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Overview of Risk Factors for Cholelytasis Patients at Royal Prima Medan Hospital in 2022-2023

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ABSTRACT

This study aims to provide an overview of the risk factors associated with *cholelithiasis* among patients treated at Royal Prima Hospital Medan during 2022–2023. Using a quantitative approach with a cross-sectional design, data were collected simultaneously from patient medical records to identify and describe risk characteristics. The research population included all patients diagnosed with *cholelithiasis* within the specified period, while the sampling technique employed was proportional random sampling. Data were obtained through documentation methods and analyzed using univariate descriptive statistics to present the distribution of each variable. The findings revealed that the majority of patients were female (59.7%), aged over 40 years (68.1%), had a family history of *cholelithiasis* (90.3%), and were overweight (45.8%). Body mass index (BMI) analysis showed that 45.8% of patients were overweight, 36.1% had normal BMI, and 18.1% were obese, with no underweight cases identified. The results are expected to highlight key factors such as age range, body mass index (BMI), and family medical history contributing to the occurrence of *cholelithiasis*. This study provides valuable insights for healthcare providers in improving preventive strategies and promoting public awareness regarding the risk factors for *cholelithiasis*.

Keywords: cholelithiasis, risk factors, body mass index, family history, Royal Prima Hospital Medan

INTRODUCTION

The gallbladder and bile duct are both potential sites for gallstone formation in *cholelithiasis* (Tanaja Jasmin et al., 2024). *Cholelithiasis* is known by several names, including gallstones and biliary calculus (Jones Mark W. et al., 2024). There are three types of gallstones: cholesterol stones, pigment stones (also known as bilirubin stones), and mixed stones. Brown and black pigments form pigment stones (*bilirubin stones*), with cholesterol stones being the most common type (Rafilia Adhata et al., 2022).

There has been an annual increase of approximately 1.3% in reported cases of acute pain, with a total of about twenty million cases in the United States. The prevalence of *cholelithiasis* among women in the U.S. has risen by 1% per year, while among men it has increased by 0.5%. *Cholelithiasis* affects about 10–15% of the population in developed Western countries but only about 3–15% of the population in developing Asian countries such as Indonesia (Everhart, 2019).

Although comprehensive *cholelithiasis* data in Indonesia remain limited, several studies indicate a rising incidence, particularly in referral hospitals (Sugioyono, 2019; Sujarweni & Wiratna, 2020). However, most existing research has focused on populations in Java and urban metropolitan areas, leaving a significant gap in understanding the disease profile in Sumatra, particularly in Medan—a major city in North Sumatra. Hospital-based epidemiological data from regional healthcare facilities are still scarce, limiting the

development of locally relevant preventive strategies and clinical guidelines (Aji et al., 2020; Alessandra, 2022; Andriyan, 2019; Baddam et al., 2023).

Risk factors for *cholelithiasis* are often summarized as the "6 F's": fat, female, forty (age over 40 years), fertile (reproductive period), fair (Caucasian race), and family history. External factors that may increase the likelihood of developing cholesterol stones include metabolic syndrome, obesity, hyperinsulinemia, insulin resistance, type 2 diabetes mellitus, physical inactivity, extreme calorie restriction (more than 1.5 kg of weight loss per week), progesterone hormone levels, pregnancy, and rapid weight loss (Kristianus et al., 2022). Although *cholelithiasis* can develop in the absence of identifiable risk factors, the probability increases as more risk factors are present (Pak Mila & Lindseth Glenda, 2022).

Increased cholesterol production in bile with advancing age makes individuals over 40 more susceptible to *cholelithiasis* than younger people (Coucke et al., 2020; Liu et al., 2022; Lysandra et al., 2022; Nabu, 2019). Because estrogen promotes cholesterol secretion in the gallbladder, women have twice the risk of developing *cholelithiasis* compared to men (Syaifuddin, 2020). The gallbladder also contracts less effectively in individuals with low physical activity levels, further increasing the risk of *cholelithiasis* (Rafilia Adhata et al., 2022).

Cholelithiasis is often asymptomatic and lacks specific symptoms, leading to frequent misdiagnosis. Research indicates that asymptomatic gallstones are more common among women, the elderly, and individuals with risk factors such as obesity or diabetes. Although many patients with gallstones remain symptom-free, about 10–15% eventually develop symptoms, typically *biliary colic* or upper right abdominal pain caused by bile duct obstruction (Hatzaras I. et al., 2020).

Ultrasound is the most common diagnostic modality for detecting gallstones due to its effectiveness, non-invasiveness, and high accuracy. However, gallstones can also be visualized using computed tomography (CT), magnetic resonance imaging (MRI), and, depending on their calcium content, may even be visible on X-ray examination (Jones Mark W. et al., 2024).

The management of gallstones depends on the severity of the condition and the patient's clinical symptoms, with numerous treatment options ranging from observation to invasive procedures such as *cholecystectomy*. There are two main approaches to treating *cholelithiasis*: non-surgical and surgical. Approximately 80% of patients improve with non-surgical management, which may include dietary modification, nasogastric suction, antibiotics, rest, and intravenous fluid therapy. To reduce *cholelithiasis* incidence, public awareness of risk factors must be improved. These factors include advanced age, female gender, pregnancy, contraceptive use, overweight status, a family history of gallstones, low-fiber diet, metabolic syndrome, and hepatic cirrhosis (Siregar D. et al., 2021).

Given the limited local evidence on *cholelithiasis* risk profiles in the Sumatran population and the absence of recent hospital-based research in Medan, this study addresses a significant knowledge gap by providing region-specific epidemiological data. Its novel contribution lies in the comprehensive documentation of patient characteristics at Royal Prima Hospital Medan—a major referral center—serving as baseline data for developing targeted preventive programs and informing clinical decision-making in North Sumatra. Furthermore, this study differentiates patient profiles based on multiple risk factors simultaneously, offering a more nuanced understanding of *cholelithiasis* risk distribution in the local context compared to national statistics.

This study aims to examine and describe the risk factors associated with *cholelithiasis* among patients at Royal Prima General Hospital Medan during 2022–2023. It seeks to address several key questions, including the predominant risk factors contributing to *cholelithiasis*, the age range of affected patients, the average body mass index (BMI) of those diagnosed, and the influence of family medical history on disease occurrence. The general objective is to provide a comprehensive overview of the *cholelithiasis* risk profile, while specific objectives include identifying common risk factors, determining age and BMI distribution, and analyzing the role of hereditary history in disease incidence.

Theoretically, this study enhances understanding of risk factors associated with *cholelithiasis* by bridging academic knowledge and clinical application. Practically, it provides several benefits: for researchers, it deepens knowledge of *cholelithiasis* risk factors; for hospitals, it supplies valuable data on prevalence and determinants to support surgical and preventive programs; and for the broader community, it raises awareness of potential risks and preventive measures to improve public health literacy.

METHOD

To characterize the risk factors of *cholelithiasis* patients at Royal Prima General Hospital Medan in 2022–2023, the study employed a cross-sectional design, in which data were collected simultaneously from medical records. This design allowed the identification of patterns, relationships, and the prevalence of risk factors within a specific timeframe, making it suitable for descriptive epidemiological analysis.

The research was conducted at Royal Prima General Hospital Medan, located at Jl. Ayahanda No. 68A, Sei Putih Tengah, Medan Petisah District, Medan City, North Sumatra. The location was chosen for its accessibility to patient records and its function as a major referral hospital in the region. Data collection took place in two phases: a preliminary survey from January 30 to February 15, 2025, followed by the main research period from February 17 to March 24, 2025. This schedule allowed adequate time for preparation, validation, and verification of data sources before the main analysis was conducted.

The study population consisted of all patients diagnosed with *cholelithiasis* at Royal Prima General Hospital Medan between January 2022 and December 2023. This population included both male and female patients of various age groups who had been diagnosed and treated during the specified period, providing a comprehensive overview of the disease distribution and associated risk factors.

A proportional random sampling method was applied, ensuring that each individual in the population had an equal opportunity to be selected. Inclusion criteria required patients to have (a) complete medical record data at the hospital and (b) a confirmed diagnosis of *cholelithiasis*. These criteria ensured sample representativeness and minimized selection bias.

Exclusion criteria were established to maintain data accuracy and relevance. These included (a) patients with incomplete or missing medical records and (b) those not diagnosed with *cholelithiasis*. The study relied solely on secondary data obtained from hospital medical records documented within the research period.

Data were collected through documentation techniques, involving the compilation of materials from hospital archives and medical records. The collected data were analyzed using univariate methods to describe the characteristics of each research variable. Frequency

distributions were generated according to data type, and descriptive statistical analysis was applied to summarize and present the findings, highlighting the distribution of risk factors among *cholelithiasis* patients at Royal Prima General Hospital Medan.

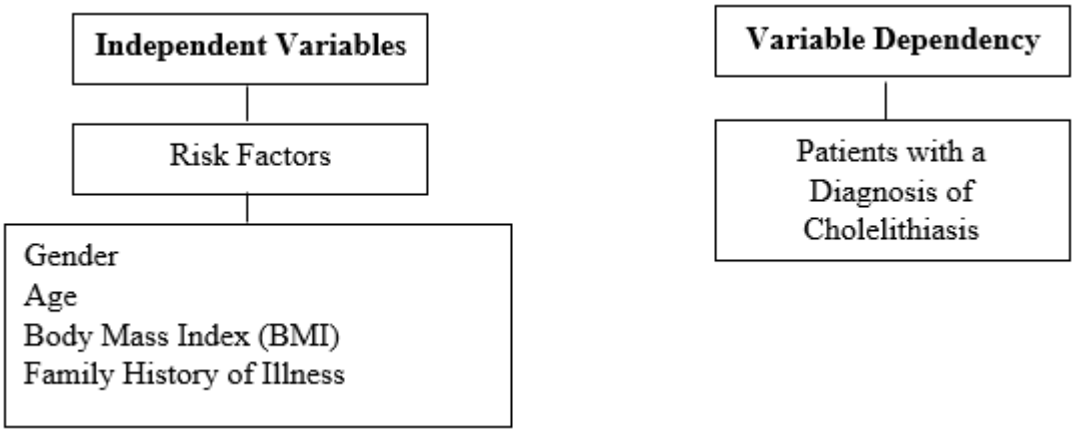

Figure 1. Concept Framework

RESULTS AND DISCUSSION

This research was conducted using 72 samples of patient medical records at Royal Prima General Hospital Medan for the 2022-2023 period.

Characteristics of Respondents

Table 1 shows the categorization of respondent characteristics according to the following criteria: Gender, patient age, family history of disease, body mass index (BMI).

Table 1. Characteristics of Respondents

Variable	Frequency (n)	Percentage (%)
Gender		
Male	29	40,3
Female	43	59,7
Total	**72**	**100**
Age		
>40 years	49	68,1
<40 years	23	31,9
Total	**72**	**100**
Family History of Illness		
Yes	65	90,3
No	7	9,7
Total	**72**	**100**
Body Mass Index (BMI)		
Underweight	0	0
Normal	26	36,1
Overweight	33	45,8
Obese	13	18,1
Total	**72**	**100**

Gender

Table 2. Frequency Distribution by Gender

Gender	Frequency (n)	Percentage (%)
Male	29	40,3
Female	43	59,7
Total	72	100,0

Based on the data in the research table, there were 43 samples (or 59.7% of the total) of women and 29 samples (or 40.3% of the total) of men. These results corroborate another study that found that cholelithiasis is more common in women than men. Estrogen and other hormonal variables can increase the release of cholesterol into the bile and decrease the contractility of the gallbladder, both of which contribute to the formation of gallstones (Liu et al., 2022).

This finding aligns with the global literature, including Shabanzadeh's (2023) comprehensive epidemiological review which reported female predominance in cholelithiasis across multiple countries, with female-to-male ratios ranging from 2:1 to 3:1. Similarly, Di Ciaula et al. (2023) emphasized that hormonal factors, particularly estrogen exposure through pregnancy, oral contraceptives, and hormone replacement therapy, significantly increase cholesterol saturation in bile. The consistency between our local data and international studies reinforces the universality of gender as a primary risk factor, while also highlighting the need for gender-specific preventive health education in the Medan region.

Age

Table 3. Frequency Distribution by Age

Age	Frequency (n)	Percentage (%)
>40 years old	49	68,1
<40 years old	23	31,9
Total	72	100,0

The largest group of respondents in the distribution was those over 40 years old, which was 68.1% of the total (49 samples). In contrast, 23 samples, or 31.9%, came from individuals under the age of 40. According to Shabanzadeh (2023) and other studies, cholelithiasis is more common in men and women between the ages of 40 and 60. According to this study, one of the main risk factors is old age.

This age distribution pattern mirrors findings from Costa et al.'s (2024) genetic study, which demonstrated that age-related changes in bile composition and gallbladder motility significantly contribute to stone formation. The physiological basis for increased risk with age includes decreased gallbladder contractility, altered bile acid metabolism, and accumulation of metabolic risk factors over time. Our data showing nearly 70% of cases occurring in patients over 40 years supports the implementation of targeted screening programs for this age group in clinical practice at Royal Prima Hospital and similar institutions across Indonesia.

Family History of Illness

Table 4. Frequency Distribution Based on Family Disease History

Family History of Illness	Frequency (n)	Percentage (%)
Yes	65	90,3
No	7	9,7
Total	72	100,0

From the data in the table above, it can be concluded that 65 out of 100 respondents (or 90.3% of the total) chose to include their family medical history, while only 7 out of 100 respondents (or 9.7% of the total) did not. Cholelithiasis is strongly related to hereditary variables and family predispositions, as this shows. Hereditary factors, family behavior, and lifestyle patterns both increase the risk of gallstones in people who have a history of diseases in the family. These findings are consistent with recent results from the literature of Costa et al (2024) illustrating how certain genetic variants may affect bile transport, gallbladder contractility, and cholesterol metabolism, thus making some people more susceptible to gallstones.

The remarkably high proportion (90.3%) of patients with positive family history in our study exceeds rates reported in Western populations, where family history typically affects 25-30% of cases (Shabanzadeh, 2023). This discrepancy may reflect either true genetic predisposition patterns in the Sumatran population, shared environmental and dietary factors within families, or potential reporting bias in medical record documentation. The strong familial clustering observed suggests that family history should be weighted heavily in risk assessment protocols at Royal Prima Hospital, warranting systematic family screening programs for relatives of diagnosed patients.

Body Mass Index (BMI)

Table 5. Frequency Distribution Based on Family Disease History

Body Mass Index (BMI)	Frequency (n)	Percentage (%)
Underweight	0	0
Normal	26	36,1
Overweight	33	45,8
Obese	13	18,1
Total	72	100,0

In this study, nutritional status based on Body Mass Index (BMI) which was classified as overweight was 33 samples or 45.8%, normal BMI was 26 samples or 36.1% and obesity was 13 samples or 18.1%. Being overweight has long been touted as one of the main risk factors in the formation of gallstones. Obesity causes an increase in liver cholesterol synthesis so that bile becomes supersaturated and easily forms stones (Di Ciaula et al., 2023). The results of this study are consistent with this theory, because the majority of respondents do have an BMI above normal.

Our findings demonstrate that 63.9% of patients (combining overweight and obese categories) exceeded normal BMI thresholds, which corroborates Di Ciaula et al.'s (2023) systematic review linking obesity with cholelithiasis through multiple mechanisms including increased cholesterol synthesis, insulin resistance, and inflammatory pathways. Zhu et al.'s

(2023) Mendelian randomization study further established causal relationships between metabolic syndrome components and cholelithiasis risk. The predominance of elevated BMI in our patient population underscores the urgent need for lifestyle modification interventions targeting weight management as a cornerstone of cholelithiasis prevention strategies.

From a preventive health framework perspective, these findings have significant implications for hospital policy and community health education. Royal Prima Hospital should consider implementing: (1) routine BMI screening and weight management counseling for patients over 40 years, particularly women; (2) family-based screening programs given the high familial clustering observed; (3) community health education campaigns emphasizing dietary modification, physical activity, and healthy weight maintenance; and (4) integration of cholelithiasis risk assessment into primary care settings. For the broader community, these results support public health initiatives promoting lifestyle modifications such as maintaining healthy body weight, regular physical activity, consuming high-fiber diets, and limiting rapid weight loss practices. Healthcare providers should prioritize patient education regarding modifiable risk factors while acknowledging non-modifiable factors like age, gender, and genetic predisposition, thereby enabling informed decision-making and proactive health management among at-risk populations in North Sumatra.

CONCLUSION

The study on *cholelithiasis* risk factors among patients at Royal Prima Hospital Medan (2022–2023) found that most patients were female (59.7%) and over 40 years old (68.1%), with family history emerging as the most dominant risk factor (90.3%). Nutritional status also played a key role, as overweight (45.8%) and obese (18.1%) patients made up the majority of cases. These results confirm that female gender, age over 40, family history, and excess body weight significantly contribute to gallstone formation in this population. The findings provide essential baseline data for region-specific prevention efforts and clinical guidelines in North Sumatra. Future research should apply bivariate and multivariate analyses to explore interactions between risk factors and to develop comprehensive risk prediction models tailored to the local population.

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