

**Research Article****Analysis of serum calcium and serum lipid profile in cholelithiasis patients**

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**ABSTRACT**

**Objective:**To analysis the serum calcium and serum lipid profile in cholelithiasis patients.

**Material and methods:**This cross sectional study was conducted at Department of Surgery, Medicare Hospital Multan from March 2017 to September 2017. Total 380 patients of cholelithiasis were selected and analysis of the serum calcium and serum lipid profile was done.

**Results:**In present study mean age of cases was  $43.18 \pm 13.970$  years, mean serum calcium was  $11.55 \pm 1.18$  mg/dl, mean serum HDL was  $40.21 \pm 3.1$  mg/dl, mean serum LDL was  $137.98 \pm 9.79$  mg/dl, mean serum TC was  $204.27 \pm 24.12$  mg/dl, mean serum TG was  $198.94 \pm 72.12$  mg/dl, mean weight was  $54.30 \pm 13.07$  kg and mean height was  $63.57 \pm 4.14$  inch.

**Conclusion:**Results of this study revealed that female are more victim of gallstone disease as compare to male. It is also concluded that increased serum calcium and serum lipid have a role in the pathogenesis of different types of human gallstones in this area.

**Keywords:**Serum calcium, lipid profile, Gallstone patients, Cholelithiasis

**INTRODUCTION**

Gallstone disease is the most common gastrointestinal disorder and it prevalent in 10% to 15% adult population of developed countries.<sup>1</sup>Most of the patients with this disorder are asymptomatic.<sup>2</sup>Women are most commonly victim of gall stone disease as compare to male.<sup>1</sup>The gall bladder is a pear shaped organ, which is 9cm in length and it has capacity of approximately 50 ml. It consists of the fundus, body and neck that tapers into the cystic duct. The main function of the gall bladder is to store and concentrate the bile secreted by the liver and then deliver it into the intestine for digestion and absorption of fat.<sup>2</sup> The motility, concentration and relaxation of the gall bladder are under the influence of a peptide hormone, cholecystokinin, released from neuroendocrine cells of the duodenum and jejunum.<sup>3</sup> This bile containing high level of cholesterol gets concentrated, becomes

hardened, crystalline and doesn't move to the intestine, that is then termed as gall stones.<sup>4</sup> Gall bladder stones are mainly cholesterol stones, while pigment stones and mixed stones composed of bile pigments and bile salts are also seen. Impaired motility of the gallbladder has been cited as contributing factor in the development of gall stones.<sup>5</sup>

Gall stones are of three major types- (i) Pure cholesterol stones contain at least 90% cholesterol, (ii) pigment stones either brown or black contain at least 90% bilirubin and (iii) mixed composition stones contain varying proportions of cholesterol, bilirubin and other substances such as calcium carbonate, calcium phosphate and calcium palmitate. Brown pigment stones bilirubin, calcium and tribasic phosphate.<sup>7</sup> No local study was conducted before on this issue. The results of this study may help us to set a

primary data in our targeted population to explore the possible role of impaired serum calcium and lipid profile in gall stone formation so that we can establish the preventive strategies in patients of altered serum parameters (serum Calcium and lipid profile)

## MATERIAL AND METHODS

This cross sectional study was conducted at Department of Surgery, Medicare Hospital Multan from March 2017 to September 2017. Male or female patients with gall stone disease having age from 20 to 70 years were included in this study. Patients with acalculus gallbladder disease on ultrasound, terminal ileal resection and disease e.g. Crohn's disease. (On history and medical record.), foreign body CBD such as stents (history and medical record), haemolysis (hereditary spherocytosis, sickle cell anemia on history and CBC film), liver cirrhosis (on Abdominal Ultrasound), renal failure (RFT) and patient on antihyperlipidemic drugs were excluded from the study.

Gallstone is determined sonographically by presence of echoes in gall bladder lumen with prominent acoustic shadowing and usually move with gravity (the rolling stone sign).

An approval was taken from ethical committee of hospital. Written informed consent was taken from every patient.

Weight and height was measured by manual weight machine and measuring tape respectively for all the patients to calculate the BMI and history was taken about diabetes mellitus.

After an overnight fasting, 5 ml venous blood sample was taken from patients. Sample was sent to laboratory for serum calcium and lipid profile analysis. All the laboratory findings with Demographic profile were record in pre- designed profroma.

The data was analyzed by using SPSS V16. Quantitative variable like age, serum calcium, serum Total Cholesterol, serum LDL, serum HDL, serum Triglycerides, weight, height and BMI were presented as mean  $\pm$  SD, while qualitative variable like gender Diabetes and obesity were presented in frequency and percentages. Stratification was

done for age, gender, diabetes and obesity. Post stratification t- test was applied to see the level of significance. P-values  $\leq$  0.05 was considered statistically significant. The other effect modifier will be controlled through exclusion criteria.

## RESULTS

Mean age of the patients was  $43.18 \pm 13.970$  years, mean serum calcium was  $11.55 \pm 1.18$  mg/dl, mean serum HDL was  $40.21 \pm 3.1$  mg/dl, mean serum LDL was  $137.98 \pm 9.79$  mg/dl, mean serum TC was  $204.27 \pm 24.12$  mg/dl, mean serum TG was  $198.94 \pm 72.12$  mg/dl, mean weight was  $54.30 \pm 13.07$  kg and mean height was  $63.57 \pm 4.14$  inch. (Table 1). As shown in Fig. 1, out of 380 patients of gall stone disease, 79 (21%) were male and 301 (79%) were female. As shown in Fig. 2, among the 380 patient of gall stone disease 150 (39%) were diabetics and 230 (61%) were non-diabetics. Out of 380 patients, 53 (14%) were obese and 327 (86%) were non-obese. (Fig. 3)

Stratification for was done and two age groups were made, age group 20-45 years and age group 46-70 years. Age group 20-45 years consisted on 182 patients and age group 46-70 years were consisted on 198 patients. Mean serum calcium, HDL, LDL, TC and TG of patients of age group 20-45 years was  $11.61 \pm 1.24$  mg/dl,  $40.35 \pm 3.01$  mg/dl,  $137.67 \pm 9.61$  mg/dl,  $201.47 \pm 23.70$  mg/dl,  $190.34 \pm 60.31$  mg/dl and mean serum calcium, HDL, LDL, TC and TG of patients of age group 46-70 years was  $11.49 \pm 1.11$  mg/dl,  $40.07 \pm 3.1$  mg/dl,  $138.26 \pm 9.97$  mg/dl,  $206.84 \pm 24.28$  mg/dl,  $206.85 \pm 80.83$  mg/dl. T test was applied to compare the mean serum calcium levels between the two age groups. Statistically significant (P=0.030, 0.026) difference for mean TC and mean TG between the both age groups were detected and insignificant (P=0.319, 0.373, 0.558) difference for mean serum calcium, HDL, LDL between the both groups were detected. (Table 2)

Gender distribution of gall stone patients was done and mean serum calcium, HDL, LDL, TC and TG was compared between male and female patients. Mean serum calcium, HDL, LDL, TC and TG of male patients was  $11.57 \pm 1.166$  mg/dl,

40.52 ± 3.05 mg/dl, 138.25 ± 9.72 mg/dl, 202.34 ± 22.43 mg/dl, 185.92 ± 55.36 mg/dl and mean serum calcium, HDL, LDL, TC and TG of female was 11.55 ± 1.179 mg/dl, 11.55 ± 1.179 mg/dl, 40.12 ± 3.06 mg/dl, 137.90 ± 9.82 mg/dl, 204.77 ± 24.56 mg/dl, 202.36 ± 75.62 mg/dl. Insignificant (P=0.873, 0.301, 0.778, 0.426, 0.071) difference for mean serum calcium, HDL, LDL, TC and TG between the male and female patients were detected. (Table 3)

In our study mean serum calcium, HDL, LDL, TC and TG of diabetics was 11.49 ± 11.49 mg/dl, 40.17 ± 3.05 mg/dl, 138.68 ± 10.12 mg/dl, 205.83 ± 23.48 mg/dl, 204.79 ± 82.813 mg/dl and mean serum calcium, HDL, LDL, TC and TG of non-diabetics was 11.59 ± 1.20 mg/dl, 40.23 ± 3.05 mg/dl, 137.52 ± 9.54 mg/dl, 203.24 ± 24.53 mg/dl, 195.12 ± 64.104 mg/dl. Insignificant

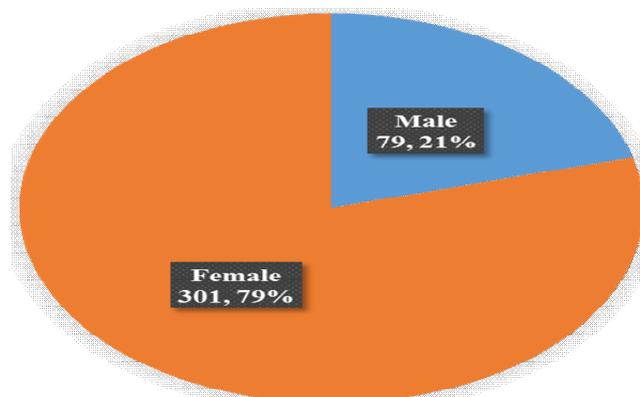
(P=0.407, 0.852, 0.260, 0.310, 0.200) difference for mean serum calcium, HDL, LDL, TC and TG between the diabetic and non-diabetic patients were detected. (Table 4)

Mean serum calcium, HDL, LDL, TC and TG of Obese was 11.5889 ± 1.22442 mg/dl, 40.00 ± 2.79 mg/dl, 140.40 ± 9.21 mg/dl, 205.25 ± 23.17 mg/dl, 202.21 ± 75.59 mg/dl and mean serum calcium, HDL, LDL, TC and TG of Non-obese was 11.5436 ± 1.16809 mg/dl, 40.24 ± 3.10 mg/dl, 137.58 ± 9.83 mg/dl, 204.11 ± 24.30 mg/dl, 198.41 ± 71.64 mg/dl. Insignificant (P=0.795, 0.597, 0.750, 0.723) difference for mean serum calcium, HDL, TC and TG and significant (P=0.052) difference for mean LDL between the obese and non-obese patients were detected. (Table 5)

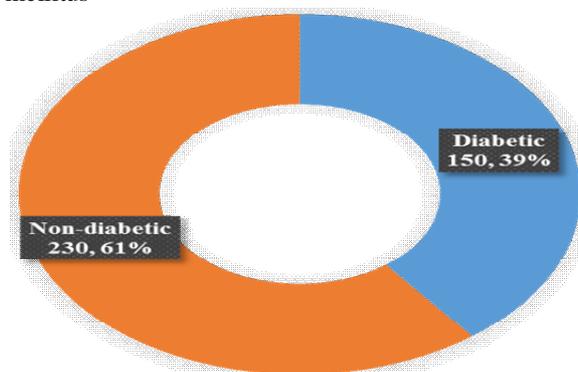
**Table 1** Mean and standard deviation for calcium and lipid profile

	Variable							
Mean & SD	Age Years	Calcium mg/dl	HDL mg/dl	LDL mg/dl	TC mg/dl	TG mg/dl	Weight kg	Height Inches
Mean	43.18	11.55	40.21	137.98	204.27	198.94	54.30	63.57
SD	13.97	1.18	3.1	9.79	24.12	72.12	13.07	4.14

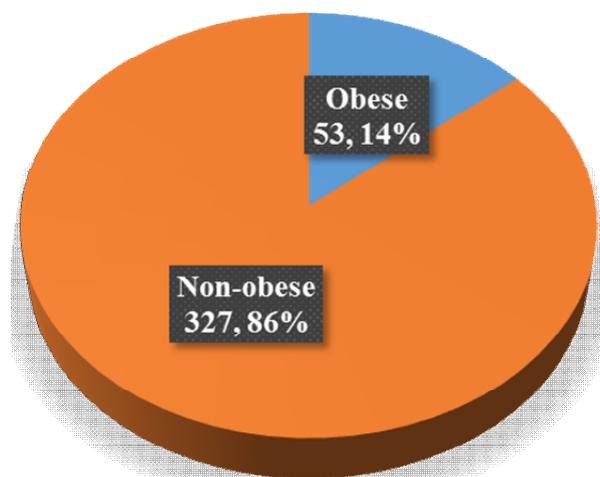
**Fig. 1** Gender distribution



**Fig. 2** Frequencies for diabetes mellitus



**Fig. 3** Frequencies for obesity



**Table 2** Comparison of mean serum calcium levels and mean lipids in different age groups

Age Group	n	Calcium mg/dl	HDL mg/dl	LDL mg/dl	TC mg/dl	TG mg/dl
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
20-45	182	11.61 ± 1.24	40.35 ± 3.01	137.67 ± 9.61	201.47 ± 23.70	190.34 ± 60.31
46-70	198	11.49 ± 1.11	40.07 ± 3.1	138.26 ± 9.97	206.84 ± 24.28	206.85 ± 80.83

**Table 3** Comparison of mean serum calcium levels between male and female

Gender	n	Calcium mg/dl	HDL mg/dl	LDL mg/dl	TC mg/dl	TG mg/dl
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Male	79	11.57 ± 1.166	40.52 ± 3.05	138.25 ± 9.72	202.34 ± 22.43	185.92 ± 55.36
Female	301	11.55 ± 1.179	40.12 ± 3.06	137.90 ± 9.82	204.77 ± 24.56	202.36 ± 75.62

**Table 4** Comparison of mean serum calcium levels between diabetics and non-diabetics

Diabetes	n	Calcium mg/dl	HDL mg/dl	LDL mg/dl	TC mg/dl	TG mg/dl
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Diabetic	150	11.49 ± 1.13	40.17 ± 3.05	138.68 ± 10.12	205.83 ± 23.48	204.79 ± 82.813
Non-diabetic	230	11.59 ± 1.20	40.23 ± 3.05	137.52 ± 9.54	203.24 ± 24.53	195.12 ± 64.104

**Table 5** Comparison of mean serum calcium levels between obese and non-obese

Obesity	n	Calcium mg/dl	HDL mg/dl	LDL mg/dl	TC mg/dl	TG mg/dl
		Mean ± SD P=0.795	Mean ± SD P=0.597	Mean ± SD P=0.052	Mean ± SD P=0.750	Mean ± SD P=0.723
Obese	53	11.588 ± 1.22	40.00 ± 2.79	140.40 ± 9.21	205.25 ± 23.17	202.21 ± 75.59
Non-obese	327	11.543 ± 1.168	40.24 ± 3.10	137.58 ± 9.83	204.11 ± 24.30	198.41 ± 71.64

**DISCUSSION**

The role of serum lipids in the aetiology of cholelithiasis is very important and in cholesterol gallstones serum lipids are altered which is suggestive of metabolic syndrome.<sup>8</sup>The incidence of gallstones increases with age.<sup>7</sup> Most Cholecystitis are made up of cholesterol, calcium carbonate calcium bilirubinate, or a mixture of these. Gallstones are believed to form, when the concentration of cholesterol exceeded that which can be held in mixed micelles solution with bile acids and phospholipids.<sup>7</sup>

In present study mean age of the patients was 43.18 ± 13.970 years which is comparable with the study of Nayal et al.,<sup>9</sup> who reported mean age of patients with gallstone as 48.6 ± 11.5 years.

In present study mean serum HDL was 40.21 ± 3.1 mg/dl, mean serum LDL was 137.98 ± 9.79 mg/dl, mean serum TC was 204.27 ± 24.12 mg/dl, mean serum TG was 198.94 ± 72.12 mg/dl, mean weight was 54.30 ± 13.07 kg and mean height was 63.57 ± 4.14 inch.

In one study by Nagaraj et al,<sup>10</sup> mean serum Triglycerides (mg/dl), Total cholesterol (mg/dl), HDL cholesterol (mg/dl), LDL cholesterol (mg/dl) was 144.19±12.70, 175.83±12.68, 30.95±4.42, 115.76±12.01 respectively in patients of gallstone. These findings are in agreement with the findings of present study.

In another study by Devaki et al,<sup>11</sup> serum lipids were measured in patients with cholelithiasis.

They found mean serum Total cholesterol (mg/dl) and HDL cholesterol (mg/dl), LDL as 224.3 ± 42.4, 139.3 ± 23.8 respectively. Findings of this study are also in favour of findings of my study.

In a study by AL-Kataan MA-G<sup>12</sup> on patients with gallstone, mean and standard deviation for total cholesterol, HDL, LDL and TG was 6.388 ± 0.98 (mmol/L), 0.91 ± 0.15 (mmol/L), 4.66 ± 1.07 (mmol/L) and 1.94 ± 0.58 respectively. In a study by Méndez-Sánchez<sup>13</sup> total cholesterol, HDL, LDL and TG was 5.3 ± 1.2 (mmol/L), 1.0 ± 0.3 (mmol/L), 3.3 ± 0.9 (mmol/L) and 1.9 ± 0.9 respectively.

In present study mean serum calcium was 11.55 ± 1.18 mg/dl. In one study by Channa et al<sup>14</sup> serum calcium level was measured and mean serum calcium level was found in patients of gallstone as 13.1 ± 4.63 (mg/dl). In another study by Kumari et al<sup>15</sup> mean serum calcium levels was 2.10 ± 0.38 (mmol/L). Findings of these studies also in agreement with my study.

**CONCLUSION**

Results of this study revealed that female are more victim of gallstone disease as compare to male. It is also concluded that increased serum calcium and serum lipid have a role in the pathogenesis of different types of human gallstones in this area.

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