

## Biochemical Analysis of Gallstones in Patients with Calculus Cholecystitis

Abinash Haziraka<sup>a</sup>, Chandana M.S.<sup>b</sup>, Karan Sehgal<sup>b</sup>

<sup>a</sup>Professor <sup>b</sup>Postgraduate, Dept. of General Surgery, Adichunchangiri Institute of Medical Sciences, Nagamangala Taluk, Mandya Dist, BG Nagara, Karnataka 571448, India.

### Abstract

Gallstones is one of the most common digestive diseases, with incidence ranging from 10 to 20%. Acute cholecystitis is major morbidity following gallstones. Hence in our study by defining the pattern and type of gallstone, and establishing correlation with severity of acute cholecystitis we will open new windows for further investigations in the future helping in implementing the non-surgical interventions measures. A prospective study was done between July 2016 to March 2017 Patients diagnosed as acute calculus cholecystitis in department of general surgery, Adichunchanagiri institute of medical sciences were included in the study. Full history, clinical examination, ultrasound abdomen and laboratory blood investigations done, after which cholecystectomy was done and subjected to biochemical analysis. In our study, highest incidence was in fifth decade, with increase incidence in female, pain and fever were most common symptom. Gallstone analysis showed mixed stone in 76% of cases and pigment stones in 16% of the cases as most common variety. Most of them were associated with grade one acute calculus cholecystitis. In our study we have found out that biochemical analysis of gallstones show there is no correlation between the type of gallstone and severity of acute calculus cholelithiasis by chi square test.

**Keywords:** Cholelithiasis; Acute Calculus cholecystitis.

**Corresponding Author:** Chandana M.S., Postgraduate, Dept. of General Surgery, Adichunchangiri Institute of Medical Sciences, Nagamangala Taluk, Mandya Dist, B G Nagara, Karnataka 571448, India.

E-mail: [hazarikadrabinash@gmail.com](mailto:hazarikadrabinash@gmail.com)

Received on 19.05.2017, Accepted on 16.06.2017

### Introduction

Gallstones, complex bio mineralized deposits formed in the gallbladder, are still a major health problem all over the world. Cholelithiasis is common with the incidence ranging from 10% to 20% of world population. On the basis of their composition, gallstones can be divided into the three types: cholesterol stones (CS) that vary in color from light yellow to dark green or brown and are oval, and they must have at least 80% cholesterol stones by weight (or 70% according to Japanese classification system); pigmented stones (PS) which are small, dark stones made of bilirubin and calcium salts that are found in bile, and they contain less than 20% of cholesterol (or 30% according, to Japanese classification system); mixed stones (MS) which typically contain 20%-80% cholesterol (or 30%-70% according to Japanese classification system). Over the past two decades, a great deal has been learned about the epidemiology of and risk factors of gallstones. Ultrasonography has played a major role in the process, providing a rapid, risk free method of screening large populations. Prior to the availability of ultrasound, most studies relied on highly selective autopsy data and limited oral cholecystography. In our study by defining the pattern and type of gallstones, and establishing correlation with severity of acute cholecystitis we will open new windows for further investigations in the future helping in implementing the non-surgical interventions measures. Gallstones disease is one of the most common and costly of all digestive diseases. Aim of our study was to determine the biochemical analysis of gallstones, to study the clinical spectrum of acute cholecystitis, to analyze the biochemical composition of gallstones and their association with severity of acute cholecystitis.

## Methodology

About 50 consecutive cases were admitted, examined, investigated and diagnosed as calculus cholecystitis during the period of 9 months from July 2016 to March 2017 and detailed history of all the 50 cases were taken according to proforma. Information regarding the age, nature of symptoms, duration of symptoms, diet history, history of OCP intake, alcohol ingestion, diabetes were obtained. All patients undergone detailed examination, underwent investigations like complete haemogram, ECG, LFT, blood sugar, blood urea, serum creatinine, urine analysis, blood group, chest X-ray, ultrasound scan of abdomen. Specialty consultations were taken for patients with associated medical illness and their control was achieved. Risk and complications of the condition as well as surgery has been explained to the patients, consent was taken. After cholecystectomy gallstones were analyzed biochemically and correlation to severity of disease were assessed. Inclusion criteria includes all patients with calculus cholecystitis undergoing cholecystectomy.

## Observation and Results

In this study, 50 patients with cholelithiasis admitted in Adichunchanagiri Institute of Medical Sciences attached to Sri Adichunchanagiri Hospital and Research Centre, B.G. Nagara between January 2016 and September 2016 were included. Well known available literature on Cholelithiasis is reviewed. The results of our study are compared with those of well known authors. After a detailed history, clinical investigations and treatment, following observations were noted.

### Age and Gender Distribution

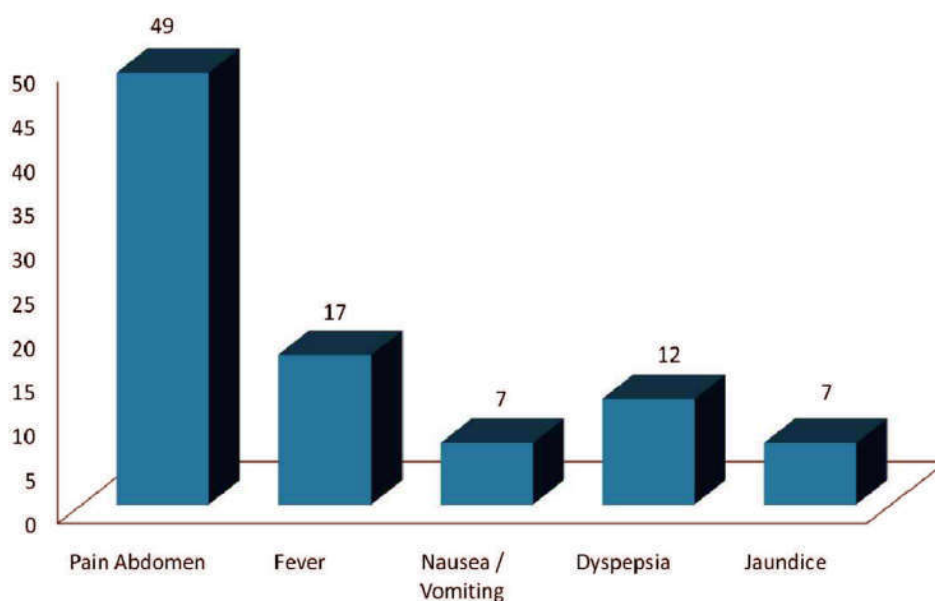
All cases fall between 22 and 75 years. There is an increased incidence in the 5<sup>th</sup> and 6<sup>th</sup> decade with the maximum incidence in the 5<sup>th</sup> decade.

### Presenting Symptoms

Pain abdomen was the most common presenting symptom in our study seen in 49 (98%) of the cases followed by fever in 17 (34%) cases. Dyspepsia was seen in 12 (24%) cases, 7 cases (14%) each presented with nausea / vomiting or jaundice.

**Table 1:** Age and Gender Distribution of Cholelithiasis

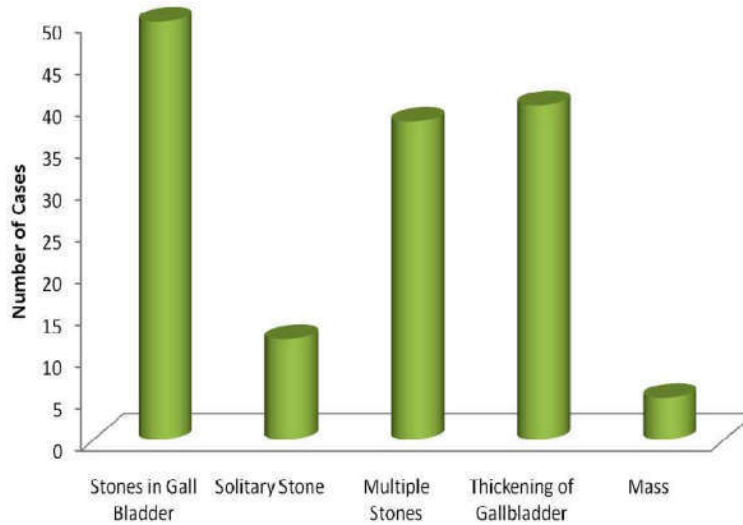
Age in Years	Gender		Total	Percent- age
	Male	Female		
21-30	3	5	8	16%
31-40	2	5	7	14%
41-50	6	10	16	32%
51-60	3	9	12	24%
>60	1	6	7	14%



**Graph 1:** Age and Gender Distribution of Cholelithiasis

**Table 2:** Presenting Symptoms of Cholelithiasis

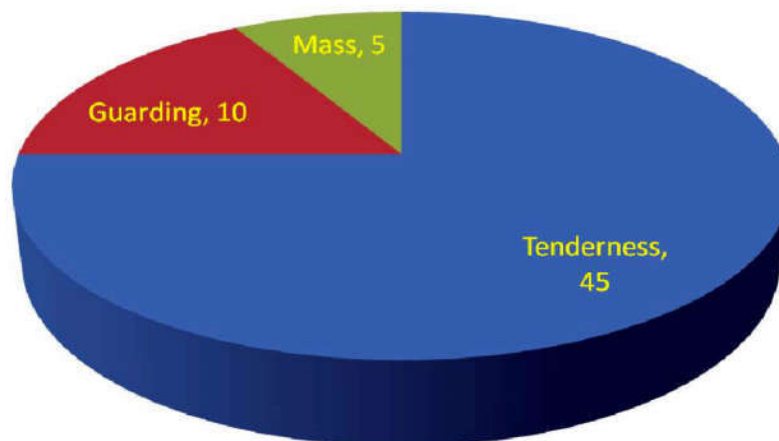
	Pain Abdomen	Fever	Nausea / Vomiting	Dyspepsia	Jaundice
Number of Cases	49	17	7	12	7
Percentage	98	34	14	24	14



**Graph 2:** Presenting Symptoms of Cholelithiasis

**Table 3:** Presenting Signs of Cholelithiasis

Signs	No. of Cases	Percentage
Tenderness	45	90
Guarding	10	20
Mass	5	10



**Graph 3:** Presenting Signs of Cholelithiasis

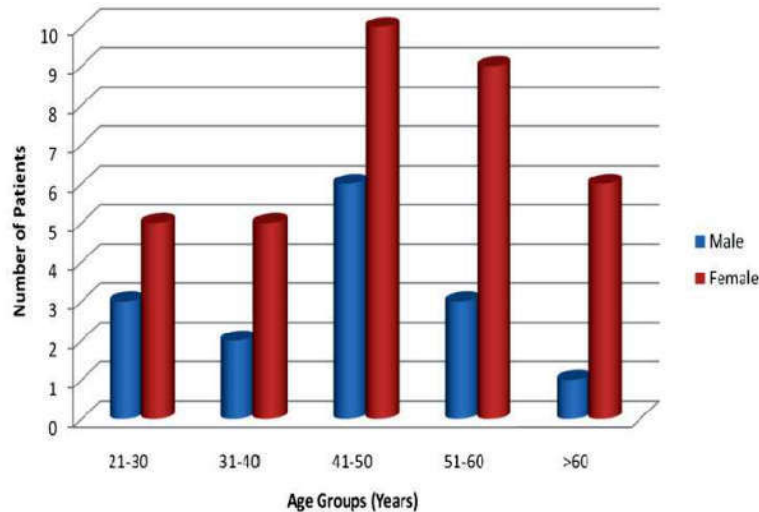
*Sign of Cholelithiasis*

Among the presenting signs seen in our study, tenderness was the most common sign seen in 45

cases (90%) followed by guarding in 10 cases (20%) and mass palpable in 5 cases (10%).

**Table 4:** Ultrasonogram Findings of Cholelithiasis

Findings of Ultrasonogram	No. of Cases	Percentage
Stones in Gall Bladder	50	100
Solitary Stone	12	24
Multiple Stones	38	76
Thickening of Gallbladder	40	80
Mass	5	10

**Graph 4:** Ultrasonogram Findings of Cholelithiasis

#### *Ultrasonogram Findings*

Among the ultrasonographic findings of cholelithiasis most common findings was thickened gall bladder wall seen in 40 cases (80%). Ultrasonogram revealed 76% (38 cases) had multiple stones and 24% (12 cases) had solitary stone. Mass was seen in 5 cases (10%).

#### *Types of Cholecystectomy*

Out of the total 50 cases who underwent cholecystectomy 43 (86%) underwent laparoscopic

cholecystectomy and rest 7 cases (14%) underwent open cholecystectomy.

#### *Gallstones in Cholelithiasis*

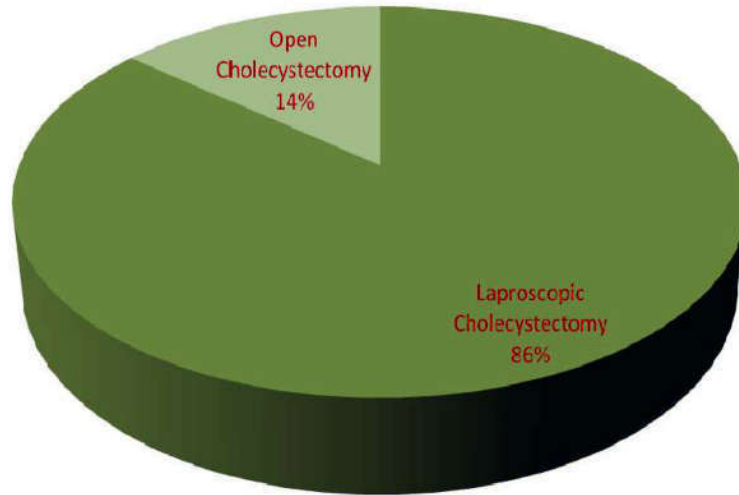
Of the total 50 cases with cholelithiasis 38 patients (76%) had mixed stones, followed by pigment stones in 8 cases (16%) followed by cholesterol stones in remaining 4 cases (8%). Majority of the patients were in the age group 41-50 (32%) followed by the 51-60 age group (24%).

**Table 5:** Types of Cholelithiasis

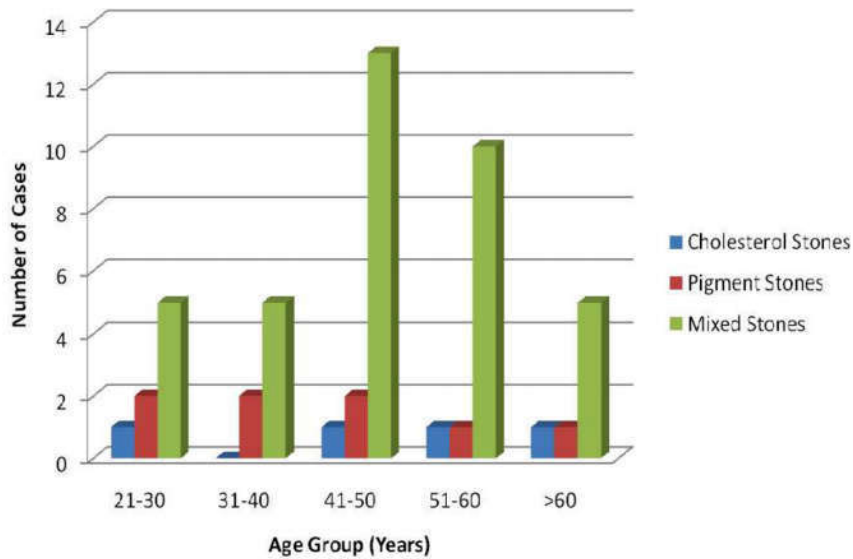
Findings of Operation	No. of Cases	Percentage
Laparoscopic Cholecystectomy	43	86
Open Cholecystectomy	7	14

**Table 6:** Types of Gallstones in Cholelithiasis

Age	Cases	Cholesterol Stones	Pigment Stones	Mixed Stones
21-30	8	1	2	5
31-40	7	0	2	5
41-50	16	1	2	13
51-60	12	1	1	10
>60	7	1	1	5
Total	50	4	8	38



Graph 5: Types of Cholelithiasis

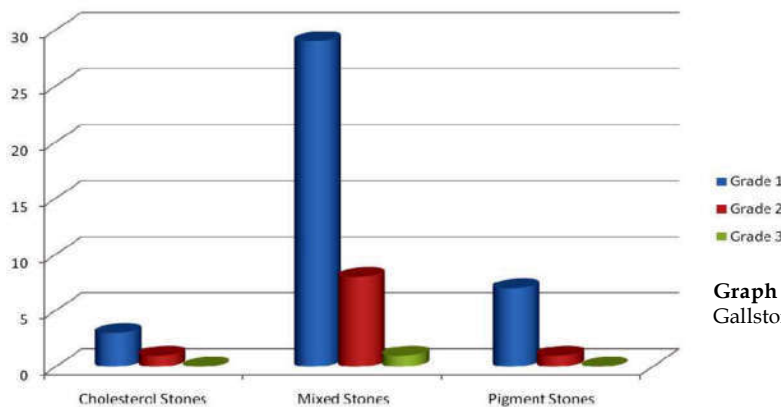


Graph 6: Types of Gallstones in Cholelithiasis

*Gallstone and Severity of Cholecystitis*

Of the total 50 cases with cholelithiasis 38 patients (76%) had mixed stones, followed by pigment stones

in 8 cases (16%) followed by cholesterol stones in remaining 4 cases (8%). Majority of the patients were in the age group 41-50 (32%) followed by the 51-60 age group (24%).



Graph 7: Correlation between type of Gallstone and Severity of Cholecystitis

**Table 7:** Correlation between type of Gallstone and Severity of Cholecystitis

	Grade 1	Grade 2	Grade 3
Cholesterol Stones	3	1	0
Mixed Stones	29	8	1
Pigment Stones	7	1	0

**Table 8:** Correlation between type of Gallstone and Severity of Cholecystitis (Chi Square Test)

	Grade			
Stones	1	2	3	<i>Row Total</i>
Cholesterol	3	1	0	4
Expected	3.120	0.800	0.800	
Mixed	29	8	1	38
Expected	29.640	7.600	0.760	
Pigment	7	1	0	8
Expected	6.240	1.600	0.160	
Columns Total	39	10	1	50

#### *Gallstones and Severity of Cholecystitis (Chi Square Test)*

In our study we have found there is NO CORRELATION between the type of gall stones and severity of cholelithiasis by CHI SQUARE test.

#### **Discussion**

After a detailed history, clinical investigations and treatment, following observations are noted. Patients fall in age group between 22 and 75 years. There is increased incidence in the fifth and 6<sup>th</sup> decade with the maximum incidence in the 5<sup>th</sup> decade. Similar incidence is seen in the studies of Herman et al (fifth decade). Hanif series showed peak incidence in 5<sup>th</sup> decade. In western studies the peak incidence is in 5<sup>th</sup> and 6<sup>th</sup> decades. Similar findings are noted in the studies of Ganey et al and Moreaux et al. In the present study 35 out of 50 cases were females while the rest were male. Battacharya series showed 71.4% were females, 28.6% were male. Similar sex preponderance in the favor of females were noted by Tamhankar AP, Ganey et al and Major Alok Sharma et al series showed that 70% were males and 30% female.

Pain was the predominant symptom in the present study with 98% incidence. The commonest site of pain was in right hypochondrium, and next commonest site was in epigastrium. Similar presentations were noted in the series of Alok Sharma, Ganey series, Goswitz et al series. 14% (7 patients) of cases in the present series had nausea/ vomiting. Patients with vomiting in this study was similar to Ganey et al series. In the present study 7 patients had jaundice.

24% (12 patients) of cases has dyspepsia. The endoscopic examination in these patients did not reveal any pathology. On ultrasound examination, these patients had gallstones. The dyspepsia was relieved in these patients after cholecystectomy. The incidence of dyspepsia in present series was similar to Ganey series, Alok Sharma series. Fever was present in 17 cases in the present study. Tenderness in the right hypochondrium was present in 45 patients guarding was present in 10 patients. A positive Murphy's sign was present in 7 patients. A mass was felt in five patients. All the patients had undergone hematological and biochemical investigations. The hemoglobin of patients ranged from 8 to 15 gm%. Ultrasound scanning was done in all patients. Out of 50 patients 12 had solitary stones, 38 were multiple, thickening of gall bladder was seen in 40 patients, mass was detected in 5 patients. Many of the features in our study was similar to studies of Major Alok Sharma et al. In the present study 7 patients had undergone open cholecystectomy and 43% patients had undergone laparoscopic cholecystectomy. The most common incision used in open cholecystectomy was right subcostal incision.

In present study 76% had mixed stones and 8% had cholesterol stones, 16% had pigment stones, which is similar to the studies of Mathur SN et al. Most of the gallstones patients were associated with grade 1 cholecystitis (78%), grade 2 cholecystitis was seen in 20% of our study patients, grade 3 was seen in 2% of our study patients. In grade 1 cholecystitis 74.35% patients were found to have mixed stones, 17.9% patients found to have pigment stones, 7.69% patients found to have cholesterol stones. In grade 2 cholecystitis 80% patients were found to have mixed

stones, 10% patients found to have pigment stones, 10% patients found to have cholesterol stones. In grade 3 cholecystitis 100% patients were found to have mixed stones.

### Conclusion

The incidence of gallstones was high in 5<sup>th</sup> and 6<sup>th</sup> decade of life, with maximum incidence in 5<sup>th</sup> decade. Gallstone disease is more common in females. The commonest symptom was pain abdomen and the commonest sign was tenderness in the right hypochondrium. Ultrasonography was the investigation of choice. It showed multiple gallstones and thickening of the gallbladder in majority of the patients. In open cholecystectomy, subcostal incision was the most common incision. Majority of patients underwent laparoscopic cholecystectomy (86%) with reduced number of stay in the hospital, pain and disability as compared to open cholecystectomy. The commonest type of stone was mixed stones. Most of the gallstones were associated with grade 1 cholecystitis (78%), grade 2 cholecystitis was seen in 20% of our study patients. In our study, there is no correlation between the type of gallstones and severity of cholelithiasis by CHI SQUARE test. In grade 1 cholecystitis 74.35% patients were found to have mixed stones, 17.9% patients found to have pigment stones, 7.69% patients found to have cholesterol stones. In grade 2 cholecystitis 80% patients were found to have mixed stones, 10% patients found to have pigment stones, 10% patients found to have cholesterol stones. In grade 3 cholecystitis 100% patients were found to have mixed stones.

### References

1. Everhart JE, Khare M, Hill M, Maurer KR. Prevalence and ethnic differences in gallbladder disease in the United States. *Gastroenterology* 1999;117:632.
2. Torvik A, Hoivik B. Gallstones in an autopsy series. Incidences, complications, and correlations with carcinoma of the gallbladder. *Acta Chir Scand* 1960; 120:168.
3. Zahor A, Sternby NH, Kagan A, et al., Frequency of cholelithiasis in Prague and Malmo. An autopsy study. *Scand J Gastroenterol* 1974;9:3.
4. Brett M, Barker DJ. The world distribution of gallstones. *Int J Epidemiol* 1976;5:335.
5. Lindstrom CG. Frequency of gallstone disease in a well-defined Swedish population. A prospective necropsy study in Malmo. *Scand J Gastroenterol* 1977; 12:341.
6. Heaton KW, Braddon FE, Mountford RA, et al. Symptomatic and silent gall stones in the community. *Gut* 1991;32:316.
7. Ganey J. B., "Cholecystectomy: Clinical experience with a large series". *Am. J. Surg.* 1986.p.352-3567.
8. Moreaux J., "Prospective study of open cholecystectomy for calculous biliary disease". *Br. J. Surg.* 1994;91:116-119.
9. Battacharya R., "Cholecystectomy in west port, Newzeland". *Indian Journal Surgery*, August 1983; 450-455.
10. A P Tamahankar, "The fate of gallstones: Traditional practice questioned". *Ann R Coll Surg Engl.* 2003;85: 102-104.
11. Maj. Alok Sharma, "Towards a safer cholecystectomy - The funds to porta approach", *Indian Journal of Surgery*, June 1997;141-145.