

Relationship Between Cholesterol and Gallstones, is There Really a Link? A Review of 80 Cases

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Abstract

Background: Cholelithiasis or gallstones and symptomatic or incidental forms a major chunk of general surgical outpatient population, with laparoscopic cholecystectomy being a very commonly done procedure. Many risk factors have been associated with the development of gallstones. The authors study a possible link between gallstones and levels of the different components of cholesterol.

Objective: This study aims to identify and establish a positive link between gallstones and cholesterol by analyzing of lipid profile.

Materials and Methods: This is a prospective study done from October 2015 to August 2017 and included 80 patients with cholelithiasis or choledocholithiasis diagnosed through radiological studies. Fasting lipid profiles were done for all of them.

Results: A total of 80 patients were evaluated in this study. 12 patients had hypercholesterolemia contributing to 15% of the study population, equivalent to similar studies on general population. 23 patients (28.7%) had high triglyceride levels, equivalent to general population prevalence. 79/80 patients had a low high-density lipoproteins (HDLs), much higher than general prevalence of 72.3%, showing a strong correlation between gallstones and decreased HDL levels. 35/80 had high levels of low-density lipoproteins (LDLs) (43.8%), compared to national level 11.8%, showing a strong correlation between gallstones and increased LDL.

Conclusion: With the above data, it was surprisingly proved that low HDL levels and high LDL levels played a more important role in the formation of gallstones. This is of more importance because serum LDL and HDL levels can be controlled by change of lifestyle and dietary patterns.

Key words: Cholelithiasis, Cholesterol, High-density lipoprotein, Low-density lipoprotein

INTRODUCTION

Cholelithiasis or gallstones and symptomatic or incidental forms a major chunk of general surgical outpatient population, with laparoscopic cholecystectomy being a very commonly done procedure. Gallstones are broadly classified into pigmented, cholesterol, and mixed stones. Cholesterol gallstones develop when bile contains too much cholesterol and not enough bile salts.^[1] We here, study possible link between gallstones and levels of the different components of cholesterol.

Objective

This study aims to identify and establish a positive link between gallstones and cholesterol by analysis of lipid profile in patients with established gallstone disease.

MATERIALS AND METHODS

Prospective study was done from October 2015 to August 2017.

Inclusion Criteria

Patients above the age of 18, both sexes, with cholelithiasis or choledocholithiasis diagnosed through radiological studies.

Exclusion Criteria

Patients with carcinoma gallbladder or on current anticholesterol medication were excluded from the study.

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Fasting lipid profiles were done for all of them with the following normalized values of serum cholesterol levels 0–200 mg/dL, serum triglycerides 0–150 mg/dL, serum high-density lipoproteins (HDLs) 60–85 mg/dL, and serum low-density lipoproteins (LDLs) 0–100 mg/dL.

RESULTS

A total of 68 patients had serum cholesterol within normal limits and 12 high levels of serum cholesterol were identified. It accounts to 85% and 15%, respectively. The results were compared to an ICMR study regarding prevalence of dyslipidemia in India [Table 1].

A Chi-square test [Table 2] was done with comparison to the prevalence of dyslipidemia in urban and rural India: The ICMR–INDIAB study.^[2]

It was found not to be statistically significant ($P > 0.01$).

Fasting lipid profile was sent in 80 patients with cholelithiasis, of which serum triglycerides levels with parameters 0–150 mg/dL were considered normal and >150 mg/dL high or hypertriglyceridemia serum triglycerides in 57 patients were within normal limits and 23 patients with high serum triglycerides were identified. It accounts to 71.3% and 28.7%, respectively [Table 3].

Table 1: Number of patients with gallstones and hypercholesterolemia

| 80 patients | Frequency | Valid percent | Cumulative percent |
|----------------------|-----------|---------------|--------------------|
| Normal | 68 | 85.0 | 85.0 |
| Hypercholesterolemia | 12 | 15.0 | 100 |
| Total | 80 | 100.0 | |

Table 2: Cholesterol in cholelithiasis and general population

| Cholesterol in cholelithiasis and general population | Observed N | Expected N |
|--|------------|------------|
| Normal | 12 | 283 |
| Hypercholesterolemia | 68 | 1759 |
| Total | 80 | 2042 |

Table 3: Number of patients with triglyceridemia

| 80 patients | Frequency | Valid percent | Cumulative percent |
|----------------------|-----------|---------------|--------------------|
| Normal | 57 | 71.3 | 71.3 |
| Hypertriglyceridemia | 23 | 28.7 | 100 |
| Total | 80 | 100.0 | |

A Chi-square test [Table 4] was done with comparison to the prevalence of dyslipidemia in urban and rural India: The ICMR–INDIAB study.^[2]

It was found not to be statistically significant ($P > 0.01$).

Serum HDL levels with parameters 60–85 mg/dL were considered normal and <60 mg/dL low or >85 mg/dL high.

A total of 80 patients were tested and 1 was within normal limits and 79 low levels of serum HDL were identified. It accounts to 1.3%, 98.7%, and 0%, respectively [Table 5].

A Chi-square test [Table 6] was done with comparison to the prevalence of dyslipidemia in urban and rural India: The ICMR–INDIAB study.^[2]

It was found to be statistically significant ($P < 0.01$).

Serum LDL levels between 0 and 100 mg/dL were considered normal and >100 mg/dL high.

A total of 80 patients were tested, 45 patients were within normal limits, and 35 high levels of serum LDL were identified. It accounts to 56.3% and 43.7%, respectively [Table 7].

Table 4: Triglycerides in cholelithiasis and general population

| Triglycerides in cholelithiasis and general population | Observed N | Expected N |
|--|------------|------------|
| Normal | 57 | 1440 |
| High | 23 | 602 |
| Total | 80 | 2042 |

Table 5: Distribution of patients with regard to HDL levels

| 80 patients | Frequency | Valid percent | Cumulative percent |
|-------------|-----------|---------------|--------------------|
| Low | 79 | 98.7 | 98.8 |
| Normal | 1 | 1.3 | 100 |
| Total | 80 | 100.0 | |

HDLs: High-density lipoproteins

Table 6: HDL in cholelithiasis and general population

| HDL in cholelithiasis and general population | Observed N | Expected N |
|--|------------|------------|
| Low | 79 | 1476 |
| Normal | 1 | 325 |
| High | 0 | 241 |
| Total | 80 | 2042 |

HDLs: High-density lipoproteins

Table 7: Distribution of patients as regard LDL levels

| 80 patients | Frequency | Valid percent | Cumulative percent |
|-------------|-----------|---------------|--------------------|
| Normal | 45 | 56.3 | 56.3 |
| High | 35 | 43.7 | 100 |
| Total | 80 | 100.0 | |

LDLs: Low-density lipoproteins

Table 8: LDL in cholelithiasis and general population

| LDL in cholelithiasis and general population | Observed N | Expected N |
|--|------------|------------|
| Normal | 45 | 1801 |
| High | 35 | 241 |
| Total | 80 | 2042 |

LDLs: Low-density lipoproteins

A Chi-square test [Table 8] was done with comparison to the prevalence of dyslipidemia in urban and rural India: The ICMR–INDIAB study.^[2]

It was found to be statistically significant ($P < 0.01$).

DISCUSSION

A total of 80 patients were included in this study, and the serum cholesterol, triglycerides, HDL, and LDL levels were checked and results interpreted.

Cholesterol

Of 80 patients, 68 were normal (0–200 mg/dL) and 12 patients had hypercholesterolemia, this accounted for 85% normal and 15% high cholesterol levels, i.e., hypercholesterolemia. Based on “the prevalence of dyslipidemia in urban and rural India: The ICMR–INDIAB study^[2]” done on 2042 people.

High cholesterol levels in the general population were found to be in 13.9%, i.e., 283 patients. This was similar to our findings and showed no statistical significance ($P > 0.01$). Even though the cholesterol level is expected to be high in cases of cholelithiasis,^[3] our study did not show a very significant increase, indicating that there might be other pathways to gallstone formation and this needs further study.

Triglycerides

Of 80 patients, 23 patients had high triglyceride levels (normal 0–150 mg/dL) and 57 patients had normal serum triglyceride levels, i.e., 28.7% and 71.3%, respectively. The national prevalence of hypertriglyceridemia was 29.5%. The study showed no statistical significance. Therefore, patients with cholelithiasis did not have altered triglyceride levels compared to the general population.

HDL The same 80 patients were evaluated for the HDL levels and 60–85 mg/dL was considered normal according to our institution's charts. The findings were 79 had low HDL and 1 had normal, it accounted for 98.8% and 1.3%, respectively. The national prevalence for the same was 72.3% low HDL. This showed a statistical significance ($P < 0.01$). Hence, it was concluded that low HDL levels predisposed the formation of gallstones.

LDL

Of 80 patients, 45 patients were within the normal limits of 0–100 mg/dL and the other 35 were having high LDL levels, i.e., 56.3% and 43.8%, respectively. This when compared to the national data of 11.8% high LDL^[2] showed statistical significance, i.e., $P < 0.01$.

With the above data, it was surprisingly proved that low HDL levels and high LDL levels played a more important role in the formation of gallstones.

CONCLUSION

The study proved that low HDL levels and high LDL levels possibly played an important role in the formation of gallstones. This is of some importance because serum LDL and HDL levels can be controlled by change of lifestyle and dietary patterns. Furthermore, prophylactic statins may have a role in the development of cholesterol gallstones.

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