

A Case Control Study of Assessment of Lipid Abnormalities in Patients Suffering From Gall Stones

Dr. Balram Jha¹, Dr. Reena Jha^{2*}

¹ Associate Professor, Department of General Medicine, M.G.M Medical College, Jamshedpur, Jharkhand.

^{2*} Medical Officer, East Singhbhum, Jharkhand.

Corresponding Author: Dr. Reena Jha

Abstract: Introduction: Cholelithiasis affects mainly women, at a proportion of approximately 2:1. Numerous conditions contribute to the development of gallstones, with the most important being obesity, hypercaloric diet, diabetes, liver cirrhosis, hemolytic disease, physical inactivity, multiple pregnancies, and long-term treatment with sex hormones.

Materials and Methods: The case control study was used in the study and the sample size was taken for convenience during the study, which was carried out in the Department of Medicine among the healthy individuals and patients of gallstones attending to the OPD of General Medicine, M.G.M Medical College, Jamshedpur, and Jharkhand. This study was conducted from 1st April 2018 to 31st December 2018. Gallstones are solid particles that develop in the gallbladder. Stones are formed from the crystallization of bile, a fluid made by the liver and secreted into the bowel through the bile ducts to help digest fats. The gallstones were collected after cholecystectomy. Total subjects taken were 50 cases and 50 controls. These cases and controls were selected by using a standard questionnaire. It was used as a study tool to collect the data including basic profile of participants and the proforma also included the different types of investigations related to the study, i.e. lipid profile assessment, ultrasound of the abdomen. A verbal or a written consent was obtained from participants before the sample collection.

Results: Total patients taken were 50 cases and 50 controls, patients participated in this study Cases i.e. patients with gallstone disease and Controls i.e. patients without gallstone disease. Out of these 26 (52%) males and 24 (48%) females were in case group and had gallstone disease whereas 33 (66%) were males and 17 (34%) were females in the control group. All the patients were in the age group of 20 to 70 years with mean age in cases was 43.2 ± 13.69 and in controls was 46.2 ± 14.39 . Comparison of serum lipid profile between patients and controls group showed that the levels of serum total cholesterol (147.22 ± 38.71) in patients were slightly higher than that of the control group (138.32 ± 49.54), but there was no significant variation in total cholesterol ($p > 0.05$) between patients and controls group. LDL-C was even lower in patients (74.74 ± 28.84) as compared to control group (76.40 ± 37.00).

Conclusion: Gallstone diseases being common disorders, might have an association with abnormal lipids. This study is done to compare the serum lipid abnormalities in patients who have cholelithiasis with controls. The results showed moderate significance in regard to TGs and VLDL in formation of gallstones. Although, this small sample size study concluded that there is correlation between presence of gallstones and TGs as well as VLDL, but a larger sample size study is required to further strengthen the findings of this study. The understanding of various other risk factors is also essential to establish the formation of gallstones.

Key Words: Gallstone diseases, Cholelithiasis

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I. Introduction

Cholelithiasis affects mainly women, at a proportion of approximately 2:1. Numerous conditions contribute to the development of gallstones, with the most important being obesity, hypercaloric diet, diabetes, liver cirrhosis, hemolytic disease, physical inactivity, multiple pregnancies, and long-term treatment with sex hormones.¹ Laparoscopic cholecystectomy (LC) has become the gold standard for surgical treatment of benign gallbladder disease. The advantages of this procedure compared to laparotomy include smaller incisions, reduced surgical trauma, less postoperative pain, faster recovery times, a shorter hospital stay, and faster return to normal activities and work. The use of a single umbilical incision for gallbladder removal was an interesting innovation and single-incision laparoscopic cholecystectomy has gained momentum in the literature since its description in the literature.⁵⁻⁸ Hence; we planned the present study to assess the serum lipid profile in patients undergoing LC.²

II. Materials And Methods

The case control study was used in the study and the sample size was taken for convenience during the study, which was carried out in the Department of Medicine among the healthy individuals and patients of gallstones attending to the OPD of General Medicine, M.G.M Medical College, Jamshedpur, and Jharkhand. This study was conducted from 1st April 2018 to 31st December 2018. Gallstones are solid particles that develop in the gallbladder. Stones are formed from the crystallization of bile, a fluid made by the liver and secreted into the bowel through the bile ducts to help digest fats. The gallstones were collected after cholecystectomy. Total subjects taken were 50 cases and 50 controls. These cases and controls were selected by using a standard questionnaire. It was used as a study tool to collect the data including basic profile of participants and the proforma also included the different types of investigations related to the study, i.e. lipid profile assessment, ultrasound of the abdomen. A verbal or a written consent was obtained from participants before the sample collection. These cases and controls were selected from the patients who visited the General Medicine, M.G.M Medical College, Jamshedpur, and Jharkhand. All the patients were in the age group of 20 to 70 years with the mean age in cases was 43.2 ± 13.69 and in controls was 46.2 ± 14.39 . Comparison of serum lipid profile between patients and control groups showed that the levels of serum total cholesterol (147.22 ± 38.71) in patients were slightly higher than that of the control group (138.32 ± 49.54), but there was no significant variation in total cholesterol ($p > 0.05$) between patient and control groups.

A standard questionnaire was used as study tool to collect the data including basic profile of participants and the proforma also included the different types of investigations related to the study, i.e. lipid profile assessment, ultrasound of the abdomen. A verbal or a written consent was obtained from participants before the sample collection. 5 mL of blood sample was collected after overnight fasting from each of the participants to measure the serum lipid parameters. Serum cholesterol levels were measured with Cholesterol Reagent (CHOD-PAP). Serum triglycerides were measured with Triglycerides DES Reagent (Dynamic Extended Stability with Lipid Clearing Agent GPO-Trinder Method, End Point). HDL Cholesterol were measured with ERBA Cholesterol Reagent. (Phosphotungstic Acid Method, End Point). LDL Cholesterol was measured by Friedewald equation and the beta-quantification method. VLDL Cholesterol = TG/5. The gallstones were collected after cholecystectomy. Statistical Software namely SPSS 21.0 version was used for the analysis of the data and Microsoft Word and Excel had been used to generate the graphs and tables. Descriptive statistics like mean, standard deviation and student's independent t-test was used to examine the degree of significance. P values less than 0.05 was considered significant.^{3,4}

III. Results

Total patients taken were 50 cases and 50 controls, patients participated in this study Cases i.e. patients with gallstone disease and Controls i.e. patients without gallstone disease. Out of these 26 (52%) males and 24 (48%) females were in case group and had gallstone disease whereas 33 (66%) were males and 17 (34%) were females in the control group. All the patients were in the age group of 20 to 70 years with mean age in cases was 43.2 ± 13.69 and in controls was 46.2 ± 14.39 . Comparison of serum lipid profile between patients and controls group showed that the levels of serum total cholesterol (147.22 ± 38.71) in patients were slightly higher than that of the control group (138.32 ± 49.54), but there was no significant variation in total cholesterol ($p > 0.05$) between patients and controls group. LDL-C was even lower in patients (74.74 ± 28.84) as compared to control group (76.40 ± 37.00). HDL-C was slightly higher in patients (47.78 ± 15.47) than the control group (44.06 ± 15.65), but it was also not significant. In our study triglycerides (126.34 ± 64.83) and very low-density lipoprotein (25.50 ± 12.56) concentration had significant ($p < 0.05$) increase in patients with gallstone formation compared with control (105.66 ± 38.55 and 21.26 ± 7.96 respectively).

Age Group (in yrs.)	Cases				Total		Controls				Total	
	Male		Female				Male		Female			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
20-30	5	19	6	25	11	22	5	15	4	24	9	18
30-40	4	15	7	29	11	22	6	18	4	24	10	20
40-50	6	23	6	25	12	24	5	15	5	29	10	20
50-60	7	27	5	21	12	24	9	27	4	24	13	26
60-70	4	15	-	-	4	8	8	24	-	-	8	16
Total	26		24		50		33		17		50	
Mean \pm S.D.	43.2 ± 13.69						46.2 ± 14.39					

Table 1. Age Wise distribution of Cases and Controls

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Sex	Cases		Control	
	No.	%	No.	%
Male	26	52%	33	66%
Female	24	48%	17	34%
Total	50		50	

Table 2. Sex Wise distribution of Cases and Controls

Range (mg/dL)	Cases				Total		Controls				Total	
	Male		Female		No.	%	Male		Female		No.	%
	No.	%	No.	%			No.	%	No.	%		
80-100	4	15	2	8	6	12	5	15	4	24	9	18
100-120	6	23	4	17	10	20	6	18	3	18	9	18
120-140	4	15	2	8	6	12	5	15	5	29	10	20
140-160	6	23	5	21	11	22	8	24	3	18	11	22
160-180	4	15	6	25	10	20	5	15	2	12	7	14
180-200	2	8	0	0	2	4	1	3	0	0	1	2
200-220	0	0	4	0	4	8	1	3	0	0	1	2
220 and above	0	0	1	0	1	2	2	6	0	0	2	4
Total	26		24		50		33		17		50	
Mean ± S.D.	147.22 ± 38.71						138.32 ± 49.54					

Table 3. Serum Cholesterol Level in Cases and Controls

*p > 0.05 not significant

Range (mg/dL)	Cases				Total		Control				Total	
	Male		Female		No.	%	Male		Female		No.	%
	No.	%	No.	%			No.	%	No.	%		
0-50	1	4	1	4	2	4	1	3	0	0	1	2
50-100	11	42	9	38	20	40	19	58	9	53	28	56
100-150	8	31	7	29	15	30	7	21	8	47	15	30
150-200	4	15	5	21	9	18	5	15	0	0	5	10
200-250	0	0	1	4	1	2	0	0	0	0	0	0
250-300	2	8	-	-	2	4	1	3	0	0	1	2
300 and above	0	-	1	-	1	2	0	0	0	0	0	0
Total	26		24		50		33		17		50	
Mean ± S.D.	126.34 ± 64.83						105.66 ± 38.55					

Table 4. Serum Triglyceride Level in Cases and Control Group

*p < 0.05. Comparison of cases and control group shows that p < 0.05 was moderately significant.

Range (mg/dL)	Cases				Total		Controls				Total	
	Male		Female		No.	%	Male		Female		No.	%
	No.	%	No.	%			No.	%	No.	%		
0-25	2	8	0	0	2	4	0	0	1	6	1	2
25-50	5	19	1	4	6	12	7	21	3	18	10	20
50-75	8	31	7	29	15	30	8	24	5	29	13	26
75-100	9	35	11	46	20	40	12	36	8	47	20	40
100-125	2	8	3	13	5	10	4	12	0	0	4	8
125-150	0	0	1	4	1	2	1	3	0	0	1	2
150-175	0	0	0	0	0	0	0	0	0	0	0	0
175-200	0	0	1	4	1	2	0	0	0	0	0	0
200 and above	0	0	0	0	0	0	1	3	0	0	1	2
Total	26		24		50		33		17		50	
Mean ± S.D.	74.74 ± 28.84						76.40 ± 37.00					

Table 5. LDL Level in Cases and Controls

*p > 0.05 Not Significant.

Range (mg/dL)	Cases				Total		Controls			
	Male		Female		No.	%	Male		Female	
	No.	%	No.	%			No.	%	No.	%
10-20	13	50	11	0	24	48	20	61	10	59
20-30	8	31	7	29	15	30	9	27	6	35
30-40	3	12	4	17	7	14	3	9	1	6
40-50	0	0	1	4	1	2	0	0	0	0
50-60	2	8	0	0	2	4	1	3	0	0
60 and above	0	0	1	4	1	2	0	0	0	0
Total	26		24		50		33		17	
Mean ± S.D.	25.50 ± 12.56						21.26 ± 7.96			

Table 6. VLDL Level in Cases and Controls

*p < 0.05 Significant.

IV. Discussion

Stones are usually classified into 3 groups depending upon their colours: pale yellow and whitish stones as cholesterol stones, black and blackish brown as pigment calculi and brownish yellow or greenish with laminated features as mixed calculi. There are studies which demonstrate the percentage of the types of gallstones present in patients. Ibtisam BM et al⁵ in their study found 53.85% as pigment stones, 29.23% mixed and 16.92% as cholesterol stones and these results were in agreement with Saadeldin A et al⁶ who considered that the most common type of gallstone in Sudanese patients was the pigment calculi 48 (51.07%) followed by mixed stone (31.9%) and then cholesterol type (17%). Although, in our study we have not classified the stones according to the colours, but they have been classified according to their presence and absence inpatients.⁷

These results were in confirmation with the earlier reports of Atman⁸ and Narjis HA et al⁹ in their studies between lipid profile and gallstone formation. Although, gallstones are formed from super saturation of cholesterol in the bile, but high total cholesterol levels themselves are not necessarily associated with gallstones as suggested by Dennis Land Portincasa.¹⁰ Some evidence suggests that high levels of triglycerides may impair the emptying actions of the gallbladder. The mechanism by which cholesterol stones form is not fully understood, but are likely as the result of a complex alteration in hepatobiliary function.

V. Conclusion

Gallstone diseases being common disorders, might have an association with abnormal lipids. This study is done to compare the serum lipid abnormalities in patients who have cholelithiasis with controls. The results showed moderate significance in regard to TGs and VLDL in formation of gallstones. Although, this small sample size study concluded that there is correlation between presence of gallstones and TGs as well as VLDL, but a larger sample size study is required to further strengthen the findings of this study. The understanding of various other risk factors is also essential to establish the formation of gallstones.

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