

A Prospective Observational Study of Clinicopathological and Biochemical Profile of Patients with Cholecystitis Visiting a Teaching Tertiary Care Centre of Haryana

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Abstract

Introduction Gallstone diseases constitute a major part of patients visiting hospitals, and more than 50% of operation theaters are occupied by it or diseases related to it. It also imposes significant financial burden on health resources. The 21st century has opened with an improved foundation to our understanding of the basis of bile formation by defining the key transporters of the lipids in bile and the responsible genes. The specter of obesity as an epidemic in developed countries, and the recent recognition of the metabolic syndromes and their links to gallstone formation, emphasize the expectation of a rise in the frequency of cholesterol cholelithiasis.

Materials and Methods Data pertaining to patients who were admitted/received surgery for a diagnosis of gallstone diseases at the Department of General Surgery of BPS GMC Khanpur Kalan was collected.

The collected data was entered in a Microsoft Excel spreadsheet. Mean \pm standard deviation (SD) was calculated for quantitative data, using Student's "t" test/Kruskal test. Chi-square test was used to find out the association for categorical data.

Results and Discussion Most of the patients were experiencing right hypochondriac pain (79.23%) as presenting complaints, with the most common age range being 31 to 40 years, followed by 41 to 50 years, that is, 31.85% and 20.74%, respectively. Females were most commonly affected, approximately 90%, and only 10% of patients with gallstones visiting our hospital were males. Maximum patients had chronic cholecystitis (80%) on histopathological examination, followed by cholesterosis (6.15%). As much as 82.6% of patients presented with mixed gallstones, followed by cholesterol stones, that is, 10.43%. All types of stones are more common in patients with abdominal adiposities, that is, having waist-to-hip ratio more than 0.85, and these findings are statistically significant.

Conclusion Our study concluded that gallstones were more common in females of younger population (31–40 years) with right hypochondriac pain as presenting complaints. The most common histopathology was chronic cholecystitis with mixed types of stones, which is associated with increased waist-to-hip ratio. All biochemical markers were within normal range.

Keywords

- ▶ Gallstone diseases
- ▶ clinicopathological profile
- ▶ biochemical profile
- ▶ cholecystitis

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Introduction

A Greek physician, Alexander Trallianus, first described gallstones in the fifth century, and they continue to be a major health problem in today's world. Gallstone diseases constitute a major chunk of patients visiting our outdoor patient department, and they also form the leading cause of inpatient admission. Almost 50% of operation theaters are occupied by patients having diseases related to gallstones. A similar trend is seen in Western countries. In fact, approximately 650000 to 700000 cholecystectomies are performed each year in the US. The frequency of hospital admission and operation has also increased in the Western countries since the 1950s.^{1,2} More than 98% of all gallbladder and biliary tract disorders are in one way or another connected to cholelithiasis. Thus, the symptoms and complications related to gallstones in the US are among the costliest digestive disorders, at an estimated \$6.5 billion, exceeding the combined total for chronic liver diseases and cirrhosis (\$1.6 billion), chronic hepatitis C (\$0.8 billion), and even pancreatic diseases (\$2.2 billion).³ The burden of gallstone diseases in Europe is similar to that of the US, with a median prevalence in large population surveys ranging from 5.9 to 21.9%.⁴ Gallstones nevertheless have become an increasing problem. In the UK, for example, the frequency of hospital admissions for gallstone diseases increased by 53% from 1989 to 1990 to 1990 to 2000.⁵ This could reflect an increased incidence of cholelithiasis, an increased frequency for gallstones to become symptomatic, greater detection because of more readily available diagnostic imaging such as ultrasound, or a decrease in threshold for surgery. Further, similar unexplained variances in surgical practices are reported in countries in the Western world.¹

Prevalence of gallstones in India was found to be 6.12% among the adult population.⁶ Gallstone prevalence has geographical variance as well as ethnic. A gallstone survey limited to railroad workers conducted in 1966, utilizing oral cholecystography, had suggested that gallbladder stones occurred seven times more commonly in north Indian workers than south Indian workers.⁷ This difference was attributed to the different ethnic backgrounds of workers. A similar study was carried out at All India Institute of Medical Sciences (AIIMS), New Delhi, among different colonies of Delhi, each with inhabitants belonging to a specific ethnic group. The study showed significant differences in gallstone prevalence among different ethnic groups, with the Punjabis being most affected (north Indians) and south Indians being least affected.⁸ There was also a variance in type of stones among different ethnic groups, with cholesterol being the predominant stone among north Indians and pigment stones being the predominant stone among south Indians.⁹ The diet is likely to be important, as the intake of calories, fat, and proteins affect the cholesterol saturation of bile. Some other potential risk factors for the development of gallstones are obesity, sedentary lifestyle, geriatric age groups, female gender, oral contraceptive pills, and family history of gallstones.¹⁰⁻¹²

The 21st century has opened with an improved foundation to our understanding of the basis of bile formation by

defining the key transporters of the lipids in bile and the responsible genes. A genetic basis for racial differences of gallstone diseases is now possible and being uncovered. The specter of obesity as an epidemic in developed countries, and the recent recognition of the metabolic syndromes and their links to gallstone formation, emphasize the expectation of a rise in the frequency of cholesterol cholelithiasis.¹³

Our hospital caters to patients not only from Haryana but also from western UP. Gallstone diseases form a major health problem, as seen in our daily practice. So, we aimed to carry out an epidemiological study to determine the clinical, pathological, and biochemical profile of gallstone disease patients visiting our teaching tertiary care center.

Materials and Methods

Data pertaining to patients who were admitted/received surgery for a diagnosis of gallstone diseases at the Department of General Surgery of BPS GMC Khanpur Kalan was collected (symptomatic cholelithiasis) (January 2017 to July 2019).

Statistical Methods

Detailed history taking and clinical examination of all patients admitted with diagnosis of cholecystitis were done, and all relevant investigations along with lipid profile were sent in on a morning empty stomach. The collected data was entered in a Microsoft Excel spreadsheet. Mean \pm standard deviation (SD) was calculated for quantitative data using Student's "t" test/Kruskal test. Percentage and proportion were calculated for qualitative data. Chi-square test was used to find out the association between categorical data. Sensitivity, specificity, positive predictive value, and negative predictive value were calculated using SPSS (version 20) software. $p < 0.05$ was considered statistically significant.

Results

Presenting Complaints

Most of the patients were experiencing right hypochondriac pain (79.23%) as presenting complaints (**► Table 1**).

Age Distribution

The most common age range for patients presenting to our hospital was 31 to 40 years, followed by 41 to 50 years, that is, 31.85% and 20.74%, respectively (**► Table 2**).

Table 1 Patient distribution according to presenting complaints

S. no.	Chief complaints	No. of patients	Percentage (%)
1.	Right hypochondriac pain	103	79.23%
2.	Dyspepsia	14	10.77%
3.	Nausea/vomiting	11	8.46%
4.	Fever	1	0.77%
5.	Jaundice	1	0.77%
6.	Total	130	100%

Table 2 Patients distribution according to age range

Sr. no.	Age range (years)	No. of patients	Percentage
1	20–30	22	16.29%
2	31–40	43	31.85%
3	41–50	28	20.74%
4	51–60	27	20%
5	60	18	13.33%
6	Total	135	100%

Gender Distribution

Females were most commonly affected, approximately 90%, and only 10% of patients with gallstones visiting our hospital were males (►Table 3).

Pathological Profile

Maximum patients had chronic cholecystitis (80%) on histopathological examination, followed by cholesterosis (6.15%) (►Table 4).

Type of Gall Bladder Stones

As much as 82.6% of patients present with mixed gallstones, followed by cholesterol stones, that is, 10.43% (►Table 5).

Distribution of Gall Stone According to Waist-to-Hip Ratio

All types of stones are more common in patients with abdominal adiposities, that is, having waist-to-hip ratio

Table 3 Patient distribution according to gender

Sr. no.	Gender	No. of patients	Percentage
1	Male	14	10.76%
2	Female	116	89.23%
3	Transgender	0	0
4	Total	130	

Table 4 Patient distribution according to histopathological examination

Sr. no.	Pathological diagnosis	No. of patients	Percentage
1	Chronic cholecystitis with hyalinization and calcification in wall	2	1.53%
2	Acute on chronic cholecystitis	3	2.31%
3	Chronic cholecystitis	104	80%
4	Chronic cholecystitis with focal giant cell reaction	1	0.77%
5	Xanthogranulomatous cholecystitis	3	2.31%
6	Chronic cholecystitis with intestinal metaplasia	3	2.31%
7	Cholesterosis	8	6.15%
8	Adenomatous hyperplasia	3	2.31%
9	GBC	3	2.31%
10	Total	130	100%

Abbreviation: GBC, gallbladder cancer.

Table 5 Distribution of gallstones among patients visiting our hospital with gallstone diseases

Sr. no.	Type of stone	No. of patients	Percentage
1	Cholesterol	12	10.43%
2	Pigment	8	6.96%
3	Mixed	95	82.61%
4	Total	115	100%

more than 0.85, and these findings are statistically significant (►Table 6).

Distribution of Gall Stones According to Age Group Range

The most common age range for all types of stones was 31 to 40 years, followed by 41 to 50 years (►Table 7).

Biochemical Profile of Cholecystitis Patients

Investigation in almost all patients with gallstone diseases visiting our hospital were within the normal range (►Table 8).

Discussion

Gallstone disease is a menace across the northern belt of India. They constitute a major part of patients coming to the outdoor patient department, and more than 50 percent of operations are occupied by patients afflicted with gallstone diseases or diseases related to it. Gallstones have an incidence of 10 to 20% worldwide. The prevalence of gallstone varies widely in different parts of world as well as various ethnic groups, like 0 to 10% in Africa and up to 60 to 70% in certain populations such as Prima Indians; this likely reflects combined differences in environmental, dietary, and genetic factors.¹⁴ Even different studies from India showed different prevalence among different geographical areas and different ethnic groups (north Indians more than south Indians). We performed an epidemiological study at our rural tertiary care center to evaluate clinicopathological and biochemical profiles of patients with symptomatic cholecystitis.

Right hypochondriac pain (79.23%) is the most common presenting complaint of patients with symptomatic gallstone diseases. Other complaints are dyspepsia, nausea/vomiting, fever, and jaundice. Our result is in accordance with the study by Srivastava et al.¹⁵ Dyspepsia is defined as upper abdominal or retrosternal pain or discomfort, heart burn or other symptoms considered to be referable to the proximal alimentary tract, whereas biliary colic was defined as pain in the epigastrium or right hypochondrium, which may have radiated to the right interscapular region and did last for more than 1 hour.¹⁶

Earlier gallbladder was considered a disease of females in their 40s, but now it is seen increasingly among younger populations as well. Maximum number of patients (31.85%) presenting to our hospital lie within 31 to 40 years of age. Similar results were seen in studies conducted by Kala et al in 2018 and EzhilArasi et al in 2015.^{17,18} Our study is not in accordance with Dhamnetiya et al 2020 study which still considers 41 to 50 years as the common age range.¹⁹

Table 6 Distribution of gallstone according to waist-to-hip ratio

Sr. no.	Type of stone	Waist/hip ratio < 0.85	Waist/hip ratio > 0.85	p-value (0.05 significance level)
1	Cholesterol Stone	4	8	0.135
2	Pigment Stone	0	8	
3	Mixed Stone	14	70	0.92

Table 7 Type of stones distribution according to age range

Sr. no.	Stone type	(20–30) years	(31–40) years	(41–50) years	(51–60) years	> 60 years
1	Cholesterol stone	2	5	3	0	2
2	Pigment stone	2	3	0	2	1
3	Mixed stone	16	33	20	17	9

Table 8 Biochemical profile of patients with gallstone diseases

Sr. no.	Biochemical investigation	Mean ± SD	Margin of error (at 95% significance level)
1	S. cholesterol	190.4 ± 50.94	190.4 ± 12.89
2	S. triglycerides	126.24 ± 61.39	126.24 ± 12.69
3	S. HDL	42.05 ± 13.93	42.07 ± 2.98
4	S. LDL	120.33 ± 46.25	120.33 ± 12.69
5	S. bilirubin	0.59 ± 0.22	0.59 ± 0.04
6	S. SGOT	30.44 ± 21.56	30.44 ± 3.99
7	S. SGPT	45.76 ± 36.34	45.76 ± 6.73
8	S. total protein	7.34 ± 0.65	7.34 ± 0.16

Abbreviations: HDL, high-density lipoprotein; LDL, low-density lipoprotein; SGOT, serum glutamic oxaloacetic transaminase; SGPT, serum glutamic pyruvic transaminase.

As much as 89.23% patients are females and 10.76% are male. This follows the same gender distribution as seen in literature. Gallbladder stone diseases are considered predominantly diseases of females. Gender distribution is attributable to sex hormones. Estrogen increases biliary cholesterol secretion, causing cholesterol supersaturation of bile. Similarly, hormonal replacement therapy in postmenopausal women is found to be associated with increased risk of gallstone diseases.²⁰

As much as 80% of patients after cholecystectomy, on histopathological examination, showed chronic cholecystitis. Three patients, that is 2.31%, had gallbladder cancer. Other histopathological findings are cholesterosis (6.15%), adenomatous hyperplasia chronic cholecystitis with intestinal metaplasia, xanthogranulomatous cholecystitis, chronic cholecystitis with focal giant cell reaction, acute or chronic cholecystitis, and chronic cholecystitis with hyalinization and calcification in wall.

The most common gallstone is mixed stones (82.61%), followed by cholesterol stone (10.43%) and pigment stones (6.96%). This is in concordance with studies conducted by Karlatti et al in 2016 and Mohan et al in 2005, which also found mixed stones in 81.12% and 62.3% patients, respectively.^{21,22} Our study is not in accordance with studies of Tandon et al in 2000 and Kala et al in 2018, which had found cholesterol stone to be the most common in patients with cholelithiasis among the north Indian population.^{8,17} All types of stones were common in those between 31 to 40 years of age.

Waist-to-hip ratio is better predictor of gallstone diseases than body mass index (BMI), as it represents a measure of central adiposity.²³ It is further submitted that all types of

stones are found in maximum number in patients having waist-to-hip ratio more than 0.85, and this association is statistically significant.

Literature has shown insignificant difference in the level of serum cholesterol in patients with gallstones as compared with controls. A similar trend is observed in our study. All biochemical markers, including liver function test and lipid profile, were within normal range.

Conclusion

Our study concluded that gallstones were more common in females belonging to the younger population (31–40 years), with right hypochondriac pain as presenting complaints. The most common histopathology was chronic cholecystitis with mixed types of stones, which are associated with increased waist-to-hip ratio. All biochemical markers are within normal range.

The increasing use of various modalities like ultrasonography, and recent recognition of metabolic syndromes and their links to gallstone formation, emphasize the expectation of rise in the frequency of cholesterol cholelithiasis. Our study focused only on patients visiting hospitals, and exact prevalence of gallstone in society is not known. Further studies are advocated at community level to determine exact prevalence and risk factors for gall stone formation.

Conflict of Interest

None declared.

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