been done in the association of lipid levels in HBV. Few data showed decreased triglyceride and high-density lipoprotein among HBV-infected individuals when compared to matched control subjects [8]. The focus of the study is to determine the variables of lipid levels among patients with chronic viral hepatitis and compare them with the control group. Similarly, a study previously done in Hyderabad, Pakistan among patients with HCV with dyslipidaemia also showed a higher incidence of dyslipidaemia among these patients [9], while comparing another study in the same province showed contradictory results, despite among patients with metabolic syndrome with HCV [10]. There is a paucity of research on Hepatitis B; however, a study done previously showed a decrease in the levels of all parameters of the lipid profile [11].

The aim of this study was to evaluate the status of dyslipidaemia among patients with chronic viral hepatitis and compare them with patients without chronic viral hepatitis.

METHODS

A cross sectional study was conducted at the outpatient Department of Dr. Ruth K M Pfau Civil Hospital Karachi, Karachi, Pakistan. The total time required to collect the specified number of patients was 9 months between 5th September 2022 to 31st May 2023. Patients were only inducted after taking proper consent and approval from the ethical review board (ERC-001/CGH/MO/2022; Dated: 5th Sep, 2022). Calculated using Rao software keeping anticipated 299 patients in view of a study done in Mexico [12]. Confidence of 95% and absolute precision of 5% gave the total sample of 169. The study was conducted on 169 patients in each group. All patients with chronic viral hepatitis, hepatitis B and C, diagnosed within two years, with child's class A, were included in the study, and they were compared with the same age group without chronic liver disease. Patients of both gender between the age group 12-80 were included. Patients with a body mass index of 25.0 – 29.9 kg/m2. Patients with other causes of chronic liver disease were excluded on the basis of history. Patients with child's Class B and C were excluded. Patients with HIV, and other chronic illness were excluded. The sampling technique used for data collection were non-probability purposive sampling. Approximately 5-10 mL of blood was drawn from each patient using a sterile needle and syringe. The blood was then transferred into appropriate collection tubes: EDTA tubes for complete blood count (CBC) and serum separator tubes for biochemical analyses (ALT, albumin, INR, and lipid profile). All patients were subjected to laboratory tests including haemoglobin, alanine aminotransferase (ALT), platelets, albumin, international normalized ratio (INR), and lipid profile including cholesterol, HDL, LDL and triglycerides (TG). Figure 1 shows the summary of storage and processing of collected samples (figure 1). Data were analysed using the statistical package for the social sciences (SPSS) version 23.0. Frequencies and percentages have been computed for categorical responses and Chi-square test and T-test to measure the associations between quantitative variables. A p-value of less than 0.05 was taken as being statistically significant. Blood was drawn from each patient using a sterile needle and syringe, then stored in EDTA and serum separator tubes under controlled temperatures, processed with aseptic techniques, properly labelled, and handled in compliance with the Declaration of Helsinki and other ethical guidelines to ensure sample integrity, patient confidentiality, and accurate results.

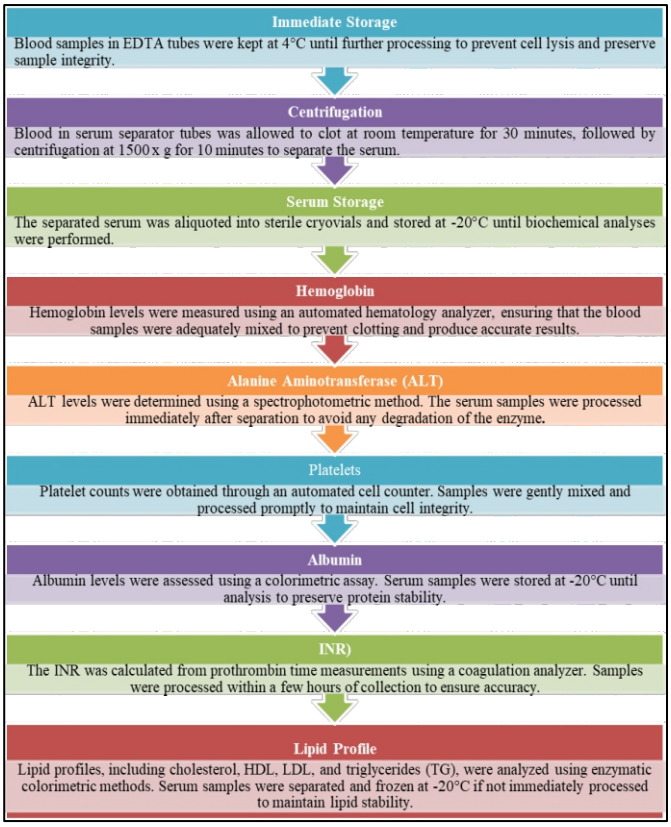

Figure 1: Flowchart showing the Storage and Processing

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RESULTS

Among 521 patients incurred in the study, the division among the three groups was almost equal. Regarding demographic features among three groups of the study population, there was a higher number of females in each group. In the control group, out of 171 patients, 102 (59.64%) were females. While in patients with hepatitis B and C; 193 (55.14%) were females. The age range was almost equal when comparing the three groups. The age range was 12-75 years with a mean age of 40.93 ± 11.89 years (Table 1).

Table 1: Age Range among Study Groups

Groups	Male	Female	Age Range
HBV	86	91	40.91 ± 12.99
HCV	71	101	44.81 ± 12.30
Control	69	102	37.03 ± 8.61
Total	226	295	-

Among the laboratory measurements studied were haemoglobin levels, which were lower in non-infected people than in those with chronic viral hepatitis. INR and albumin were normal in all groups even though platelets were somewhat increased in non-infected people (Table 2).

Table 2: Laboratory Assessment among Study Population

Parameters	Control n=171	HBV n=177	HCV n=173	Pearson Correlation Coefficient	p-value
Haemoglobin	11.94 ± 2.14	13.37 ± 10.46	13.05 ± 8.27	-0.047	0.010
Platelets	272.80 ± 80.52	246.77 ± 94.04	214.55 ± 92.57	0.113	0.010
Albumin	1.27 ± 0.448	4.83 ± 4.80	3.95 ± 0.57	-0.159	0.000
INR	1.01 ± 0.626	0.97 ± 0.12	1.04 ± 0.22	0.055	0.213
ALT	40.83 ± 20.87	34.89 ± 13.75	69.67 ± 99.08	0.044	0.321

While comparing parameters of lipid profile, cholesterol and triglycerides were much lower in patients with viral hepatitis with p-value of 0.000 in both categories. While comparing HDL and LDL, the same pattern is observed. (Table 3)

Table 3: Lipid Profile of the Study Population

Parameters	Control n=171	HBV n=177	HCV n=173	Pearson Correlation Coefficient	p-value
Cholesterol	209.71 ± 90.57	148.48 ± 41.85	150.40 ± 85.09	0.310	0.000
Triglycerides	173.48 ± 59.08	133.29 ± 62.17	119.54 ± 65.12	0.246	0.000
HDL	33.69 ± 8.73	40.66 ± 32.60	39.09 ± 9.66	0.691	0.000
LDL	121.15 ± 34.86	92.11 ± 32.37	82.60 ± 33.76	-0.638	0.000

DISCUSSION

Viral hepatitis including hepatitis B and C is the major cause of chronic liver disease leading to cirrhosis of the liver around the world, but especially in lower socioeconomic countries including Pakistan. The prevalence of hepatitis B among blood donors is 0.84, while among healthy subjects it was 6.9%. The same distribution was seen among hepatitis C carriers among blood donors and affected healthy adults [13]. Among the commonest two, hepatitis B is considered a metabolic virus affecting various metabolic pathways. Regarding extra-hepatic manifestations in hepatitis B polyarteritis nodosa, genotynon-Hodgkin's lymphoma, non-rheumatoidal arthritis, cryoglobulinemic vasculitis, glomerulonephritis, and dyslipidemia [14]. There are various extra-hepatic complications associated with hepatitis C as well including essential mixed cryoglibulinemia, porphyria cutanea tarda, type II diabetes mellitus, sicca syndrome, thyroid disorders, lichen planus, peripheral neuropathy and dyslipidemia [15]. The work on association with Hepatitis C with dyslipidaemia is more extensive than hepatitis B although the results are almost equal. Alteration in lipid levels may be deleterious to health when increased levels of cholesterol and triglycerides lead to atherosclerosis, pancreatitis and aortic dissection, [16] low levels may lead to hopelessness, confusion, and agitation [17]. Studies have shown that diseases of the liver are often associated with impaired liver metabolism because the liver is the main determinant of lipid metabolism and serum lipoprotein synthesis [18]. In most patients with hepatitis C, lower total cholesterol, as well as LDL are commonly seen as compared to patients with hepatitis B in whom there is a low level of TG and HDL is more commonly seen [19]. In current study, mean cholesterol level in patients with hepatitis C and B were 148.48 ± 41.85, respectively which is much lower than in control group which is 209.71 ± 90.5. In comparing the other study done in Ghana, [20] opposite results were in patients with hepatitis B in whom cholesterol was higher in control subjects. While the same pattern was seen among patients with hepatitis C as well [21]. In the present study both the triglyceride and LDL are lower as compared to control subjects in both viral hepatitis. The same pattern was seen in a study done in Iraq [22]. The observation is further endorsed by a study done in Pakistan which also showed low TC, TG and LDL in both hepatitis B and C, as compared to non-infected patients [11]. In view of various genotypes of hepatitis C, the commonest seen in our study was genotype 3, which is also more prevalent in other studies done in Pakistan [23]. Although we couldn't find a significant difference among different parameters of lipid profile in them. Although this is contradictory to one of the studies done previously in which there were much higher levels of cholesterol and LDL were seen in genotypes 1 and 3, while comparing different genotypes [24]. While comparing patients with hepatitis B with hepatitis C, the same pattern of decreased cholesterol and triglycerides was seen which is contrasting with non-infected individuals. Studies done before had the same pattern of observation as our study. As we further evaluated the rest of the parameters of dyslipidaemias including HDL and LDL, we also couldn't find much difference while comparing the previous studies, with decreased levels, as compared to normal subjects.

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There is a lack of evidence of treatment of dyslipidaemias among patients with viral hepatitis. Both viruses are associated with cardiovascular complications, although more pronounced with chronic hepatitis C infection [21]. Patients are prone to develop myocardial infraction when matched with controls. Furthermore, LDL and cholesterol both might increase even after clearance of the virus. Decreased HDL and triglycerides in patients with chronic hepatitis may lead to cardiovascular complications. Thus it should be monitored vigilantly among chronic viral infections. It is advisable to follow guidelines to treat dyslipidaemias, and statins are safe and should be used as first-line therapy among both infections [25, 26].

CONCLUSIONS

Less evidence of dyslipidaemias among patients with chronic viral hepatitis with child's class A, despite being overweight. Although this study does not show high levels of parameter sit is imperative to advise monitoring it vigilantly as hepatitis C has an increased risk of cardiovascular illness, as compared to hepatitis B.

Authors Contribution

Conceptualization: RJ
Methodology: AUR, HH, MU
Formal analysis: RJ, AUR, HH, MU
Writing-review and editing: AM, IM

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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