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BIOCHEMICAL CHANGES IN SERUM LIPIDS AND LIPOPROTEINS IN Viral C HEPATITIS PATIENTS

Rawia Sarhan Amin

Biochemistry Department, Faculty of Pharmacy
Zagazig University, Zagazig - Egypt

ABSTRACT

Serum lipids and lipoproteins were determined in 20 patients with chronic viral C hepatitis as well as 10 volunteers. Liver functions were also performed. Results of the present study showed that there is a significant increase in both total and direct bilirubin (TB & DB). Total proteins and albumin (TP & Alb) showed significant decrease. Liver enzymes; Alanine aminotransferase (ALT), Aspartate aminotransferase (AST) and Alkaline phosphatase (ALP) were also significantly increased. Total cholesterol (TC), HDL cholesterol (HDL-C), LDL-cholesterol (LDL-C) and triglycerides (TG) showed significant decrease. Apolipopratein fractions (Apo A_1 and Apo B) showed significant decrease. There was a negative correlation between Apo A_1 and both TB and ALT. Apo B showed also a negative correlation with TB. This study clarified that patients with hepatitis C virus showed a significant decrease in serum lipids, hence they are less susceptible for atherosclerosis and coronary heart diseases.

INTRODUCTION

Viral hepatitis causes considerable morbidity and mortality. Early prediction of impending complications is important to modify its' course and prognosis. Serum lipids are known to be altered and vary with the stages of liver disease[1]. Patients with liver cirrhosis have both impaired liver functions and lipid profile, mainly plasma lipoproteins. This is mainly due to impairment of hepatocytes for their synthetic properties[2].

It has been reported that in hepatitis C, cholesterol significantly increased during acute icteric phase of the disease, which remains elevated for three years after recovery. Cholesterol metabolism did not return to the prehepatitic state, and fluctuations in total cholesterol level have been demonstrated[3]. Other investigators demonstrated that total cholesterol, triglycerides, HDL - cholesterol and LDL-cholesterol were significantly reduced[2&4].

In **1992, Ahaneku et al.** [5] found that in hepatitis, the plasma total cholesterol concentration was significantly reduced, while there was a slight increase in HDL-cholesterol level. However, they reported that alkaline phosphatase level was within the normal range. The ALT, albumin and total proteins levels were decreased in case of cirrhosis. Moreover, the plasma levels of apolipoproteins were decreased in cirrhotic subjects compared to controls[2].

The present study was undertaken to provide additional information on possible relation between serum lipoprotein profile and hepatitis.

MATERIALS AND METHODS

Patients:

This study was conducted on twenty patients with chronic viral hepatitis of both sex and aged 30-50 years with jaundice. They were subjected for thorough clinical examination at the gastroenterology unit of Zagazig University Hospital, Zagazig, Egypt. The diagnosis of hepatitis for them was established by serological tests and ultrasonography. Patients suffering from diabetes mellitus, nephrotic syndrome, altered thyroid functions as well as who undermedications were excluded. Ten healthy volunteers were selected as normal control.

Venous blood samples were collected after an over-night fasting, from both the patients and the normal individuals and were centrifuged at 4000 rpm for 15 min for separation of serum.

Biochemical Parameters:

Total and direct bilirubin levels were determined according to the method of **Jendrassik et al.**[6]. Total proteins were determined by **Gornall**[7] Serum albumin was determined according to the method of **Drupt**[8]

Aminotransferases were determined according to the method of **Reitman and Frankel**[9] and alkaline-phosphatase activity was estimated by the method of **Belfield and Goldberg**[10].

Total cholesterol and triglycerides were determined by **Allaine**[11] **and Fossatip**[12] respectively. HDL and LDL cholesterol were determined by **Burstein et al.**[13]. Both apolipoproteins A_1 and B were assayed by radial immunodiffusion - Biomidi kits (Frances). All other determinations were carried out using commercial kits of Boehringer Manheim (Germany), BioMerieux (France) and Randox (Ireland).

Statistical analysis:

Data were expressed as mean values ± S.E.M. and statistical comparisons were performed using the two-tailed Student "t" test at $P<0.001$.

RESULTS

Results of this study revealed that there is a significant increase in both TB and DB levels, while TP and Alb levels were significantly decreased (Table 1). Liver enzymes including ALT, AST and ALP showed significant increase in their serum levels as compared with control (Table 2).

Lipid fractions represented by TC, TG, HDL-C, LDL-C, Apo A_1 and Apo B showed a significant decrease in their serum levels as compared with controls (Table III) There was a negative correlation between Apo A_1 & ALT ($r = 0.451$) from one side & between Apo B & TB from the other side ($r = 0.538$). By another way there were no correlations between either ApoA, & TB or Apo B & ALT.

Table (1): Changes in TB, DB, TP and Alb levels in normal individuals and patients with hepatitis C virus.

Biochemical Parameters	Control (n = 10) X ± SE	Patients (n = 20) X ± SE
TB (mg/dl)	0.61 ± 0.042	4.55 ± 0.288*
DB (mg/dl)	0.1 ± 0.01	3.13 ± 0.275 *
TP (gm/dl)	7.1 ± 0.206	5.62 ± 0.118*
Alb (gm/dl)	4.2 ± 0.078	2.9 ± 0.09*

* Significant at P < 0.01

Table (2): Changes in ALT, AST and ALP levels in normal individuals and patients with hepatitis C virus.

Biochemical Parameters	Control X ± SE (n = 10)	Patients X ± SE (n = 20)
ALT (U/L)	15.3 ± 0.42	61 ± 2.496*
AST (U/L)	13.8 ± 0.442	39.45 ± 1.49*
ALP (U/dl)	11.6 ± 0.485	27.9 ± 1.04*

* Significant at P < 0.001

Table (3): Changes in TC, HDL-C, LDL-C, TG, $ApoA_1$ and Apo B levels in normal individual and patients with hepatitis C virus.

Biochemical Parameters	Control X ± S.E. (n = 10)	Patients X ± S.E. (n = 20)
TC (mg/dl)	194 ± 5.973	136.45 ± 2.13
HDL- C (mg/dl)	49 ± 0.93	37.95 ± 0.827*
LDL- C (mg/dl)	149 ± 3.19	103.9 ± 2.438*
TG (mg/dl)	112.5 ± 3.98	61.15 ± 2.121*
Apo A1 (mg/dl)	133 ± 2.72	103.8 ± 2.729*
Apo B (mg/dl)	99.9 ± 1.41	76.9 ± 1.946*

* Significant at P < 0.001.

DISCUSSION

Previous studies showed that serum lipids and lipoproteins are certainly affected in case of liver diseases.

In the present study results revealed that total cholesterol was significantly decreased in patients with viral C hepatitis. These results are in accordance with the findings of **Ahaneku et al.**[5]. Whereas, these results are in conflection with that reported by some other investigators[14], who found that viral C hepatitis significantly increased the blood levels of total cholesterol. However, **Taylor and Bamgboye**[15], found non significant changes in total plasma cholesterol level.

The significant reduction of total cholesterol and HDL-C may be due to hepatocellular necrosis secondary to cirrhosis[16&17] as liver cells are the major site for cholesterol synthesis. However, some workers[3] found that serum cholesterol increased significantly during the acute icteric phase of the illness and remained elevated for 3 years after recovery but cholesterol metabolism did not return to the prehepatic state. Similar observations were reported[18]. The possible mechanism of this reduction in HDL-C may be in part due to decreased production of lecithin cholesterol acyltransferase (LCAT) by the diseased liver[18] and decreased production of Apolipoprotein[19].

Results of the present study showed that virus C hepatitis significantly decreased the blood levels of LDL-C & TG. These results are in accordance with that reported by many investigators[1, 2 & 20]. The possible mechanisms of these effects are the reduced hepatic lipase and cholesterol ester transfer protein activities [2 & 20]. However, the decreased levels of TG may be due to the inability of the infected liver to carry out re-esterification of free fatty acides[1].

Apo A_1, the main constituent of high density lipoproteins, is significantly decreased. This is supported by the findings of **Suehiro et al.** [21] who found that pro Apo A_1 was increased with advanced liver disorders. Because most of the plasma pro Apo A_1 is converted to mature Apo A_1 in liver [22], the resulting decrease in Apo A_1 is mainly intestine due to impaired activity of pro Apo A_1 converting enzyme[23&24]. These findings confirm the view that liver is the main site of synthesis of Apo-lipoproteins. The negative correlation of the results of Apo-lipoproteins and both ALT and bilirubin added an additional support.

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بعض التغيرات الكيميائية الحيوية التى تحدث فى بعض مكونات الدهون والبروتينات الدهنية فى مصل مرضى فيروس سى الكبدى

راوية سرحان أمين

قسم الكيمياء الحيوية – كلية الصيدلة –جامعة الزقازيق – مصر

فى هذا البحث تمت دراسة تأثير مرض فيروس س الكبدى على بعض مكونات الدهون والبروتينات الدهنية.

تمت دراسة عشرين حالة من مرضى فيروس سى الكبدى وعشرة حالات متطوعين (مجموعة ضابطة). وتم عمل وظائف الكبد للمرضى وتعيين نسبة الدهون والبروتينات الدهنية فى المصل وكانت النتائج كالآتى:-

١) زيادة معنوية فى نسبة البليروبن الكلى والمباشر ونقص معنوى فى نسبة البروتينات الكلية والألبيومين وكذا أحدث زيادة معنوية فى نسبة نشاط الأمين (جلوتاميك بيروفيك ترانس أميناز – جلوتاميك اوكسالو استيك ترانس امتياز) هذا بالإضافة إلى زيادة معنوية فى مستوى الفوسفاتيز القلوى.

٢) نقص معنوى فى نسبة الكلوستيرول الكلية، الدهون عالية الكثافة والدهون منخفض الكثافة والترای جليسريدات.

٣) إنخفاض معنوى فى نسبة البروتينات الدهنية (أ-١ ، ب).

من خلال نتائج هذا البحث يمكن استنتاج أن انخفاض نسبة بعض مكونات الدهون والبروتينات الدهنية فى مرض فيروس سى الكبدى يقلل من احتمال الإصابة بمرض تصلب الشرايين وأمراض القلب.