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Research Article

CORRELATION OF SERUM CHOLESTEROL AND GALL STONE FORMATION: AN OBSERVATIONAL STUDY

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ABSTRACT

The epidemiology of Cholelithiasis or gall stone has been debated for many years, efforts has been made to know the patho-physiological basis of gall stone formation. Gall stones are associated with abnormalities in relative concentrations of major biliary lipids like cholesterol and phospholipids, hence the aim of this study is to determine the correlation between serum cholesterol and gall stone formation. This was an observational study in which 78 patients were included who were diagnosed as cholelithiasis or choledocolithiasis. These patients were of low and middle socio economic groups and diagnosis was based on USG report. Blood samples of diagnosed patients were collected for cholesterol analysis. The results were surprising showing 93.6% patients of gall stones in the group having serum cholesterol concentration in normal range. So we concluded a negative correlation between serum cholesterol and gall stone formation.

Keywords: Cholelithiasis; Choledocolithiasis; USG

INTRODUCTION

Gall stones or cholelithiasis (chole-bile, lithier-stone & sis-process) are the most common digestive diseases worldwide. They can occur anywhere within the biliary tree, including the common bile duct.[1] Gallstones are classified into: cholesterol stones, pigment stones and mixed stones. However, all stones even pure cholesterol gall stones usually contain small amounts of bilirubin. The prevalence of gallstones continues to rise with age, and it is higher in women than in men. This may be due to the increase of cholesterol content in the bile by the effect of estrogen.[2] It is now widely accepted that the primary event in pathogenesis of cholesterol gallstones is an altered lipid metabolism because of which there is a relative increase in the cholesterol levels compared to other lipids secreted by the liver into the bile.[3] Cholesterol is water insoluble lipid, and is taken in mixed micelles and vesicles. Micelles are aggregates of phospholipids, bile salts, and cholesterol, and vesicles are closed spherical bi-layers of phospholipids with associated cholesterol. There are three stages of gallstone formation, super saturation, nucleation and aggregation.[4] The relative concentrations of cholesterol, bile salts and phospholipids determine the cholesterol solubility in bile. Cholesterol precipitation results from an imbalance of these three components in bile; cholesterol, bile salts and phospholipids.[5] In recent years, a great deal of effort has been devoted to defining the patho-physiological basis of gallstone formation. The role of serum lipids in the etiology of cholelithiasis is very important and in cholesterol gallstones serum lipids are altered which is suggestive of metabolic syndrome.[6]

The present study was carried out with the objective of finding any Correlation between serum cholesterol and gall stone formation.

MATERIALS AND METHODS

The study was conducted in department of Jarahat (Surgery) A.K Tibbiya College Hospital AMU, Aligarh. In this study 78 patients were included who were diagnosed as cholelithiasis or choledocholithiasis. These patients were of low and middle socio economic groups and the diagnosis was based on ultrasonography report.

78 blood samples of diagnosed patients of cholelithiasis or choledocholithiasis were collected in adequate amounts for cholesterol analysis. The SPAN diagnostic reagent kit for cholesterol estimation one step method of Wybenga & Pileggi, by colorimetric method, was used to estimate cholesterol.

Blood serum was centrifuged for 10-15 minutes with the help of cyclomixer. Mark the test tube properly as blank (B), Standard (S) and Test (T).

Table 1: Method for cholesterol estimation

	Blank	Standard	Test
Reagent 1- Cholesterol reagent	5.0 ml	5.0 ml	5.0 ml
Reagent 2- Working cholesterol standard (200 mg %)	-	0.025 ml	-
Serum/ Plasma of Blood	-	-	0.025 ml

Mix well and keep the tubes immediately in the boiling water bath exactly for 90 seconds and cool them immediately at room temperature under running tap water. Measure the optical density (OD) of standard (S) and Test (T) against blank (B) on a colorimeter with a yellow green filter at 560 nm. We used the colorimeter (Lab System Analyser) manufactured by J. Mitra & Co. Ltd. having 9 filters included with a wide range of wavelength from 400-700 nm.

Calculation of total cholesterol = O.D Test / O.D Standard X 200 mg/dl
Normal values- adults (130-250 mg/dl), then results were tabulated.

OBSERVATION AND RESULTS

Regarding gallstone formation in relation with serum cholesterol level, in our study out of 78 patients the maximum incidence i.e. 69% of gallstone patients were in the group having serum cholesterol concentration (151- 200 mg %). And only 7.7% patients were in range of below 150 mg%. The percentage of gall stone patients decreases above 200 mg% serum cholesterol concentration. 16.7% of gall stones were in range of (201-250 mg%) of serum cholesterol concentration. While as, 5.1 % gallstone were in the range of (251 - 300 mg %) of serum cholesterol concentration was observed. Above 300 mg% of serum cholesterol level the percentage of gall stone were 1.3%. As shown in Table 2.

Table 2: Serum Cholesterol range and incidence of gall stones

Serum Cholesterol mg%	Total no of patients	Average serum cholesterol mg%	Male	Female	Total %
<150	6	139.3	1	5	7.7
151-200	**54**	**177**	**4**	**50**	**69.2**
201-250	13	223.8	1	12	16.7
251-300	4	259.3	-	4	5.1
301-350	1	320	-	1	1.3
TOTAL		**187.9**	**6**	**72**	**100**

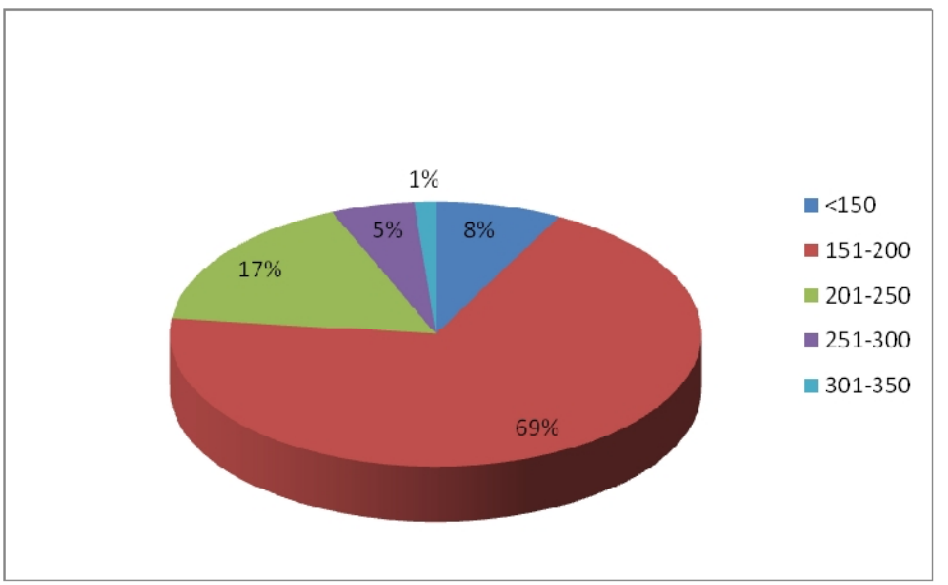

Figure 1: Incidence of Gall stone and Serum Cholesterol Level

DISCUSSION

The present study was undertaken to know the level of serum Cholesterol and to find out the possible association of cholelithiasis. Many studies have shown that untreated gallstone patient present with hypercholesterolemia, the actual mechanism behind it is still unknown .[7]In recent years, the aetiology of cholelithiasis is thought to be closely related to metabolic syndrome, since the serum lipids are altered in gallstone patients.[6] Other studies also demonstrates elevated serum total cholesterol, LDL cholesterol and triglycerides and decreased levels of HDL cholesterol in gallstone patients may play a major role in the pathogenesis of gallstone.[8] One more study also shows elevated serum total cholesterol, free cholesterol, LDL cholesterol, triacylglycerols and decreased levels of HDL cholesterol seem to play major contributing role in the pathogenesis of gallstones in females of up to 45 years of age with more than three children.[9]

In the present study, a negative correlation was observed between serum cholesterol and gall stones formations as maximum incidence about 93.6% patients of gallstone were in the group having normal serum cholesterol.

The sample size was small and was conducted at only one centre. Future studies should be multicentric with a large sample size. Moreover as cholesterol solubility is dependent over lipid concentration of bile, bile salt, bile acids and lecithin, further these parameters may be estimated to give definite results.

CONCLUSION

In conclusion, the study shows that the serum cholesterol concentration has got no effect on etiopathogenesis of gall stone formation, as increase in serum cholesterol concentration does not increase incidence of gall stone formation, and maximum number of patients were in normal range of serum cholesterol concentration.

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