Demographic profile and clinical spectrum of gallstone disease in a rural tertiary care center: A retrospective observational study

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ABSTRACT

Background: Gallstone disease is a major public health problem worldwide irrespective of age. The incidence of gallstone disease shows considerable geographical and regional variations. **Aims and Objectives:** The aim and objectives are to study the correlation between demographic profile and clinical spectrum of gallstone disease and to study the clinical spectrum of gallstone disease at a rural tertiary care hospital to assess the demographic profile of gallstone disease patients. **Material and Methods:** The present retrospective observational study was conducted in the Department of General Surgery, BPS Medical College for Women, Khanpur Kalan, District, Sonipat. A total of 342 patients with gallbladder disease were included. **Results:** Out of 342 patients, 294 were female and 48 were male. The most common presenting symptoms among gallstone diseases were right hypochondrium pain in 307 (89.8%) patients, followed by epigastric pain in 24 (7%) patients, and nausea in 11 (3.2%). Ultrasonography suggests that the highest number of patients were associated with multiple gallstones in 203 (59%) patients out of which 170 were females and 33 were males; single stones were associated with 139 (40.6%) patients out of which 124 were females and 15 were male followed by double calculi in 5 (1.5%) patients. **Conclusion:** Gallbladder stone disease is more common in females. It can affect any age group. The maximum number of gallstone disease patients present with pain in the right hypochondrium and nausea. Maximum patients had multiple calculi gallbladder disease. Gallstone disease with chronic symptoms affects the liver function and anatomy of the Calot's triangle that may affect the surgical procedure outcomes and hospital stay.

Key words: Demographic; Clinical spectrum; Gallstone disease; Retrospective

INTRODUCTION

Gallstone disease is a major public health problem worldwide irrespective of age. The incidence of gallstone disease shows considerable geographical and regional variations.[1] The incidence and morbidity increase with age ranging from 8% (in adults) to 50% in patients older than 70 years of age.[2,3] The patients with gallstone disease commonly present with acute pain abdomen, mainly in the right hypochondrium, nausea, vomiting, abdominal discomfort, generalized weakness, jaundice, dyspepsia, etc. The clinical presentation of gallstone disease can be acute cholecystitis, chronic cholecystitis, mucocele, empyema, carcinoma gallbladder, and gallbladder perforation. There are multiple factors such as age, sex, pregnancy, race, obesity, rapid weight loss, drugs, and triglyceridemia that are supposed to cause gallstone disease.[3] Some environmental and lifestyle risk factors may also be involved in the development of gallstones and the subsequent gallbladder carcinoma formation. The common pathophysiological changes reported in gallbladder disease patients are hypomotility, hypercholesterolemia, bile stasis, congestion, and edema.[4] Despite a common entity in North India, only a few researches are available about its clinical presentation

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and demographic profile. The aim of this study is to focus on the demographic and clinical presentation of gallstone disease in this rural region of North India.

Aims and objectives
1. To study the correlation between demographic profile and clinical spectrum in the gallstone disease
2. To study the clinical spectrum of gallstone disease at a rural tertiary care hospital to assess the demographic profile of gallstone disease patients.

MATERIALS AND METHODS

The present retrospective observational study was conducted in the Department of General Surgery, BPS Medical College for Women, Khanpur Kalan, District Sonipat. A total of 342 patients with gallbladder disease included in this study period of almost 5½ years of span from November 1st, 2019, to September 30th, 2024 were included. Patient data of improper details were excluded from the study. Details of history, hospital stay, laboratory findings, radiological findings, patients' symptoms, duration of hospital stay, and operative findings were collected from the patient's records from the MRD department of our institution.

Inclusion criteria
All patients with gallbladder disease admitted during November 1st, 2019–September 30th, 2024 were included in this study.

Exclusion criteria
All other patients except gallbladder disease were excluded from the study.

Methodology
The plan of study was drawn up and submitted to and cleared up by the institutional scientific review board vide letter number BPS/SRC/207 and the ethical review board vide letter number BPSGMCW/RC1069/IEC/24 of our institution. Patient data were collected from patient records based on inclusion and exclusion criteria. All details such as gender, presenting symptoms, ultrasonography (USG) findings, serum glutamic-oxaloacetic transaminase (SGOT), serum glutamic-pyruvic transaminase (SGPT), total protein, albumin, globulin, total bilirubin, conjugated bilirubin, unconjugated bilirubin, hemoglobin (Hb), total leukocyte count, red blood cell (RBC), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red cell distribution width (RDW), platelet counts, duration of symptoms, and intraoperative findings were appropriately collected.

Statistical analysis
At the end of the study, data were entered and analyzed using the statistical software Statistical Package for the Social Sciences version 22.0. The nominal data were described using frequency and percentage and compared. The ordinal data were described using median and interquartile range (IQR) and compared using the Mann–Whitney U-test. The continuous data were described using mean±SD and compared using an unpaired t-test. A P<0.05 was considered statistically significant.

Ethical clearance
Ethical clearance was obtained from the Institutional Ethical Committee, BPS GMC KHANPUR KALAN. The certificate reference number is BPSGMCW/RC1070/IEC/24.

RESULTS

A total of 342 patients data were evaluated in this study of which 294 were female and 48 were male. The most common presenting symptoms among gallstone diseases were right hypochondrium pain in 307 (89.8%) patients, followed by epigastric pain in 24 (7%) patients, and nausea in 11 (3.2%).

All undergone USG that suggests the highest number of patients were associated with multiple gallstones in 203 (59%) patients out of which 170 were females and 33 were males with P=0.15; single stones were associated with 139 (40.6%) patients out of which 124 were females and 15 were male with P=0.15 followed by double calculi in 5 (1.5%) patients.

Mucocele was absent in 335 (98.0%) patients and was present in 7 (2.0%) patients, and Calot's triangle was distorted in 2 (0.6%) patients, frozen in 11 (3.2%) patients, normal in 311 (90.9%) patients, parkland 1 in 7 (2.0%) patients, and parkland 2 in 11 (3.2%) patients. Gallstone disease with normal gallbladder wall was seen in 256 (74.9%) patients, thickened wall of the gallbladder was in 37 (10.8%) patients, and gallbladder disease with distended gallbladder was in 43 (12.6%) patients followed by contracted gallbladder in 6 (0.9%) patients. Single calculi were present in 139 cases, out of which Calot's triangle anatomy was not distorted and frozen in any patient, normal in 133 (95.7%) patients with parkland 1 grade in 3 (2.2%) patients, and parkland 2 in 3 (2.2%) patients with P=0.23 (Table 1).

In the present study, multiple calculi were present in 198 cases, out of which Calot's triangle anatomy was distorted in 2 (1.0%) patients, frozen in 11 (5.4%) patients,

Table 1: Different findings on USG in gallstone disease subjects (n=342)

Parameters	Findings	No.	%
Wall of gallbladder	Normal	256	74.9
	Distended	43	12.6
	Contracted	6	0.9
	Thickened	37	10.8
No of calculi	1	139	40.6
	2	5	1.5
	Multiple	198	57.9
Calot's triangle	Distorted	2	0.6
	Frozen	11	3.2
	Normal	311	90.9
	Parkland 1	7	2.0
	Parkland 2	11	3.2
Mucocele	Absent	335	98.0
	Present	7	2.0

USG: Ultrasonography

normal in 178 (87.7%) patients with parkland 1 grade in 4 (2.0%) patients, and parkland 2 in 8 (3.9%) patients with P=0.03.

Serum SGOT levels done in all patients with a range of 624.0–3.0 (mean 46.35±51.96), median 36.00, and IQR 27–51; serum total bilirubin levels done in all patients ranged from 18.2 to 0.2 with mean 0.803±1.0810, median 0.600, and IQR 0.5–0.8; serum conjugated bilirubin levels done in all patients was 10.9–0.1 with mean 0.281±0.6041, median 0.200, and IQR 0.2–0.3; serum unconjugated bilirubin levels observed from maximum 7.3 and minimum 0.1 (mean 0.509±0.5638 and median 0.400, IQR 0.3–0.5); serum total protein levels ranged from 0.6 to 9.6 (mean 7.27±0.96, median 7.400, and IQR 6.9–7.8); serum albumin levels (range 0.40–5.50, mean 3.93±0.56, median 4.10, and IQR 3.5–4.3); serum globulin levels (0.20–4.90, mean 3.11±0.65, median 3.10, and IQR 2.8–3.5).

Serum Hb levels were done in all patients with a range of 4.0–16.5 (mean 11.52±1.68, median 11.50, and IQR 10.5–12.5), serum total leukocyte counts (660–10400, mean 8931.38±9763.50, median 7500.00, and IQR 6000–9100), serum RBC levels (2.40–31.50, mean 4.388±1.578, median 4.28, and IQR 3.9–4.6), serum MCV levels (8.0–125, mean 84.92±14.56, median 86.60, and IQR 79.65–92.85), serum MCH levels (17.30–70.70, mean 27.99±4.91, median 27.90, and IQR 25.42–30), serum MCHC levels (range between 16.40 and 39.90, mean 31.34±3.36, median 32.20, and IQR 29.1–33.4), serum RDW levels (range 1.80–50.80, mean 16.42±3.71, median 15.90, and IQR 14.62–17.4), and serum platelets levels (0.86–10.0, mean 2.48±1.04, median 2.40, and IQR 1.8–2.94).

Mean value of SGOT levels in single gallbladder calculi patients was 34 (26.5–46) and 38 (27–54) in multiple calculi (P<0.11), SGPT 34 (25–54) and 41 (26–75) in multiple calculi gallbladder disease (P=0.03), serum total protein 7.24±1.06 and 7.29±0.89 (P=0.67), serum albumin 3.99±049 and 3.88±0.61 in multiple calculi patients (P=0.23), serum globulin 3.11±0.57 and 3.11±0.71 (P=0.98), serum total bilirubin 0.88±1.53 and 0.75±0.61 (P=0.03), and duration of symptoms was 2 (10–10.25) in single calculi patients and 4 (1-12) (P<0.01) (Tables 2 and 3).

Among 342 patients, the incidence of no gallstone disease with a single stone was found and three with multiple in up to 20 age group, 26 patients with single and 41 with multiple gallstones in the 21–30 age group, 44 with single and 59 with multiple in 31–40 age group, 32 with single and 37 with multiple in 41–50 age group, 17 with single and 30 with multiple in 51–60 age group, 14 with single and 20 with multiple in 61–70 age group, and six with single and 13 with multiple in more than 70 age group (Table 4).

A comparison of the duration of symptoms between single and multiple stones shows that in single, it was two (10 days–10.25 months) and in multiple, it was four (1–12 months) (P<0.01). The association between the number of calculi and USG findings in subjects is depicted in Table 5.

DISCUSSION

The main objective of this study was to assess the relationship between the clinical spectrum and demographic profile of gallstone disease at a rural tertiary care hospital. In this retrospective observational study, it was observed that the female gender dominated with a higher incidence of gallstone disease study population than the male population with a female population of 294 (85.9%) and a male population of 48 (14.1%). Similar findings were found in other studies by Agrusa et al. and Nielsen et al.[5,6] Contradictorily, Fukami et al., found that the incidence of gallstone disease was higher in males as compared to females.[7] In this study, most of the patients of cholelithiasis fall in the 31–40 years followed by the 41–50 years of age group. Similar observations were reported by Idris et al.,[8] and Aslam et al.,[9] where the majority of cases fall in the 31–50 years of age group.

In the present study, it was observed that the maximum number of patients with gallstone disease presented with pain in the right hypochondrium, that is, 307 (89.8%) patients, nausea in 11 (3.2%) patients, followed by pain in epigastrium in 24 (7.0%) patients. Similar observations were reported by Pradhan et al.,[10] in their study, 75% of cases present with pain in the right hypochondrium followed by epigastric pain (57.5%).

Table 2: LFT profile in gallstone disease subjects (n=342)

Parameters	SGOT	Total protein	Albumin	Globulin	Total bilirubin	Conjugated bilirubin	Unconjugated bilirubin
Mean	46.35	7.27	3.93	3.11	0.803	0.281	0.509
Standard deviation	51.96	0.96	0.566	0.652	1.08	0.6041	0.5638
Median	36.0	7.40	4.10	3.10	0.600	0.200	0.400
IQR	27–51	6.9–7.8	3.5–4.3	2.8–3.5	0.5–0.8	0.2–0.3	0.3–0.5
Minimum	3.0	0.6	0.40	0.20	0.2	0.1	0.1
Maximum	624.0	9.6	5.50	4.90	18.2	10.9	7.3

SGOT: Serum glutamic-oxaloacetic transaminase, IQR: Interquartile range, LFT: Liver function tests

Table 3: CBC profile in gallstone disease subjects (n=342)

Parameters	Hb	TLC	RBC	MCV	MCH	MCHC	RDW	Platelet count
Mean	11.52	8931.38	4.38	84.92	27.99	31.34	16.42	2.48
Standard deviation	1.68	9763.50	1.75	14.56	4.91	3.36	3.71	1.041
Median	11.50	7500.00	4.28	86.60	27.90	32.20	15.90	2.40
IQR	10.5–12.5	6000–9100	3.9–4.6	79.65–92.85	25.42–30	29.1–33.4	14.62–17.4	1.8–2.94
Minimum	4.0	660	2.40	8.00	17.30	16.40	1.80	0.86
Maximum	16.5	104000	31.50	125.00	70.70	39.90	50.80	10.00

IQR: Interquartile range, Hb: Hemoglobin, TLC: Total leukocyte count, RBC: Red blood cells, RDW: Red cell distribution width, MCV: Mean corpuscular volume, MCH: Mean corpuscular hemoglobin, MCHC: Mean corpuscular hemoglobin concentration

Table 4: Comparison of LFT between single and multiple stones

Parameters	Single	Multiple	P-value
SGOT	34 (26.5–46)	38 (27–54)	0.11
SGPT	34 (25–54)	41 (26–75)	0.03
Total protein	7.24±1.06	7.29±0.89	0.67
Albumin	3.99±0.49	3.88±0.61	0.23
Globulin	3.11±0.57	3.11±0.71	0.98
Total Bilirubin	0.88±1.53	0.75±0.61	0.03

SGOT: Serum glutamic-oxaloacetic transaminase, SGPT: Serum glutamic-pyruvic transaminase, LFT: Liver function tests

Table 5: Association between no of calculi and USG finding in subjects (n=342)

Parameters	Findings	Single (n=139)	Multiple (n=203)	P-value
Wall of gallbladder	Normal	96 (69.1%)	160 (78.8%)	0.23
	Distended	22 (15.8%)	21 (10.3%)	
	Contracted	3 (2.2%)	3 (1.5%)	
	Thickened	18 (12.9%)	19 (9.4%)	
Calot's triangle	Distorted	0 (0.0%)	2 (1.0%)	0.03
	Frozen	0 (0.0%)	11 (5.4%)	
	Normal	133 (95.7%)	178 (87.7%)	
	Parkland 1	3 (2.2%)	4 (2.0%)	
	Parkland 2	3 (2.2%)	8 (3.9%)	

USG: Ultrasonography

The present study shows that USG findings of gallstone disease were observed and found that the wall of the gallbladder was normal in 74.9%, thickened in 10.8% of patients of the study group, and gallbladder was distended in 12.6% and contracted in 0.9% in USG. However, multiple gallbladder calculi were seen in 57.9% and single gallbladder calculi in 40.6% followed by two gallbladder calculi in the 1.5% study population.

In this study, it was observed that SGOT levels were higher 38 (27–54) in multiple gallbladder calculi and 34 (26.5–46) in single calculi gallstone disease. SGPT levels were also higher in multiple calculi gallstone disease as compared to 34 (25–54) in single calculi gallstone disease, and total protein values were also higher in multiple calculi gallstone disease as compared to single calculi gallstone disease 7.29±0.89 and 7.24±1.06.

In our study, albumin levels were 3.99±0.49 higher in single calculi gallstone disease as compared to multiple calculi gallstone disease, and globulin levels were similar in both single and multiple gallstone disease patients group.

In this study, it was observed that the duration of symptoms in multiple calculi gallstone disease was higher 4 (1–12 months) as compared to single calculi gallstone disease 2 (10 days−10.25 months).

The present study observed that the wall of the gallbladder was normal in multiple calculi gallstone disease as compared to the single calculi gallstone disease group; the thickened wall of the gallbladder was higher in multiple 19 (9.4%) calculi gallstone disease than single 18 (12.9%) calculi gallstone disease.

The present study observed that the anatomy of the Calot's triangle was distorted in two patients with multiple calculi gallstone disease, and no anatomical distortion of the Calot's triangle was seen in single calculi gallstone disease. The anatomy of Calot's triangle was frozen in 11 patients with multiple calculi gallstone diseases and no anatomical frozen in single calculi gallstone disease. Normal Calot's

triangle anatomy was found in 311 patients out of which 178 fell in multiple calculi gallstone disease and 133 fell in single calculi gallstone disease. Parkland grade 1 was in seven patients out of which four patients fell into multiple calculi gallstone disease and three patients fell into single calculi gallstone disease. Parkland grade 2 was seen in 11 patients out of which eight patients fell into multiple calculi gallstone disease, and three patients fell into single calculi gallstone disease.

In this study, it was observed that female sex dominance in gallstone disease was 85.9% as compared to male sex 14.1%. Interestingly, females have a higher incidence of multiple calculi gallstone disease 170, and 33 patients belong to the male sex group, and the incidence of single calculi gallstone disease is higher in the female sex group at 124 as compared to the male sex group with 15.

In this study, it was also observed that mucocele incidence was very low with 2% of the study population. It was also observed that the CVC profile in gallstone disease patients of this study group shows no significant raise in the gallstone disease patients study group.

Limitations of the study

One of the major limitations of this study is the small sample size due to the COVID-19 pandemic fall during the study period. Number of patients lost to follow-up. Patient data records were also affected due to this. Hospital stays of patients decreased due to COVID-19 guidelines and many patients were followed after the COVID guidelines were relaxed. The COVID-19 reverse transcription polymerase chain reaction (RT-PCR) report period in our institute was around 1–2 days and RT-PCR before surgery if positive; then patients were discharged for a quarantine period and advised to re-admit. Many patients were lost to follow-up. Patient data were lost due to the change of wards into dedicated COVID-19 patient wards as our institution was declared a dedicated COVID-19 hospital.

CONCLUSION

Gallbladder stone disease is more common in females. It can affect any age group but commonly affects 31–50 years of age group. The maximum number of gallstone disease patients present with pain in the right hypochondrium and nausea. Maximum patients had multiple calculi gallbladder disease. Patients with multiple calculi in the gallbladder fall in the 21–50-year age group with female dominance. Gallstone disease with chronic symptoms affects the liver function and anatomy of Calot's triangle that may affect the surgical procedure outcomes and hospital stay.

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