Original Article

Association of Sociodemographic Factors with Clinical Characteristics and Risk of Cholelithiasis in Patients from A Tertiary Care Hospital in Tripura

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Abstract

Background: Cholelithiasis (gallstone disease) represents a significant global health burden, with prevalence varying considerably across populations. While clinical factors such as obesity, dyslipidemia, and hormonal status are well-established risk factors, the independent influence of sociodemographic factors—including age, sex, socioeconomic status, education, and geographic origin—on disease presentation and risk remains complex and context-dependent. The aim is to investigate the association of sociodemographic factors with the clinical characteristics and risk of cholelithiasis in a defined patient population. **Material and Methods:** The present study was a hospital-based cross-sectional observational study conducted in the Department of General Surgery, Agartala Government Medical College, and Hospital over a period of one year. The study included adult patients aged 18 years or older diagnosed with cholelithiasis during the study period. Participants were recruited from the Departments of General Surgery, Gastroenterology, and Emergency Medicine, as well as from cases incidentally detected on abdominal imaging in the Radiology Department. The hospital caters to a diverse population from urban, semi-urban, and rural areas, thereby providing a representative sample for assessing the association between sociodemographic factors and disease characteristics. A total of 400 patients were included in the study. **Results:** The clinical profile of the study population showed that of 400 patients with cholelithiasis, 88 (22%) were asymptomatic, 192 (48%) presented with uncomplicated symptomatic cases, and 120 (30%) had complicated disease. Among the types of complications observed, acute cholecystitis was the most common, affecting 72 patients (18%), followed by choledocholithiasis in 28 patients (7%), gallstone pancreatitis in 16 patients (4%), and cholangitis in 4 patients (1%). Regarding stone characteristics, multiple stones were slightly more common, seen in 220 patients (55%), compared to single stones in 180 patients (45%). In terms of stone size, 168 patients (42%) had stones measuring 10–20 mm, followed by 152 patients (38%) with stones <10 mm, and 80 patients (20%) with stones >20 mm. Gallbladder wall thickness assessment revealed that 196 patients (49%) had a thickened wall (3–5 mm), 144 patients (36%) had normal wall thickness (<3 mm), and 60 patients (15%) had severe thickening (>5 mm). **Conclusion:** Sociodemographic factors, particularly sex, socioeconomic status, and geographic residence, significantly influence both the risk and clinical presentation of cholelithiasis. These findings underscore the need for targeted prevention strategies and highlight that access to care, and health literacy may modify disease outcomes. Integrating sociodemographic risk profiling into clinical practice could facilitate earlier diagnosis and risk stratification.

Keywords: Cholelithiasis, Gallstones, Sociodemographic Factors, Risk Factors, Clinical Presentation, Epidemiology, Sex Distribution, Socioeconomic Status.

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Introduction

Cholelithiasis, commonly known as gallstone disease, represents one of the most prevalent and economically burdensome gastroenterological disorders worldwide, affecting approximately 10–15% of the adult population in developed nations.[1] The condition arises from a complex interplay of genetic predisposition, metabolic disturbances, and environmental factors that lead to supersaturation of bile with cholesterol or bilirubin, resulting in crystal nucleation and gallbladder stone formation.[2] While gallstones may remain asymptomatic in a substantial proportion of affected individuals, approximately 20–30% of patients will develop complications over their lifetime, including biliary colic, acute cholecystitis, choledocholithiasis, cholangitis, and pancreatitis, which collectively contribute to significant morbidity, healthcare utilisation, and economic costs.[3,4] The

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clinical spectrum of cholelithiasis is remarkably heterogeneous, ranging from incidental findings on abdominal imaging to life-threatening septic complications, necessitating a nuanced understanding of the factors that influence both disease susceptibility and clinical presentation.

Traditionally, research efforts have focused on well-established biomedical risk factors for cholelithiasis, including the classical "4F" paradigm—female, fair, fat, and forty—which highlights the importance of sex, ethnicity, obesity, and advancing age.[5] Female sex hormones, particularly estrogen, have been shown to increase hepatic cholesterol secretion and reduce bile acid synthesis, thereby promoting lithogenic bile formation.[6] Obesity and the metabolic syndrome contribute to gallstone risk through insulin resistance, increased cholesterol saturation, and impaired gallbladder motility.[7] Additionally, rapid weight loss, parenteral nutrition, certain medications, and underlying hemolytic disorders are recognised as significant risk factors.[2] However, these biomedical determinants alone do not fully account for the wide variations in gallstone prevalence, age of onset, and clinical outcomes observed across different populations and geographic regions.

In recent years, there has been growing recognition that sociodemographic factors—including socioeconomic status, educational attainment, occupation, geographic residence, and access to healthcare—play a critical and often under-appreciated role in shaping the epidemiology and clinical course of cholelithiasis.[8] These factors operate through multiple pathways, influencing dietary habits, physical activity levels, health-seeking behaviours, diagnostic delays, and quality of surgical care. For instance, individuals from lower socioeconomic backgrounds may have limited access to preventive healthcare services, resulting in delayed diagnosis and a higher likelihood of presenting with complicated disease.[9] Conversely, higher socioeconomic status in certain populations has been paradoxically associated with increased gallstone risk, potentially reflecting dietary patterns characterised by high-calorie, high-fat, and low-fiber intake typical of Westernised lifestyles.[10]

Age and sex represent fundamental sociodemographic variables that consistently demonstrate strong associations with cholelithiasis risk and presentation. The female predominance in gallstone disease is well-documented, with women having approximately two to three times higher risk than men, attributable to the effects of estrogen and progesterone on biliary lipid metabolism and gallbladder emptying. However, this sex disparity narrows with advancing age, and men tend to present with more severe complications when gallstones do occur. Age itself is a powerful determinant, with gallstone prevalence increasing progressively from less than 5% in individuals under 40 years to over 20% in those over 60 years. Older patients also exhibit distinct clinical characteristics, including higher rates of atypical or silent presentations, increased comorbidity burden, and greater perioperative risks, which collectively complicate management decisions.

Socioeconomic status and educational level have emerged as important determinants of gallstone-related outcomes. Lower socioeconomic status is associated with increased exposure to dietary risk factors such as processed foods and saturated fats, limited opportunities for physical activity, and reduced health literacy. These factors contribute not only to higher gallstone prevalence but also to delays in seeking medical care, leading to more advanced disease at presentation. Studies have demonstrated that patients from disadvantaged backgrounds are more likely to present with acute cholecystitis or biliary pancreatitis rather than uncomplicated biliary colic, and they experience higher rates of postoperative complications and prolonged hospital stays. Educational attainment influences health literacy, dietary choices, and adherence to preventive measures, highlighting the need for targeted public health interventions.

Geographic residence, whether urban or rural, represents another critical sociodemographic dimension affecting cholelithiasis. Rural populations often face barriers to healthcare access, including longer travel distances to surgical facilities, limited availability of specialised diagnostic imaging, and reduced access to elective cholecystectomy. Consequently, rural residents frequently present with more advanced disease and have higher rates of emergency surgery, which is associated with increased morbidity and mortality compared to elective procedures. Additionally, dietary practices and physical activity patterns may differ substantially between urban and rural settings, further influencing gallstone risk. The interplay between sociodemographic factors and clinical characteristics of cholelithiasis is complex and multidimensional. Beyond determining disease risk, these factors influence stone characteristics such as number, size, and composition, which in turn affect clinical behaviour and treatment outcomes. For example, socioeconomic deprivation has been associated with higher rates of pigment stones, while obesity-related cholesterol stones are more prevalent in higher socioeconomic groups in transitional economies. Understanding these associations is essential for developing personalised risk stratification approaches and for designing public health strategies that address the underlying social determinants of health.

Despite the established importance of sociodemographic factors in chronic disease epidemiology, there remains a relative paucity of comprehensive studies examining their independent contributions to cholelithiasis risk and clinical characteristics, particularly in diverse population settings. Most existing research has focused on Western populations, with limited data from developing countries where the epidemiology of gallstone disease is undergoing rapid transition in parallel with urbanisation and lifestyle changes. The present study aims to address this knowledge gap by systematically evaluating the association between sociodemographic factors—including age, sex, socioeconomic status, educational level, and geographic residence—and clinical characteristics and the risk of cholelithiasis. By elucidating these relationships, this research seeks to contribute to a more comprehensive understanding of gallstone disease epidemiology and to inform targeted prevention and management strategies tailored to high-risk population subgroups.

The present study aims to evaluate the clinical profile, sociodemographic characteristics, and risk factors associated

with cholelithiasis in adult patients attending Agartala Government Medical College and Hospital. The objectives of the study include assessing the age and gender distribution of patients with cholelithiasis, analysing the association of sociodemographic factors such as residence, education, and socioeconomic status with the disease, and studying the clinical presentation along with the pattern of complications. The study also aims to evaluate the ultrasonographic characteristics of gallstones, including number, size, and gallbladder wall thickness, and to identify the key predictors and risk factors associated with the severity of cholelithiasis.

Materials and Methods

Study design: This study is a hospital-based cross-sectional observational study

Study place: Department General Surgery, Institution Agartala Government Medical College, and Hospital

Study duration: 1 year

Study population: The study population will comprise adult patients aged 18 years or older diagnosed with cholelithiasis at the Institution, Agartala Government Medical College, and Hospital, over a defined study period of 1 year. Patients will be recruited from the Departments of General Surgery, Gastroenterology, and Emergency Medicine, as well as from individuals diagnosed incidentally on abdominal imaging in the Radiology Department. The institution serves a diverse patient population across urban, semi-urban, and rural communities, providing a representative sample for evaluating the association between sociodemographic factors and disease characteristics.

Sample size: 400 patients

Inclusion Criteria

Patients will be included in the study if they are aged 18 years or above and have a confirmed diagnosis of cholelithiasis based on objective imaging modalities, including abdominal ultrasonography, computed tomography, magnetic resonance cholangiopancreatography, endoscopic retrograde cholangiopancreatography, or intraoperative findings. Patients across the full clinical spectrum—from asymptomatic gallstones to complicated disease such as acute cholecystitis, choledocholithiasis, cholangitis, and gallstone pancreatitis—will be included. Only patients who provide written informed consent and have complete medical records available for data extraction will be enrolled.

Exclusion Criteria

Patients will be excluded from the study if they are below 18 years of age, have undergone prior cholecystectomy, or present with acalculous cholecystitis, gallbladder polyps, or gallbladder malignancy. Individuals with secondary causes of gallstones, including hemolytic anemias (sickle cell disease, hereditary spherocytosis, thalassemia), cirrhosis of the liver, cystic fibrosis, prolonged total parenteral nutrition use, or a history of bariatric surgery, will also be excluded. Additionally, pregnant women, patients with cognitive impairment or psychiatric disorders preventing informed consent, those with incomplete medical records, and individuals who decline to participate will be excluded from the study.

Ethical approval: The study was approved by the Institutional Ethics Committee.

Statistical analysis: For statistical analysis, data were entered into a Microsoft Excel spreadsheet and then analysed using SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism version 5. Data had been summarised as means and standard deviations for numerical variables and counts and percentages for categorical variables. Two-sample t-tests for a difference in means involve independent or unpaired samples. Paired t-tests were a form of blocking and had greater power than unpaired tests. A chi-squared test ($\chi 2$ test) is any statistical hypothesis test in which the sampling distribution of the test statistic is chi-squared when the null hypothesis is true. Without other qualification, 'chi-squared test' is often used as a short form for Pearson's chi-squared test. Unpaired proportions were compared by the chi-square test or Fisher's exact test, as appropriate.

Explicit expressions that can be used to carry out various t-tests are given below. In each case, the formula for a test statistic that either exactly follows or closely approximates a t-distribution under the null hypothesis is given. Also, the appropriate degrees of freedom are given in each case. Each of these statistics can be used for either a one-tailed or a two-tailed test.

Once a t-value is determined, a p-value can be found using a table of values from Student's t-distribution. If the calculated p-value is below the threshold chosen for statistical significance (usually the 0.10, 0.05, or 0.01 level), then the null hypothesis is rejected in favour of the alternative hypothesis.

P-value ≤ 0.05 was considered statistically significant.

Results

Table 1: Sociodemographic Characteristics of Study Population (N=400)

Sociodemographic Variable	Category	Number (n)	Percentage (%)
Age Group	18–40 years	112	28
	41–60 years	198	49.5
	>60 years	90	22.5
Sex	Male	128	32
	Female	272	68
Socioeconomic Status	Low	156	39
	Middle	184	46
	High	60	15
Educational Level	Illiterate/Primary	140	35
	Secondary	168	42
	Graduate/Postgraduate	92	23
Residence	Urban	224	56
	Rural	176	44

Occupation	Unemployed/Homemaker	168	42
	Manual Labor	132	33
	Professional/Salaried	100	25

Table 2: Clinical Characteristics of Cholelithiasis (N=400)

Clinical Characteristic	Category	Number (n)	Percentage (%)
Clinical Presentation	Asymptomatic	88	22
	Symptomatic Uncomplicated	192	48
	Complicated	120	30
Type of Complication	Acute Cholecystitis	72	18
	Choledocholithiasis	28	7
	Gallstone Pancreatitis	16	4
	Cholangitis	4	1
Stone Characteristics	Single Stone	180	45
	Multiple Stones	220	55
Stone Size	<10 mm	152	38
	10–20 mm	168	42
	>20 mm	80	20
Gallbladder Wall Thickness	<3 mm (Normal)	144	36
	3–5 mm (Thickened)	196	49
	>5 mm (Severe)	60	15

Table 3: Association of Sociodemographic Factors with Risk of Cholelithiasis (N=400)

Sociodemographic Factor	Category	Patients with Cholelithiasis (n)	Adjusted OR	95% CI	p-value
Age	18–40 years	112	1.00 (Ref)	—	—
	41–60 years	198	2.45	1.82–3.30	<0.001
	>60 years	90	3.12	2.24–4.35	<0.001
Sex	Male	128	1.00 (Ref)	—	—
	Female	272	2.89	2.12–3.94	<0.001
Socioeconomic Status	High	60	1.00 (Ref)	—	—
	Middle	184	1.56	1.08–2.25	0.018
	Low	156	2.34	1.62–3.38	<0.001
Residence	Urban	224	1.00 (Ref)	—	—
	Rural	176	1.78	1.32–2.40	0.002
Educational Level	Graduate/Postgraduate	92	1.00 (Ref)	—	—
	Secondary	168	1.45	1.02–2.06	0.038
	Illiterate/Primary	140	2.12	1.48–3.04	<0.001

Table 4: Association of Sociodemographic Factors with Clinical Presentation (Complicated vs. Uncomplicated) (N=312)

Sociodemographic Factor	Category	Uncomplicated (n=192)	Complicated (n=120)	p-value
Age Group	≤60 years	158 (82.3%)	70 (58.3%)	<0.001
	>60 years	34 (17.7%)	50 (41.7%)	
Sex	Male	48 (25.0%)	52 (43.3%)	<0.001
	Female	144 (75.0%)	68 (56.7%)	
Socioeconomic Status	High/Middle	132 (68.8%)	52 (43.3%)	<0.001
	Low	60 (31.2%)	68 (56.7%)	
Residence	Urban	128 (66.7%)	44 (36.7%)	<0.001
	Rural	64 (33.3%)	76 (63.3%)	
Educational Level	Secondary & Above	144 (75.0%)	56 (46.7%)	<0.001
	Illiterate/Primary	48 (25.0%)	64 (53.3%)	

Table 5: Multivariate Analysis of Factors Associated with Complicated Cholelithiasis (N=312)

Variable	β Coefficient	Adjusted OR	95% CI	p-value	Status
Age >60 years	1.206	3.34	2.02–5.52	<0.001	Significant
Male Sex	0.824	2.28	1.42–3.66	<0.001	Significant
Low Socioeconomic Status	1.015	2.76	1.74–4.38	<0.001	Significant
Rural Residence	1.238	3.45	2.14–5.56	<0.001	Significant
Low Educational Level	1.092	2.98	1.86–4.77	<0.001	Significant
Multiple Stones	0.742	2.1	1.32–3.34	0.002	Significant
Stone Size >20 mm	0.892	2.44	1.52–3.92	<0.001	Significant
Gallbladder Wall Thickening	1.156	3.18	1.98–5.10	<0.001	Significant

The study included 400 patients with cholelithiasis. Regarding age distribution, the majority of patients were in the 41–60 years age group (198 patients, 49.5%), followed by those aged 18–40 years (112 patients, 28%), and those aged more than 60 years (90 patients, 22.5%). With respect to sex distribution, the study showed a female predominance, with 272 patients (68%), while 128 patients (32%) were males. Based on socioeconomic status, most patients belonged to the middle class

(184 patients, 46%), followed by the low socioeconomic group (156 patients, 39%), and the least were from the high socioeconomic group (60 patients, 15%).In terms of educational status, the largest proportion of patients had secondary education (168 patients, 42%), followed by those who were illiterate or had primary education (140 patients, 35%), and graduates/postgraduates (92 patients, 23%). Regarding place of residence, a slightly higher proportion of patients were from urban areas (224 patients, 56%), compared to rural areas (176 patients, 44%). Occupation-wise, the most common group was unemployed or homemakers (168 patients, 42%), followed by manual laborers (132 patients, 33%), and professionals or salaried individuals (100 patients, 25%).

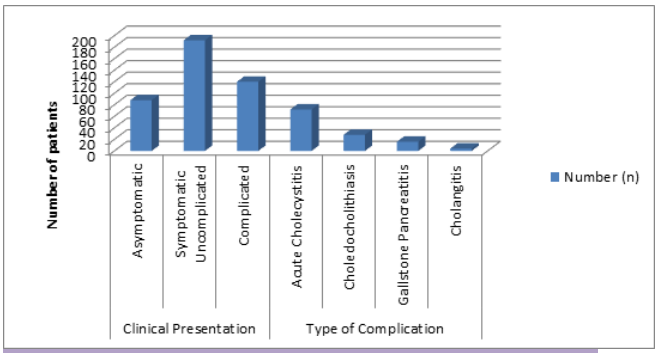

Figure 1: Clinical Characteristics of Cholelithiasis (N=400)

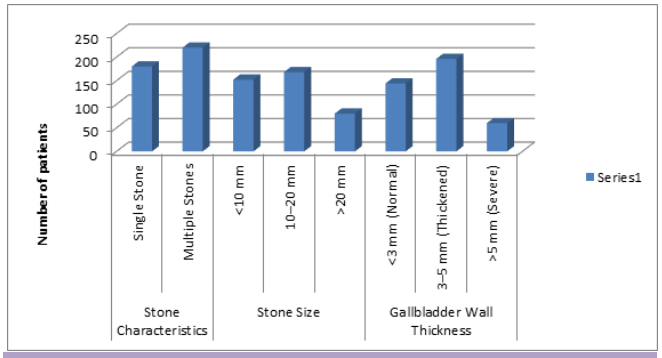

Figure 2: Association of Sociodemographic Factors with Clinical Presentation (Complicated vs. Uncomplicated) (N=312).

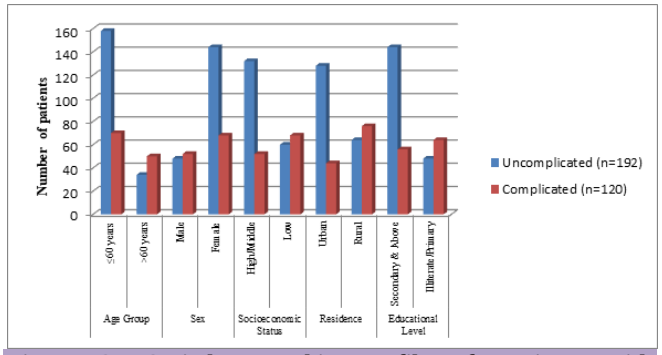

Figure 3: Sociodemographic Profile of Patients with Cholelithiasis

The clinical profile of the study population showed that out of 400 patients with cholelithiasis, 88 patients (22%) were asymptomatic, while the majority presented as symptomatic uncomplicated cases (192 patients, 48%), and 120 patients (30%) had complicated disease. Among the types of complications observed, acute cholecystitis was the most common, affecting 72 patients (18%), followed by choledocholithiasis in 28 patients (7%), gallstone pancreatitis in 16 patients (4%), and cholangitis in 4 patients (1%). Regarding stone characteristics, multiple stones were slightly more common, seen in 220 patients (55%), compared to single stones in 180 patients (45%). In terms of stone size, 168 patients (42%) had stones measuring 10–20 mm, followed by 152 patients (38%) with stones <10 mm, and 80 patients (20%) with stones >20 mm. Gallbladder wall thickness assessment revealed that 196 patients (49%) had a thickened wall (3–5 mm), 144 patients (36%) had normal wall thickness (<3 mm), and 60 patients (15%) had severe thickening (>5 mm).

The association between sociodemographic factors and risk of cholelithiasis was analysed using adjusted odds ratios. With respect to age, individuals aged 41–60 years (n = 198) had significantly higher odds of cholelithiasis compared to those aged 18–40 years (OR = 2.45, 95% CI: 1.82–3.30, $p < 0.001$), while those aged >60 years (n = 90) showed the highest risk (OR = 3.12, 95% CI: 2.24–4.35, $p < 0.001$), both findings being statistically significant. Regarding sex distribution, females (n = 272) had a significantly higher risk compared to males (n = 128), with an adjusted odds ratio of 2.89 (95% CI: 2.12–3.94, $p < 0.001$), indicating a strong female predominance in cholelithiasis. Based on socioeconomic status, patients from the middle group (n = 184) had increased odds (OR = 1.56, 95% CI: 1.08–2.25, $p = 0.018$), while those from the low socioeconomic group (n = 156) had an even higher risk (OR = 2.34, 95% CI: 1.62–3.38, $p < 0.001$) compared to the high socioeconomic group. In terms of residence, rural patients (n = 176) showed significantly higher odds of developing cholelithiasis compared to urban patients (n = 224), with an adjusted OR of 1.78 (95% CI: 1.32–2.40, $p = 0.002$). Regarding educational status, individuals with secondary education (n = 168) had moderately increased risk (OR = 1.45, 95% CI: 1.02–2.06, $p = 0.038$), while those who were illiterate or had primary education (n = 140) showed significantly higher risk (OR = 2.12, 95% CI: 1.48–3.04, $p < 0.001$) compared to graduates or postgraduates.

The association between sociodemographic factors and disease severity (uncomplicated vs complicated cholelithiasis) showed statistically significant differences across all variables. With respect to age, patients aged ≤60 years (n = 158 uncomplicated, 70 complicated) were more commonly seen in the uncomplicated group, whereas those aged >60 years (n = 34 uncomplicated, 50 complicated) showed a higher proportion of complicated cases, and this association was statistically significant ($p < 0.001$). Regarding sex distribution, males (n = 48 uncomplicated, 52 complicated) had a higher proportion of complicated disease compared to females, while females (n = 144 uncomplicated, 68 complicated) were more commonly seen in the uncomplicated group, with a significant association observed ($p < 0.001$). Based on socioeconomic status, patients from the high/middle group (n = 132 uncomplicated, 52 complicated) were predominantly in the uncomplicated category, whereas those from the low socioeconomic group (n = 60 uncomplicated, 68 complicated) had a higher proportion of complicated disease, showing a

statistically significant association ($p < 0.001$).In terms of residence, urban patients (n = 128 uncomplicated, 44 complicated) were more frequently uncomplicated, while rural patients (n = 64 uncomplicated, 76 complicated) showed a higher proportion of complicated cases, with a significant association ($p < 0.001$). Regarding educational status, individuals with secondary education and above (n = 144 uncomplicated, 56 complicated) were mostly in the uncomplicated group, whereas those with illiterate/primary education (n = 48 uncomplicated, 64 complicated) had a higher proportion of complicated disease, and this association was statistically significant ($p < 0.001$).

The multivariate logistic regression analysis identified several independent predictors of cholelithiasis and its severity. Age greater than 60 years showed a strong positive association with disease risk ($\beta = 1.206$, adjusted OR = 3.34, 95% CI: 2.02–5.52, $p < 0.001$), indicating that elderly patients had more than three times higher odds of developing the disease compared to younger individuals. Male sex was also found to be a significant risk factor ($\beta = 0.824$, OR = 2.28, 95% CI: 1.42–3.66, $p < 0.001$), suggesting higher odds of disease among males. Similarly, low socioeconomic status was independently associated with increased risk ($\beta = 1.015$, OR = 2.76, 95% CI: 1.74–4.38, $p < 0.001$). Rural residence showed a strong association with disease occurrence ($\beta = 1.238$, OR = 3.45, 95% CI: 2.14–5.56, $p < 0.001$), indicating significantly higher odds compared to urban populations. Low educational level was also significantly associated with increased risk ($\beta = 1.092$, OR = 2.98, 95% CI: 1.86–4.77, $p < 0.001$). Among clinical factors, the presence of multiple stones was significantly associated with a higher risk ($\beta = 0.742$, OR = 2.10, 95% CI: 1.32–3.34, $p = 0.002$). Stone size greater than 20 mm also showed a significant association ($\beta = 0.892$, OR = 2.44, 95% CI: 1.52–3.92, $p < 0.001$). In addition, gallbladder wall thickening was identified as a strong predictor of disease severity ($\beta = 1.156$, OR = 3.18, 95% CI: 1.98–5.10, $p < 0.001$).

Discussion

In the present study, cholelithiasis was found to be more common in the 41–60 years age group (49.5%) with a clear female predominance (68%). Similar findings were reported by Acalovschi,[11] who noted that increasing age and female sex are major non-modifiable risk factors for gallstone disease due to hormonal influences and altered cholesterol metabolism. Likewise, Wang et al,[12] observed a higher prevalence of gallstones in middle-aged women and attributed this to estrogen-induced increases in biliary cholesterol secretion and gallbladder hypomotility. In our study, a significant association was observed between low socioeconomic status and rural residence with increased disease risk and severity. This is consistent with findings by Shaffer,[13] who reported that socioeconomic deprivation, unhealthy dietary patterns, and limited access to healthcare contribute significantly to gallstone formation and delayed diagnosis. Similarly, Kratzer et al,[14] demonstrated a higher prevalence of gallstones among individuals with lower income and educational levels, supporting the findings of the present study. The clinical presentation in the present study showed that 30% of patients had complicated cholelithiasis, with acute cholecystitis being the most frequent complication. Comparable results were reported by Diehl,[15] who highlighted that delayed presentation and untreated symptomatic gallstones often progress to complications such as cholecystitis and biliary obstruction, thereby increasing morbidity. Regarding stone characteristics, multiple stones (55%), and intermediate stone size (10–20 mm) were most observed in our study. Similar findings were reported by Everhart and Ruhl,[16] who identified cholesterol supersaturation and bile stasis as key mechanisms responsible for multiple gallstone formation. Additionally, Portincasa et al,[17] explained that altered lipid metabolism and impaired gallbladder motility contribute to increased stone burden and disease progression. In the present study, multivariate analysis identified age >60 years, female sex, low socioeconomic status, rural residence, low educational level, multiple stones, larger stone size, and gallbladder wall thickening as significant predictors of cholelithiasis. These findings are supported by Stinton and Shaffer,[18] who emphasised that gallstone disease is a multifactorial condition influenced by metabolic, genetic, and environmental factors. Similarly, Nakeeb et al,[19] reported that obesity, metabolic syndrome, and lifestyle-related factors significantly increase both the risk and complications of gallstone disease.

Conclusion

In the present study, cholelithiasis was found to be most common in the 41–60 years age group with a marked female predominance, indicating the strong influence of age and hormonal factors in gallstone formation. The disease was more frequently observed among individuals belonging to low socioeconomic status and rural backgrounds, highlighting the role of lifestyle, dietary habits, and limited access to healthcare in disease development and progression. Clinically, a considerable proportion of patients presented with complicated cholelithiasis, with acute cholecystitis being the most common complication, emphasising the importance of early diagnosis and timely management to prevent morbidity. Ultrasound findings revealed a higher occurrence of multiple stones and intermediate-sized stones, along with gallbladder wall thickening in a substantial number of cases, suggesting progressive inflammatory changes in advanced disease. Multivariate analysis identified advanced age, female sex, low socioeconomic status, rural residence, low educational level, multiple stones, larger stone size, and gallbladder wall thickening as significant predictors of cholelithiasis. These findings indicate that gallstone disease is multifactorial, influenced by demographic, metabolic, environmental, and socioeconomic factors.

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Conflicts of interest

There are no conflicts of interest.

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