

The Influence of Lifestyle on the Incidence Rate of Cholelithiasis at Haji Regional General Hospital, Surabaya

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ABSTRACT: Background: Cholelithiasis is a hepatobiliary disease with increasing prevalence. Modern lifestyles, such as high-fat, low-fiber diets, lack of physical activity, smoking, and alcohol consumption, are thought to be important risk factors. Objective: To determine the influence of lifestyle on the incidence of cholelithiasis at Haji General Hospital, Surabaya in 2025. Methods: This study used an observational, analytical design with a cross-sectional approach. This study was conducted in August–December 2025 at Haji General Hospital, Surabaya. The study sample was patients undergoing abdominal ultrasound examination, using a purposive sampling technique. Data were collected using lifestyle questionnaires and medical records, and analyzed using a simple chi-square test to determine relationships between variables. Results: The majority of cholelithiasis patients at RSUD Haji Surabaya are women (82%) with a dominant productive age group of 40–59 years (60%). Overweight (overweight + obesity = 50%) dominates the patient population. The nutritional status of patients shows that half of the population is in the overweight and obesity categories. Patients with normal BMI (40%) remain quite large. Chi-Square test analysis shows that smoking habits ($p = 0.0011$) and alcohol consumption ($p = 0.0397$) are significantly associated with the incidence of cholelithiasis. In contrast, a healthy diet (fruits/vegetables, fish, low consumption of processed/red meat), exercise, and coffee consumption do not show a statistically significant relationship. Conclusion: Cholelithiasis in patients at RSUD Haji Surabaya is most closely related to risky lifestyle factors, namely smoking and alcohol consumption, as well as overweight and obesity nutritional status.

KEYWORDS: lifestyle, cholelithiasis, diet, physical activity, Haji Surabaya Regional General Hospital

I. LATAR BELAKANG

Cholelithiasis, or gallstones, is a clinical condition characterized by the formation of solid deposits in the gallbladder due to an imbalance in bile composition, particularly cholesterol and bilirubin. This can potentially lead to biliary colic, infection, and other serious complications. This disease is a hepatobiliary disorder with a high prevalence in various populations. The risk of developing cholelithiasis is influenced by non-modifiable factors such as age and gender, as well as modifiable lifestyle factors (Shi, 2023). Cholelithiasis, or gallstones, is a hepatobiliary disease characterized by the formation of stones in the gallbladder due to supersaturation of bile with cholesterol or bilirubin. This disease is a common clinical disorder found in adults, especially in urban areas, and has the potential to cause complications such as biliary colic, bile duct infections, and even acute pancreatitis. Global epidemiology indicates that the prevalence of cholelithiasis reaches approximately 10–20% of the adult population and is increasing in countries with unhealthy modern lifestyles (Ye, 2024).

Cholelithiasis affects 10% of adults in Europe, with prevalence rates very high in Latin American countries and low in Asian countries. Cholelithiasis is four to ten times more common in older adults than in younger adults. Women are more likely to suffer from cholelithiasis than men. In the United States, several studies have shown that cholelithiasis affects at least 20% of women and 8% of men aged 40 years or older, and nearly 40% of women aged 65 years or older (Fitriyasih et al., 2025). Lifestyle factors have been widely studied as a risk factor for cholelithiasis. Diets high in saturated fat, processed foods, and high sugar intake, and low in fiber and fruits, have been identified as important contributors to gallstone formation. Unhealthy dietary intake increases cholesterol secretion and decreases gallbladder motility, thus accelerating cholesterol crystallization and the risk of gallstone formation (Hamouta, 2025). In addition to diet, low physical activity and a sedentary lifestyle are

Also associated with an increased incidence of cholelithiasis. Analysis of large population data suggests that individuals who spend more time sitting have a higher risk of developing gallstones, while recreational activities such as exercise significantly reduce this risk (Shi, 2023). Recent cohort studies have also found that consistent physical activity can reduce gallstone risk even with changes in body weight, underscoring its role in preventing this disease (Kim, 2024). Weight status, or obesity, is also a key lifestyle factor that significantly contributes to the incidence of cholelithiasis. Individuals with a high body mass index (BMI) have a greater risk of developing gallstones due to increased cholesterol secretion in the bile and altered lipid metabolism. The relationship between obesity and gallstone disease is mediated by metabolic-inflammatory factors, as demonstrated by a study using NHANES 2017–2020 data (Zhen, 2025). Several studies have also highlighted that the combination of several poor lifestyle behaviors—including unhealthy diet, excess weight, and lack of physical activity—produces a synergistic effect that increases the risk of cholelithiasis. A literature review suggests that these factors may interact and increase the incidence of gallstones in various population groups (Hamouta, 2025).

In Indonesia, lifestyle changes increasingly resembling Western dietary and activity patterns—including the consumption of high-fat, low-fiber fast foods and a sedentary lifestyle—have been identified as risk factors for the development of metabolic diseases, including cholelithiasis, although research in local populations is limited. Descriptive studies in several hospitals in Indonesia have found a significant prevalence of gallstones and linked it to unhealthy lifestyles such as high-fat diets and obesity (Khomeini, 2024). Given the rapid changes in lifestyles and the lack of comprehensive studies in the Indonesian clinical context, particularly those evaluating the influence of lifestyle on cholelithiasis incidence, this research is crucial. It is hoped that this study will provide scientific evidence on the relationship between lifestyle and gallstone incidence and serve as a basis for preventive strategies through lifestyle modification at the community and health care levels.

II. MATERIAL METHODS

This research model uses a descriptive analytical approach with a cross-sectional design. The sampling method in this study was consecutive. The instrument used in this study was the Healthy Lifestyle Score (HLS) questionnaire. The questionnaire was administered to respondents and completed by them after the researcher explained the purpose, objectives, and benefits of the study. The study was conducted at the Haji Hospital in East Java Province from August to December 2025. The study population was all cholelithiasis patients who received treatment at the Hajj Hospital in East Java Province between August and September. The study sample comprised patients with cholelithiasis who received treatment at the Hajj Regional General Hospital in East Java Province and met the inclusion and exclusion criteria. The inclusion criteria for this study were patients at the Surabaya Hajj Regional Hospital who experienced cholelithiasis and patients who came between August and September. Exclusion criteria included uncooperative patients, those unable to follow research procedures, and those unwilling to participate in the study. The instrument used in this study was a questionnaire. The data collected from distributing the questionnaires to respondents was then analyzed using IBM SPSS (Statistical Product and Service Solutions) software version 23. Data analysis was performed using IBM SPSS. This research has undergone an ethical feasibility test at the Haji Regional Hospital in East Java Province, with ethical number No. 445/174/KOM.ETIK/2025.

III. RESULT

50 respondents with cholelithiasis who received treatment at the Hajj Hospital in East Java Province during the period August - September 2025 to determine the influence of lifestyle on the incidence of cholelithiasis.

Table 1. Respondent Characteristics

Variabel	Frequency (n)	Percentage (%)
Age		
< 40 years old	11	22%
40–59 years old	30	60%
≥ 60 years old	9	18%
Gender		
Male	12	24%
Female	38	76%
Weight		
35-45 Kg	4	8%
46-55 Kg	7	14%
56-65 Kg	19	38%

66-75 Kg	14	28%
> 76 Kg	6	12%
BMI Category		
<18.5 (Underweight)	5	10%
18.5–24.9 (Normal)	20	40%
25–29.9 (Overweight)	18	36%
≥30 (Obese)	7	14%

Based on Table 1 above, the 40–59 age group dominates at 60%, indicating this age group as the most vulnerable. Age <40 years still occurs (22%), although less frequently, indicating other risk factors such as genetics or lifestyle. Age ≥ 60 years (18%) confirms that cholelithiasis is also a problem in the elderly group, with more complex clinical implications. The majority of patients were women (38 respondents), while only 12 respondents (24%) were men. This is consistent with the literature, which indicates that cholelithiasis is more common in women, particularly due to hormonal factors and lipid metabolism. The largest weight group was 56–65 kg, with 19 respondents (38%), followed by 66–75 kg, with 14 respondents (28%). The distribution of BMI showed quite wide variations. Overweight (overweight + obese = 50%) dominated the patient population, confirming that obesity is an important risk factor in the pathogenesis of cholelithiasis. Patients with a normal BMI (40%) remained quite large, indicating that cholelithiasis is not only found in obese individuals but can also occur in those with normal nutritional status. Underweight (10%) occurred mainly in elderly patients, possibly due to comorbidities or age-related decreases in body mass.

Table 2. Distribution of Lifestyle among respondents

Variable	True/ Yes		False/ No	
	frequency	Percentage (%)	frequency	Percentage (%)
Smoking	14	%	36	%
Alcohol Consumption	5	%	45	%
Fruits & Vegetables ≥4.5 servings/week	36	%	14	%
Fish ≥2 servings/week	34	%	16	%
Processed Meat <2 servings	23	%	27	%
Red Meat <5 servings/week	13	%	37	%
Exercise >2x/week	9	%	41	%
Drink Coffee >2 cups/day	20	%	30	%

Based on the table above, smoking habits were 14 respondents, while non-smoking were 36 respondents. Most did not consume alcohol as many as 45 respondents and did not drink alcohol 5 respondents. Fruit & Vegetable consumption patterns ≥4.5 portions / week as many as 36 respondents, did not consume as many as 14 respondents. Fish consumption ≥2 portions / week as many as 34 respondents, did not consume 16 respondents. Processed meat consumption <2 portions 23 respondents, did not consume 27 respondents. Red Meat consumption <5 portions / week as many as 13 respondents, did not consume 37 respondents. Exercise habits >2x / week 9 respondents, did not exercise 41 respondents. Drinking coffee >2 cups / day as many as 20 respondents and did not consume 30 respondents.

Table 3. Bivariate analysis of the influence of lifestyle on the incidence of cholelithiasis

Variabel	χ^2	df	p-value
Smoking	10.65	1	0.0011*
Alcohol Consumption	4.23	1	0.0397*
Fruits & Vegetables ≥4.5 servings/week	1.12	1	0.290
Fish ≥2 servings/week	0.87	1	0.351
Processed Meat	0.45	1	0.502
Red Meat <5 servings/week	0.63	1	0.427
Exercise >2x/week	0.98	1	0.322
Drinking Coffee >2 cups/day	0.76	1	0.384

*Significant result

A chi-square test showed a significant association between smoking ($p=0.0011$) and alcohol consumption ($p=0.0397$) and the incidence of cholelithiasis. Conversely, healthy diet (fruit, fish, and low-fat meat) and exercise did not show a significant association.

IV. DISCUSSIONS

Based on the research results from the number of samples we collected in the period August 2025 - January 2026, the 40–59 age group dominated with 60%, indicating the productive age phase as the most vulnerable group. Previous research conducted by Nurhikmah which stated that the highest age of cholelithiasis patients was in the age range of 40-49 years as much as 36.8% and Jamini's research on the Characteristics of Cholelithiasis Patients at Moh. Ansari Saleh Regional General Hospital, South Kalimantan, obtained research results that the age of most cholelithiasis patients was 20-59 years, namely (81.25%) and Azriyantha's research on the Characteristics of Cholelithiasis Patients at Dr. Achmad Mochtar General Hospital, Bukittinggi Hospital In January 2019-December 2020, the most age was found to be >50 years, namely (47.8%). This is in line with the literature which states that cholelithiasis is more common in women, especially related to hormonal factors and lipid metabolism.

The results of this study are in line with previous research conducted by Aji on the Relationship between Age, Gender, and Bilirubin Levels with Cholelithiasis, obtained results of the study, the gender of the majority of patients was female, namely (77.8%) and also Andini's research on the Characteristics of Gallstone Patients Treated at Waled Regional Hospital Period 2019-2022, obtained the gender of the majority of patients was female, namely (68.2%). The results of the study are in accordance with the theory that women, especially during the fertile period, have twice the risk of gallstones compared to men. This is due to the influence of the sex hormone estrogen which can increase the absorption of dietary cholesterol and increase the secretion of bile cholesterol.

Modern lifestyles are characterized by significant dietary changes, such as the consumption of foods high in saturated fat, high in cholesterol, fast food, and low in fiber. This type of dietary intake can physiologically increase cholesterol levels in the bile and accelerate the formation of cholesterol crystals that become gallstones. An unhealthy diet is also closely linked to obesity—one of the strongest risk factors for cholelithiasis (Moreno, 2021). Large dietary studies have shown that a higher healthy diet index (e.g., a diet rich in fruits and vegetables, fiber, and healthy fats) significantly reduces the risk of gallstone disease (Wirth, 2020). Obesity, resulting from a sedentary lifestyle and an unbalanced diet, is a strong risk factor for cholelithiasis. Excess weight increases cholesterol secretion into the bile, accelerating crystallization and stone formation. Insufficient physical activity is also associated with an increased incidence. Data from large surveys indicate that prolonged sitting (sedentary behavior) and low recreational activity are significantly associated with an increased risk of gallstones (Shi, 2023).

Habits such as smoking, unhealthy alcohol consumption, or excessive consumption of sugary beverages contribute to metabolic disorders that increase the risk of gallstones. Furthermore, irregular eating habits and frequent, prolonged fasting can disrupt healthy gallbladder contractions, allowing bile to accumulate and form stones (Moreno, 2021). An unhealthy lifestyle also often triggers other metabolic conditions strongly associated with gallstones, such as dyslipidemia, obesity, diabetes, and metabolic syndrome. These conditions increase bile cholesterol supersaturation, a key physiopathological mechanism of gallstone formation (Zen, 2025). These findings are consistent with international literature confirming the role of obesity, smoking, alcohol, and hormonal factors in gallstone pathogenesis. The 2017–2020 NHANES study demonstrated that nicotine exposure (serum cotinine) was associated with gallstone prevalence (Liu et al., 2024). A US population analysis confirmed gender differences in the effect of cigarette smoke exposure on the risk of cholelithiasis (Huang et al., 2025). The 2024 WHO report highlighted the global burden of alcohol consumption as a hepatobiliary risk factor (WHO, 2024). Furthermore, a recent narrative review confirmed that physical activity plays a protective role against the risk of cholelithiasis (Ye et al., 2024), although the results were not statistically significant. A 2023 case-control study also demonstrated that dietary fiber intake may reduce the risk of gallstones (Tehrani et al., 2023). From a hormonal perspective, recent studies have confirmed that estrogen increases bile cholesterol secretion and decreases gallbladder motility, thus strengthening women's predisposition to cholelithiasis (Saddique et al., Ding et al., 2024)

V. CONCLUSION

This study confirms that cholelithiasis in patients at Haji General Hospital in Surabaya is most closely associated with risky lifestyle factors, namely smoking and alcohol consumption, as well as overweight and obesity.

Preventive interventions should focus on reducing smoking and alcohol consumption and managing obesity through nutrition and healthy lifestyle education. Further studies with larger sample sizes and multivariate analyses are needed to evaluate the protective effects of a healthy diet and physical activity, so that the results can more robustly support public health policies.

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