

Burden of Gallstone Disease Among Patients Presenting to the Surgery Department in a Tertiary Care Center : A Descriptive Cross-Sectional Study

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Abstract

Introduction: The frequency of gallstone disease varies worldwide. Female gender, a family history of gallstones, obesity, diabetes, metabolic syndrome, estrogen therapy, dietary habits, and an inactive lifestyle increase the risk. Symptomatic individuals experience abdominal pain and indigestion, occasionally leading to complications, while many remain asymptomatic.

Methods: A retrospective, descriptive, cross-sectional study was conducted at Nepal Armed Police Force Hospital, from April to December, 2024. Data of patients visiting the surgery department over a period from December 01, 2023 to November 30, 2024 was taken from the record section of the hospital. The ethical clearance was obtained from the Institutional Review Committee (registration number: NAPFH-007/2024). Patients aged 18 years or above were included, and those having common bile duct calculus, with biliary malignancy, in an immunocompromised state, and pregnancy were excluded.

Results: Out of 1835 patients, gallstone disease was observed in 210 (11.44%). 149 of them (70.95%) were females. 128 (60.95%) cases had multiple gallstones while 82 (39.05%) cases had a solitary gallstone. 170 (80.95%) cases presented with abdominal pain, whereas 30 (14.29%) remained asymptomatic. 19 (9.05%) cases presented with acute cholecystitis. Laparoscopic cholecystectomy was the commonest modality of management (76.19%).

Conclusion: Prevalence of gallstone disease was 11.44%, similar to other literature. Further research on gallstone disease helps to understand the disease in these settings.

Keywords: armed police, cholelithiasis, gallbladder, gallstone disease, prevalence

Introduction

Gallstone disease, a major global issue of modern society, has been prevalent for many years.^{1,2} The prevalence of gallstones varies geographically and is increasingly common, especially among older individuals.^{3,4} In Europeans, the prevalence rates ranges from 10-15% in adults compared to 5-10% in Africans and Asians.⁵ Female gender, gallstone disease in family, and metabolic conditions like obesity and dyslipidemia contribute to its formation.⁶ It is also linked to hyperinsulinemia, insulin resistance, and type 2 diabetes, a complication of metabolic syndrome.⁷ Estrogen therapy, transient high cholesterol and high-calorie intake, decreased activity,

and weight fluctuations also increase the risk.⁸⁻¹⁰

Many are asymptomatic, and not requiring treatment. Recurrent upper abdominal pain is seen in symptomatic patients, possibly due to cystic duct blockage.^{11,12} Complications like acute cholecystitis can occur, causing severe pain, fever, nausea, vomiting, and leukocytosis.^{13,14} Gallstones often migrate to the common bile duct, leading to obstructive jaundice and biliary pancreatitis.¹⁵ Occasionally, stones in the neck or cystic duct may compress the common hepatic duct leading to obstructive jaundice, Mirizzi syndrome.^{16,17} Often symptoms are nonspecific abdominal pain with or without radiation to the back and shoulder.¹⁸ Transabdominal ultrasonography,

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in the fasting state, is the investigation of choice, yielding a diagnosis more than 90% of the times but may miss bile duct stones in 50% of cases.¹⁹ Literature related to gallstones in Nepal is limited. More studies are needed to understand the cause of increasing prevalence in our region. The study aims to assess the prevalence of the gallstone in patients who present to the surgery department of a tertiary care center.

Methods

The protocol of this study was approved after review by the Institutional Review Committee (IRC) of Nepal APF Hospital, Balambu, Kathmandu, Nepal (registration number: NAPFH-007/2024). All the collected data were anonymized to ensure confidentiality. This quantitative research was conducted from April to December, 2024, as a descriptive, cross-sectional, single-center (hospital-based) study in the Nepal Armed Police Force (APF) Hospital to investigate the prevalence of gallstone disease in patients visiting the department of surgery in the hospital.

The study population consisted of patients who presented to the surgery department of Nepal APF Hospital. There has not been any study on gallstone disease, a very frequently encountered disease in outpatient and emergency settings, causing significant morbidity among patients. Data of adult patients visiting the department of surgery over a period from December 01, 2023 to November 30, 2024 was taken from the record section of the hospital. Consecutive sampling technique was used. Permission was obtained from the hospital to access the hospital data. Patients aged 18 years or above were included, and those having common bile duct calculus, with biliary malignancy, in an immunocompromised state and in pregnancy were excluded.

Calculation of the sample size was done using the formula:

$$n = Z^2 \times p \times q / e^2$$

$$1.962 \times 0.11 \times 0.89 / 0.032 \approx 417$$

Where, n = minimum required sample size, Z = 1.96 at a 95% Confidence interval (CI),

p = prevalence, q = 1-p, e = margin of error, 3%

In a similar study done by Pahari et al. at Nepalese Army Institute of Health Sciences, prevalence of gallstone was found to be 11.79%.²⁰

Therefore, p = 0.11 and q = 0.89

The minimum sample size calculated was 417.

Adding a 10% non-response rate, the minimum sample size was 459.

However, a total of 1843 cases visited surgery OPD during the study period. Of these, 4 cases with common bile duct stones and 4 pregnant cases with gallstones were excluded. Thus, 1835 cases were taken for the study.

Prior institutional approval was obtained before collecting the data from the hospital's surgical OPD records, emergency room records, and operation room records.

The collection of data was done in the pre-formed proforma sheet and then entered in Microsoft Excel. Different graphical methods and tables were used to

describe different categorical variables. The statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 26. Frequency, percentage, mean, and standard deviation were calculated.

Results

Out of a total of 1835 patients in the study, gallstones were observed in 210 (11.44%). Among them, 70.95% (n=149) were female, whereas 29.05% (n=61) were males. M: F ratio of 1:2.44. The mean age of the patients was 42.4±13.57 years. (Figure 1)

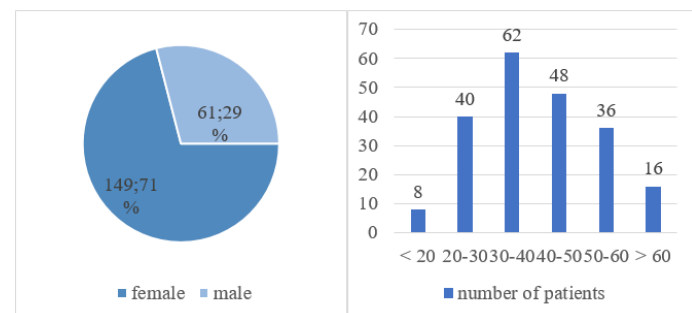


Figure 1: Age and gender distribution (n=210)

Out of 210 cases with gallstones, 39 (18.57%) cases were smokers, while 32 (15.24%) consumed alcohol; 26 (12.38%) were vegetarians, whereas 184 (87.62%) consumed mixed diets. More than 60% of cases were either overweight, i.e., 86 (40.95%) or obese, i.e., 48 (22.85%).

Presenting symptom in the majority of patients was mild abdominal pain 170 (80.95%). Asymptomatic patients, 30 (14.29%) also comprised a significant number of patients who found out about gallstones on routine sonographic scans or scans done for other medical conditions.

Table 1: Factors associated with gallstones and chief presenting symptoms (n=210)

Characteristic	Data
Patients with gallstones	n = 210
Smoking	
Smoker	39 (18.57 %)
Non - smoker	171 (81.43 %)
Alcohol Consumption	
Consumer	32 (15.24 %)
Non - consumer	178 (84.76 %)
Diets	
Mixed Diet	184 (87.62 %)
Vegetarian Diet	26 (12.38 %)
BMI, Kg/m²	
More than 25kg/m ²	134 (63.81 %)
Obese (≥30 kg/m ²)	48 (22.85 %)
Overweight (25-30 kg/m ²)	86 (40.95 %)
Normal	76 (36.19 %)
Chief Presenting Symptoms	
Abdominal pain	170 (80.95 %)
Asymptomatic	30 (14.29 %)
Non-specific symptoms	6 (2.86 %)
Nausea, vomiting	4 (1.90 %)

On radiological investigations, multiple gallstones were detected in 128 (60.95%) cases, while 82 (39.05%) cases had a solitary stone. 19 cases (9.05%) presented with features of acute cholecystitis, while 32 (15.24%) showed contracted gallbladder. Abnormal blood counts (leukocytosis) were observed in 22 cases (10.48%) and abnormal liver function tests were noted in 30 cases (14.29%).

Table 2: Radiological and laboratory findings associated with gallstones

Characteristic	Data
Patients with gall stones	n = 210
Ultrasound findings	
Gallstones findings	
Multiple Gallstones	128 (60.95 %)
Solitary Gallstones	82 (39.05 %)
Gall bladder findings	
Features of Acute cholecystitis	19 (9.05 %)
Contracted Gall Bladder	32 (15.24 %)
Laboratory Findings	
Abnormal Blood counts (leukocytosis)	22 (10.48 %)
Elevated Alkaline Phosphatase level	30 (14.29 %)

Out of all patients, 165 (78.57%) patients underwent surgery. 160 (76.19%) underwent laparoscopic cholecystectomy, and 5 (2.38%) underwent open cholecystectomy. Conservative management was done in 45 (21.43%) cases, 1 (Table 3).

Table 3: Modality of management of patients with gallstones

Modality of management	Data (n= 10)
Laparoscopic cholecystectomy	160 (76.19 %)
Open Cholecystectomy	5 (2.38 %)
Conservative management	45 (21.43 %)

Discussion

Gallstones are the global medical problems that can remain asymptomatic in most patients. This condition occurs in 10-15% of the Western population and up to 10% of the Asian population.^{5,20} Gallstone prevalence rate was 11.44% in our study, which was similar to the results of a study done by Pahari et al. in the Nepalese Army Institute of Health Sciences.²⁰

Gallstone disease is significantly more prevalent in females, with studies indicating a sex ratio (male-to-female ratio) ranging from 1:3 to 1:4. One of the studies highlighted a ratio of 1:3.1 in gallstone prevalence in Nepal.²² Another study found similar trends, noting that gallstone disease affects women more often, especially during reproductive years.²³ Our study also showed that most patients were female (70.95%) with a male: female ratio of 1:2.44. These findings are consistent with other

studies. This pattern is commonly attributed to hormonal factors such as estrogen's influence on bile cholesterol saturation.²² The use of hormonal contraceptive pills and the effect of sex hormones in females are well-known factors contributing to gallstone formation.^{24,25} In a similar study done in Nepal by Bansal et al., cholelithiasis was common in the age group of 31-40 years.²⁶ Consistent with this finding, our study also showed a higher prevalence among the 30-40 years' age group.

Among the 210 cases, 87.62% consumed a mixed diet while 12.38% consumed a vegetarian diet. In a similar study done in Nepal, 94.50% consumed non-vegetarian and 5.5% consumed only vegetarian diets.²⁰

However, another study showed that only 58% of cases consumed a mixed diet, which is less than the findings of our study.²⁶ These variations could be attributed to variation of dietary habits across Nepal. Research has indicated a strong link between the development of cholesterol gallstones and a diet high in fat and red meat consumption.²⁷

While only 18.57% of cases were smokers, obesity (BMI more than or equal to 30 kg/m²) was seen in 22.85% of cases. More than 60% of cases (63.81%) were either overweight (BMI of 25-29.9 kg/m²) or obese. This finding is similar to a study done at the Nepalese Army Institute of Health Sciences.²⁰ The reason for this may be that both these hospitals receive patients of similar job nature. Obesity is a recognized risk factor for gallstones, with gallstones present in at least 25% of individuals who are morbidly obese.²¹ The mechanism involves obesity enhancing cholesterol production in the liver and thereby increasing its secretion into bile.

In our study, 14.29% of cases detected incidentally were asymptomatic. A similar study done in Nepal showed 8.42% were asymptomatic.²⁰ The reason for the higher number of cases could be due to increased health service-seeking behavior. Among the symptomatic patients, abdominal pain was present in 80.95% followed by non-specific symptoms like bloating and discomfort in 2.86% of cases. Only 1.90% experienced nausea and vomiting. The most common presentation of a gallstone disease is biliary colic.

Among the laboratory findings, 10.48% of cases were associated with leukocytosis (more than 11,000/mm³) among which 9.05% of cases had features of acute calculus cholecystitis in ultrasound examination, which was consistent to the findings of similar studies done in Nepal.^{20,23} Abnormal liver function test (elevated alkaline phosphatase level) was present in 14.29% patients. In transabdominal ultrasonography, multiple stones were detected in 60.95% of patients and 39.05% of patients had a solitary gallstone. Other studies have reported 59% to 76% of multiple gallstones, which is similar as compared to our study.^{20,23}

In our study, most of the patients were treated surgically. Laparoscopic cholecystectomy was performed in 76.19% of cases. 21.43% of cases were managed conservatively. They were either unfit for surgery or asymptomatic

patients opted for follow-up. In about 2.38% of cases, laparoscopic cholecystectomy was converted to open cholecystectomy either due to difficult/frozen Calot's triangle or for prevention of possible bile duct injury. Similar findings were noted in the previous studies.

Laparoscopic cholecystectomy is the preferred surgical treatment for symptomatic gallstones as it involves fewer complications and allows for a quicker recovery. Laparoscopic cholecystectomy sometimes needs to be converted to open if situations like difficult anatomy arise intraoperatively.²⁸

This study included the findings of patients presenting to the department of surgery of a single institution. However, patients presenting with similar complaints to outpatient clinics of other departments could not be included.

Conclusion

Gallstone disease was found to be highly prevalent among patients visiting surgery OPD. A prevalence rate of 11.44% was similar to previously reported literature in Nepal. With an advancement of diagnostic services and an increased healthcare-seeking behavior, the prevalence could be even higher in the future, especially among middle-aged population. More studies involving multiple departments, as well as different hospitals or centers in different regions, are recommended to further understand the clinical-epidemiological features associated with gallstone disease and their outcomes in Nepal.

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