

## LIPID PROFILE AND HEMATOLOGICAL CHANGES IN GALLSTONE PATIENTS

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### Abstract

The current study was aimed to find out the possible alterations of the serum lipid profile and some hematological parameters in 17 (11 female and 6 male) gall stone former patients with age range between (19-57) years. During this study, total serum cholesterol, triglycerides, lipoproteins (HDL and LDL) and total leukocyte count, erythrocyte count, hemoglobin ratio and platelet count were included. All cases were newly diagnosed in surgery unit of Rizgary hospital in Erbil city. The results showed an elevation in the level of cholesterol, triglyceride and LDL and decreased cholesterol-HDL level in patients with cholelithiasis. Furthermore, the total erythrocyte number, total leukocyte number and platelet count were increased with a significant decrease of blood haemoglobin levels in the gallstone patients. In conclusion the changes in the levels of lipid profile and hematological parameters may be used as markers for gallstone formation.

**Key word:** Gallstone, Lipid profile, Hematological parameters

### Introduction

Gallstones or cholelithiasis is the most common type of gallbladder diseases affecting 10% of USA population (Dave, 2010). The main constituents of gallstone are cholesterol, bilirubin and calcium (Johnston and Kaplan, 1993). Other constituents may include fatty acids, triglycerides, protein and polysaccharide (Selvaraju *et al.*, 2009).

Gallstones are crystalline structures formed by concretion or accretion (adherence of particles, accumulation) of normal or abnormal bile constituents through three stages of gallstone formation, supersaturation, nucleation and aggregation (Channa, 2008).

It is now widely accepted that the primary event in the pathogenesis of cholesterol gallstones is an altered lipid metabolism because of which there is a relative increase in the cholesterol levels are compared to other lipids secreted by the liver into the bile (Rao *et al.*, 2012). Alterations in the lipid metabolism may arise as a result of a combination of various factors such as estrogen treatment, aging (Cuevas *et al.*, 2004), hypertriglyceridemia, over weight and insulin resistant patients (Smelt, 2010), excess dietary cholesterol/fat, obesity, diabetes and genetic causes (Rao *et al.*, 2012). Women are twice as likely as men to develop gallstones; the higher prevalence of gallstones in women is thought to be caused by multiple pregnancies and obesity (Devrajani *et al.*, 2010).

Lithogenicity of the bile is mainly determined by the concentrations of their principal three lipid components, cholesterol, bile acids and

phospholipids (Smelt, 2010). Relative increase concentrations of cholesterol in bile, or supersaturation, led to gallstones formation (Cuevas *et al.*, 2004) also changes in bile acid metabolism and gallbladder function are critical factors in the pathogenesis of gallstones diseases (Smelt, 2010).

Some previous studies reported that advanced age, history of coronary artery disease, and leukocytosis have to be associated with an increased risk for gangrenous cholecystitis (Fagan *et al.*, 2003). The gall stone may results in hemorrhagic cholecystitis with hemoperitoneum and depletion of Hb content, which is most familiar in female (40%) than in male (36%) (Channa *et al.*, 2005). In another study (Kim *et al.*, 2007) showed that gallstone spillage caused by the perforation of the hemorrhagic cholecystitis which cause the drop of blood hemoglobin also thrombocytopenia. It was also revealed that in patients with hemoglobin C diseases, continued hemolysis may produce pigment gallstones which are unusual type of gallstone (Carter and Besa, 2012).

In general, beside the determination of lipid profile for prognosis of patient with gallstones, a routine hematological and liver function tests in preoperative assessment of uncomplicated symptomatic cholelithiasis usually required (Habib *et al.*, 2009). This is due to the fact that gallstone disease is known to cause liver disease and a derangement of its enzymes (Olokoba *et al.*, 2009). This may due to move of gallstone into the common bile duct and liver, causing inflammation, and elevated leukocyte count and

liver enzymes often result from damage to liver cells caused by inflammation and infection (Pereira-Lima *et al.*, 2000).

This study was aimed to find out the possible change in serum lipid profile and some hematological parameters in gall stone formation.

### Materials and Methods

During this study, total serum cholesterol, triglycerides, lipoproteins (HDL and LDL) and some hematological parameters (Total leukocyte count, erythrocyte count, Hb value and platelet count) were studied in the sera of 17 patients with gallstones newly diagnosed in surgery unit of Rizgary hospital- Erbil, the patients were of normal weight, non smokers, not receiving any treatments and with age range between 19-57 years.

Fasting blood samples were collected by drawing five mls of venous blood from each patient and healthy persons. The samples were immediately transferred into plastic tubes, centrifuged at 3000 rpm for 15 min and the serum was separated and kept at  $-85^{\circ}\text{C}$  until assay. The serum cholesterol level was estimated using standard kit (Syrbio, France), which depends on enzymatic conversion of cholesterol to quinoneimine pigment, then its absorbance was measured at a wave length of 500 nm using

UV/VIS Spectrophotometer (Philips, Pye Unicam SP800). Serum triglyceride level was estimated using standard kit (Syrbio, France), which depends on enzymatic hydrolysis triglyceride with lipases, then its absorbance was determined at wave length of 520 nm using UV/VIS Spectrophotometer (Philips, Pye Unicam SP800). LDL- cholesterol and HDL-cholesterol were measured according to Sewerynek (2000).

Total leukocyte, erythrocyte and platelet counts were determined using hemocytometer. Hemoglobin (Hb) concentration determined using Drabkin solution by cynmethaemoglobin method.

Data was analyzed by using student T-test by statistical packages for social science software (SPSS). Statistical analysis with a value greater than 0.05 considered as non significant (NS) and less than 0.05 considered as significant.

### Results

The results in (table 1) shows significant ( $p<0.05$ ) elevation in total cholesterol, triglyceride and LDL levels in patients with cholelithiasis when compared to the healthy control persons. While the level of serum HDL was significantly ( $p<0.05$ ) decreased in gallstone patients as compared with healthy individuals.

**Table (1):** Change in lipid profile in gallstone patients

Lipid profile	Control(No= 10)	Patients(n=17)
Cholesterol	144.40 $\pm$ 5.01	225.94 $\pm$ 6.97*
Triglycerides	86.60 $\pm$ 4.79	305.88 $\pm$ 10.51*
LDL	113.10 $\pm$ 4.78	173.17 $\pm$ 5.66*
HDL	43.10 $\pm$ 1.57	35.82 $\pm$ 1.84*

\* $P<0.05$ : significant

The results in table (2) shows that there are significant ( $p<0.05$ ) increases in the total erythrocyte (TEC), total leukocyte (TLC) and platelet counts in gallstone patients as compared to the healthy control persons. On the other hand there is a significant decrease in haemoglobin (Hb) level in gallstone patients than the healthy control group.

**Table (2):** Hematological parameters in control and gallstone patients

Hematological parameters	Control (No= 10)	Patients (n=17)
TLC* 10 <sup>3</sup>	7.0±0.2	7.5 ±0.3*
TEC* 10 <sup>6</sup>	5.0 ±0.1	5.7±0.3*
Hb (gm/dl)	14.4 ±0.4	13.4±0.2*
<i>Platelets</i>	210.9 ±6.2	275.4±12.2*

\*P&lt;0.05: significant

### Discussion

Increased total lipid profile (cholesterol, triglyceride and LDL) levels in gallstone patients agree with the results of gallstone patients in Pakistan reported by Channa *et al.*, (2010), Channa (2008) showed that free cholesterol increases steroid synthesis, which in turn decreases the production of bile acids is responsible for the precipitation of cholesterol in bile, which is a prerequisite for gallstone formation. Jaraari *et al.*, (2010) also revealed that quantitative analysis of Libyan patients serum with gallstone showed significant increase of cholesterol level. Shiina *et al.*, (2011) showed that there was a significant increase in total free cholesterol, cholesterol-LDL, and triglycerides in patients with cardiac disease developed gallstones after cardiac surgery. Some investigators reported a positive association between gallstone and serum triglycerides in Spanish men (Channa *et al.*, 2010) whereas; others found no such association (Olokoba *et al.*, 2006). In Libyan patients with cholelithiasis unlike that of other studies both male and females serum showed highly significant raise in total cholesterol, LDL and HDL level (Rao, *et al.*, 2012), But our results showed decreased level of cholesterol-HDL in studied patients group.

The significant increase in total leukocyte in gallstone patients may due to the fact that liver produces bile and releases it to the gallbladder through the common bile duct, gallstones can eventually move into the common bile duct and liver, causing inflammation, and elevated leukocyte count and liver enzymes often result from damage to liver cells caused by

inflammation and infection (Pereira-Lima *et al.*, 2000). This is consistent with the results of Merriam *et al.*, (1999); Barak *et al.*, (2009) and (Black and Hawks, 2004) found that the elevated leukocytosis appears to be related to the intense inflammatory reaction associated with the gangrenous cholecystitis which in turn caused elevated total WBC level (Black and Hawks, 2004). Channa *et al.*, (2005) showed that the depletion of blood hemoglobin is most familiar in gall stone patients, while the blood TLC rose in gallstone patients. This agree with the result of the present study, in which there is significant increase in the total platelet and erythrocyte count, and decrease in Hb in studied gall stone patients. While Kim *et al.*, 2007 showed that blood analysis of newly diagnosed gallstone patient revealed mild thrombocytopenia and decrease in Hb-value and increase WBC-count this was because gallstone spillage caused by the perforation of the hemorrhagic cholecystitis which cause inflammation and increasing WBC in blood and drop of blood hemoglobin also thrombocytopenia.

Increase in total platelet count in the present study is a good indicator of presenting hemorrhage, because platelets play an important role in spontaneous homeostasis, interrupting in a natural manner the hemorrhage resulting from the traumatic rupture of blood vessels and these cells act on the acute phase of the inflammatory response that occurs in response to tissue injury, releasing vasoactive amines (histamine and serotonin) that are chemical mediators of inflammation (Crema *et al.*, 2005).

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پوختە:

لەم لیکۆلینەوهی ئیستادا پشکین بۆ گۆرانکاریه کانی چهوری خوین له جوره کانی ( Triglyceride Total ,LDL ,HDL ,cholesterol ) و ریژهی پیکهاته کانی خوین له (خرۆکهی سپی, خرۆکهی سوور, په ره کانی خوین, ریژهی هیموگلوبین) نهجم درا له کەسانی تووش بوو به بهردی زراو. ئەم پشکینە نهجم درا به وهگرتنی سیرۆمی ۱۰ کەسی ساخ و ۱۷ نهخۆشی تووشبوو به بهردی زراو ( ۱۱ مێ) و ( ۶ نێر) دواي سهلماندنی نهخۆشیه که له یه کهی نهشتهرگهري گشتی نهخۆشخانهی رزگاری فیوکاری له شاری ههولێر .

ههلسهنگاندنی نهجمه کانی لیکۆلینهوه که له کەسانی نهخۆش به بهراوردکردن له گهڵ کەسانی ساخ (کۆنترۆل) بهرزبوونهوهیهکی بهرچاو دهر دهخات له چهوریه کانی جووری ( Total cholesterol, Triglyceride and LDL, ی سیرۆمی نهخۆشه کان, بهلام ئاستی چهوری جووری (HDL) له هه مان ئه وه نهخۆشانه دا نزمه , له گهڵ ئه وه شدا زیابوونیکی بهرچاو له ریژهی (خرۆکهی سپی, خرۆکهی سوور, په ره کانی خوین) بینرا له گهڵ نزم بوونهوهی ئاستی هیموگلوبینی خوینی هه مان ئه وه نهخۆشانه دا.

الخلاصة

في هذه الدراسة، تم اختبار التغيرات المحتملة للدهون في الدم وبعض مكونات الدم في تكوين الحصوه. اذ تم دراسة مستوى الكولسترول ، الدهون الثلاثية، البروتينات الدهنية (LDL وHDL) والعدد الكلي لخلايا البيض وعدد كرات الدم الحمراء والمحتوى الهيموغلوبيني للدم وعدد الصفائح الدموية، و شملت الدراسة ۱۷ مریضا (۱۱ أنثى و ۶ ذكور) باعمار بين (۱۹-۵۷) سنة. تم تشخيص جميع الحالات المرضی حصة المرارة في وحدة جراحة في مستشفى رزطاری التعليمی في مدينة اربیل.

أظهرت النتائج ارتفاعا في مستوى إجمالي للدهون (الكولسترول، والدهون الثلاثية و LDL) و انخفاض مستوى الكولسترول HDL- في المرضی الذين يعانون من تحص صفراوي. كما أظهرت النتائج زيادة في كرات الدم الحمراء , عدد الصفائح الدموية وخلايا الدم البيضاء وانخفاض ملحوظ في مستويات الهيموكلوبين في الدم المرضی اللذين يعانون من تحص صفراوي.