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An Analysis of Risk Factors and Clinical Outcomes of Choledocholithiasis in Patients at a Tertiary Care Hospital in Bangladesh.

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ABSTRACT

Background: Choledocholithiasis is a common biliary disorder characterized by the presence of stones in the common bile duct, leading to significant clinical complications and morbidity. This study aims to investigate the clinical profile, risk factors, and symptoms of patients diagnosed with choledocholithiasis at a tertiary care hospital in Bangladesh, with an emphasis on demographic patterns and associated comorbid conditions.

Methods: This cross-sectional study was conducted at Bangladesh Medical University (BMU) between July 2024 and December 2024, involving 170 patients diagnosed with choledocholithiasis. Data were collected through a detailed review of clinical records, which included demographic information, clinical features, lifestyle factors, comorbidities, and symptoms. Patients were also assessed for risk factors such as diet, physical activity, and body composition.

Results: The study sample primarily consisted of patients aged 41-60 years (27.65%), with a female predominance (58.83%). Common risk factors included a non-vegetarian diet (57.64%), a sedentary lifestyle (56.47%), and obesity (48.23%). Comorbidities, including diabetes mellitus (38.82%) and hypertension (32.94%), were also prevalent in the patient population. The most frequently reported symptoms were pain (80%), jaundice (71.76%), and fever (52.94%). Clinical signs, such as tenderness in the right hypochondriac region (91.76%) and icterus (89.41%), were predominant.

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Conclusion: This study provides a comprehensive overview of the clinical characteristics and risk factors associated with choledocholithiasis in Bangladesh. The findings suggest the need for targeted interventions to address lifestyle factors, manage comorbidities, and consider gender-based risk stratification in clinical practice. Further studies are needed to assess the long-term impact of these factors on disease progression and patient outcomes.

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INTRODUCTION

Gallstone disease is one of the most prevalent medical conditions globally, contributing significantly to abdominal morbidity and mortality. Cholecystectomy, a common surgical procedure, is frequently performed to treat this condition, which results from the impaired metabolism of cholesterol, bilirubin, and bile acids, leading to the formation of gallstones in the gallbladder, hepatic bile duct, or common bile duct (CBDS) [1,2]. CBDS occurs in 6-12% of patients with gallbladder stones, and approximately 11% of patients present with CBDS at the time of surgery. Interestingly, between 5-7% of CBDS cases remain undetected prior to surgery [3]. CBDS is a primary cause of obstructive jaundice and cholangitis, both of which significantly affect patient outcomes and require timely intervention [2].

In high-income countries, laparoscopic techniques such as laparoscopic cholecystectomy and bile duct exploration have become the preferred treatment methods for CBDS due to their advantages of reduced pain, shorter hospitalization, and faster recovery [4]. However, in developing countries like Bangladesh, where the availability of endoscopic services and laparoscopic equipment is limited, open surgery remains the standard treatment for CBDS [5]. In South Asia, there is a notable prevalence of pigment gallstones, particularly in the gallbladder and common bile duct [6]. Cholesterol gallstones, affecting both the gallbladder and common bile duct, are also common in this region, including cases where CBDS is present without an associated gallbladder stone [3].

Endoscopic retrograde cholangiopancreatography (ERCP) has emerged as a valuable procedure for diagnosing and treating biliopancreatic diseases, particularly in patients with CBDS. It is often the first-line treatment for CBDS, but the rising detection of asymptomatic CBDS, driven by advances in abdominal imaging techniques, has prompted questions about its management [7,8]. While the natural history of asymptomatic CBDS remains uncertain, these patients are at an increased risk for developing severe complications, such as cholangitis and pancreatitis, which necessitate treatment as per international guidelines [9,8].

However, ERCP is associated with significant risks, including complications such as cholangitis, bleeding, perforation, and post-ERCP pancreatitis (PEP), the most common and potentially fatal of these complications [10]. Endoscopic treatments, including endoscopic sphincterotomy (EST), endoscopic papillary balloon dilation (EPBD), and endoscopic papillary large balloon dilation (EPLBD), are essential for stone extraction but also serve as known risk factors for PEP [11,12].

Given the inherent risks associated with ERCP, especially in asymptomatic CBDS patients, a careful risk-benefit analysis is crucial before proceeding with the procedure. Although the incidence of asymptomatic CBDS is rising, there is limited research addressing the risk of PEP in this subset of patients [13,14]. This study aims to investigate

the incidence and severity of PEP in patients with asymptomatic CBDS with a naive papilla, identifying potential risk factors and clinical outcomes that could guide better management strategies in a tertiary care setting in Bangladesh.

METHODOLOGY

This cross-sectional study was conducted at Bangladesh Medical University (BMU) from July 2024 to December 2024. A total of 170 patients diagnosed with choledocholithiasis were included in the study. The sample size was determined to provide adequate statistical power for assessing the risk factors and clinical outcomes associated with choledocholithiasis.

Informed consent was obtained from all participants, ensuring that they were fully informed about the nature of the study and the data collection process. Patient data were collected through detailed clinical assessments, including age, sex, and various clinical features. Additionally, several associated risk factors were recorded, including obesity (calculated by Body Mass Index [BMI]), history of diabetes mellitus, hypertension, liver disease, dietary habits (such as non-vegetarian diet and low fiber intake), and other relevant clinical factors.

The data were systematically tabulated, and descriptive statistics, including percentages, were calculated for analysis. Ethical approval for the study was obtained from the institutional review board of BMU, ensuring that the study adhered to ethical standards in research, including patient confidentiality and voluntary participation.

RESULTS

The study sample of 170 patients consists of 12.94% in the 21-40 age group, 27.65% in the 41-60 age group, and 9.41% aged ≥ 61, with no patients in the ≤ 20 age group. Regarding sex distribution, 58.83% of the patients are female, while 41.17% are male. (**Table 1)**

Table 1: Age distribution of patients, including frequencies and percentages (n=170)

Age	Number of Patients	Percentage
≤ 20	0	0.00%
21-40	44	12.94%
41-60	94	27.65%
≥ 61	32	9.41%
Sex		
Female	100	58.83%
Male	70	41.17%

Table 2 presents the clinical profile and risk factors of 170 patients, revealing key information about their diet, lifestyle, comorbid conditions, and body composition. The majority of patients (57.64%) follow a non-vegetarian (mixed) diet, with 43.52% being vegetarian. Regarding lifestyle, a significant portion (56.47%) leads a sedentary lifestyle, while 31.76% engage in moderate physical activity, and 10.58% report heavy physical activity. In terms of comorbidities, diabetes mellitus is the most prevalent, affecting 38.82% of patients, followed by hypertension in 32.94% and a history of liver disease in 25.88%. When considering body composition, 48.23% of patients are overweight, 25.88% are obese, 20.0% have a normal weight, and 5.88% are underweight.

Table 2: Distribution of risk factors among patients, including clinical profile, diet, lifestyle, comorbidities, and body composition (n=170)

Clinical Profile		Number of patients	Percentage
Diet	Non-vegetarian (Mixed)	49	57.64%
	Vegetarian	74	43.52%
Lifestyle/Physical activity	Sedentary	96	56.47%
	Moderate	54	31.76%
	Heavy	18	10.58%
Comorbid medical illness	Diabetes mellitus	99	38.82%
	H/o liver disease	44	25.88%
	Hypertension	56	32.94%
Built	Normal weight	34	20.0%
	Over weight	82	48.23%
	Underweight	10	5.88%
	Obese	44	25.88%

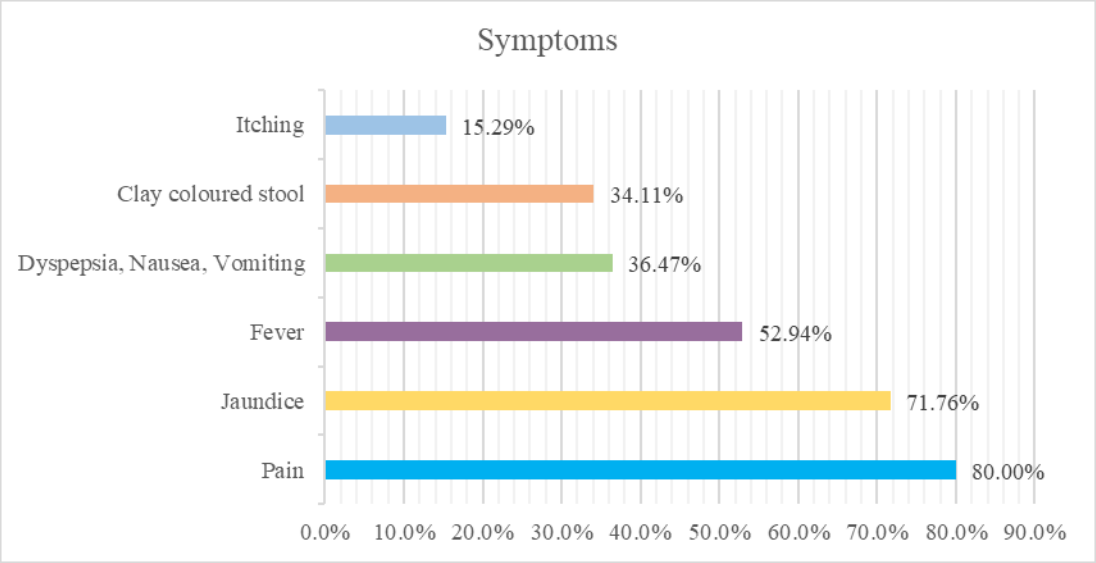

Figure 1: Distribution of symptoms experienced by patients, showing the percentage of occurrence for each symptom (n=170)

Figure 1 illustrates the distribution of symptoms experienced by the patients, with the highest prevalence being pain (80%), followed by jaundice (71.76%). Other common symptoms include fever (52.94%), dyspepsia, nausea, and vomiting (36.47%), and clay-colored stool (34.11%). The least reported symptom was itching (15.29%). This indicates that pain and jaundice are the most frequently observed symptoms in the patient population.

Table 3 presents the distribution of clinical signs among patients, with tenderness in the right hypochondriac region being the most common, observed in 91.76% of patients. Icterus (yellowing of the skin) was present in 89.41% of patients, while elevated temperature was noted in 55.29%. Hepatomegaly (enlarged liver) was the least reported sign, seen in only 4.70% of patients. This suggests that tenderness and icterus are the most prevalent clinical signs in the patient population.

Table 3: Distribution of clinical signs among patients, including tenderness, icterus, temperature, and hepatomegaly (n=170)

Signs	Number of patients	Percentage
Tenderness-Rt. Hypochondriac	156	91.76%
Icterus	152	89.41%
Temperature	94	55.29%
Hepatomegaly	8	4.70%

DISCUSSION

In this study, the majority of patients (27.65%) were in the 41-60 age group, with 47.5% of the sample being aged between 21 and 60 years. The youngest patient was 20 years old, and the oldest was 75 years old. Our study also observed a higher proportion of female patients, with 58.83% of the sample being female, resulting in a male-to-female ratio of 1:1.4. These findings are consistent with those of Wani et al., who observed a predominance of females in their cohort, although their study reported the highest incidence in the 31-40 age group [15]. Despite the difference in the peak age group, the consistent female predominance across both studies highlights a significant gender-based trend in the occurrence of choledocholithiasis.

The clinical impact of choledocholithiasis is notable due to its high morbidity, although it generally carries a low mortality rate. The financial and healthcare burden remains significant, primarily due to the complications and long-term management required for patients [16]. The etiology of common bile duct stones is multifactorial, involving factors such as cholesterol, bile pigments, calcium, infection, age, sex, and dietary habits, along with the presence of liver cirrhosis [17]. This study adds to the literature by providing detailed insights into the age and sex distribution, risk factors, clinical signs, and symptoms of patients with choledocholithiasis.

Our findings regarding gender distribution are in line with studies by Dharmesh P et al. and Chhoda A et al., both of which reported a higher prevalence of choledocholithiasis in females compared to males [18,19]. The higher female prevalence observed in these studies suggests that gender stratification may improve the predictive accuracy of the American Society for Gastrointestinal Endoscopy (ASGE) risk stratification criteria, potentially enhancing patient outcomes and reducing healthcare costs. These results underscore the importance of considering gender as a critical factor in risk assessment and management.

The age distribution in our study revealed that the majority of patients (27.65%) were in the 41-60 age group, a finding consistent with the work of Ravi MJ et al., who reported that 46.7% of patients in their study were aged between 41 and 60 years [20]. This age group is particularly vulnerable to choledocholithiasis, likely due to the migration of primary gallbladder stones to the common bile duct in older patients. This observation is supported by studies such as those by Wani et al. and Joana Tozatti J et al., who noted that cholangitis symptoms, including right hypochondriac pain, jaundice, and fever, along with ultrasound evidence of stones in the

common bile duct, are crucial preoperative indicators for choledocholithiasis [15,21].

Symptoms commonly observed in our study included abdominal pain (80%), jaundice (71.76%), fever (52.94%), and dyspepsia, nausea, and vomiting (36.47%). These findings align with those of Wani NA et al. who reported abdominal pain in 94.9%, fever with rigors in 13.44%, and jaundice in 43% of their cohort [15]. The high prevalence of pain and jaundice in our study emphasizes the importance of these symptoms in diagnosing choledocholithiasis.

The most prevalent risk factors in our study were a non-vegetarian diet (57.64%), a sedentary lifestyle (56.47%), and obesity (48.23%). Comorbidities such as diabetes mellitus (38.82%), hypertension (32.94%), and a history of liver disease (25.88%) were also significant contributors to the risk profile of our patients. These findings highlight the importance of managing lifestyle factors and comorbidities in the prevention and treatment of choledocholithiasis. Given the high morbidity associated with choledocholithiasis, addressing these risk factors through public health interventions and patient education may reduce its prevalence and improve patient outcomes.

CONCLUSION

This study highlights the clinical profile and risk factors of choledocholithiasis patients in Bangladesh, with a predominance of females and most patients in the 41-60 age group. Key risk factors include a non-vegetarian diet, sedentary lifestyle, obesity, and comorbidities such as diabetes, hypertension, and liver disease. The most common symptoms were pain, jaundice, and fever, while tenderness and icterus were the predominant clinical signs. These findings emphasize the importance of addressing lifestyle factors and comorbidities in managing choledocholithiasis, and further research is needed to explore long-term outcomes.

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