

## Research of the Risk Factors for Gall-Bladder Stones at a Tertiary Medical Facility

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### Abstract

**Background:** Gall-stones can form in the hepatic bile duct, common bile duct, or gall-bladder as a result of gall-stone disease, a chronic recurring hepato-biliary condition caused by the poor metabolism of cholesterol, bilirubin, and bile acids.

**Aims & objectives:** At a tertiary medical facility, the goal of the current research was to investigate the factors related to gall-stones.

**Material and Methods:** The current investigation was an observational, prospective, hospital-based research that involved people who had gall-stone disease and were visiting the emergency room or outpatient clinic.

**Results:** 328 cases were examined with a confirmed diagnosis of gall-stones during the research period. The age group 51–60 years represented 31% of patients, followed by the age group 41–50 years (27%). Male to female ratio was 1:2, with females outnumbering males (66%) to 34%. Gall stone patients frequently have concomitant conditions such diabetes mellitus (35%), gastroesophageal reflux disease (34%), hypertension (27%), ischemic heart disease (20%), and renal calculi (10%). Right hypochondrial pain (74%) was a common clinical symptom among patients with gall stone illness, along with nausea (49%) and epigastric pain (47%) and vomiting (35%) and jaundice (9%). Numerous stones were found on the USG in 47% of patients; additional findings included two to three stones, biliary sludge, a single stone, choledocholithiasis, and cancer of the gall-bladder. Common risk factors identified in individuals with gall stone disease included sedentary lifestyle (67%), female gender (66%), obesity (BMI > 25 kg/m<sup>2</sup>) (58%), age > 50 years (41%), and family history (38%). Parity 3 (29%), h/o rapid weight loss due to fasting, illness (27%), alcohol consumption (23%), smoking (21%), and medicines including ceftriaxone, octreotide, and thiazide diuretics were less often reported risk factors. (6%).

**Conclusion:** Patients with gall stone disease frequently have the following risk factors: sedentary lifestyle, female gender, obesity (BMI > 25 kg/m<sup>2</sup>), age > 50 years, and family history.

**Keywords:** gall-bladder stones, sedentary lifestyle, female gender, obesity

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### Introduction

Gall-stones can form in the hepatic bile duct, common bile duct, or gall-bladder as

a result of gall-stone disease, a chronic recurring hepato-biliary condition caused

by the poor metabolism of cholesterol, bilirubin, and bile acids [1]. Immutable risk factors for GB disease include things like race, advanced age, female sex, and pregnancy, but modifiable risk factors can be changed [2]. Cholesterol stones can develop as a result of factors such as advanced age, obesity, weight loss, multiparity, hyperlipidemia, diabetes mellitus, a high-calorie diet, and medications that impair normal motility and storage function [3]. Gall-stone development is positively linked with high triglyceride, low HDL, and high low-density lipoprotein (LDL) levels. Gall stone disease incidence is rising internationally as a result of significant dietary changes, a shift in lifestyle toward eating more fast food, and an increase in sedentary behaviour [4]. In the meantime, conditions including cirrhosis, ileal illness, hemolytic anemia, truncal vagotomy, hyperparathyroidism, and bile duct infection increase the chance of pigment stone development. An early diagnosis may be advantageous for patients since cholelithiasis can be treated with conservative or surgical care before complications arise [5]. Cholelithiasis can be easily seen in abdominal ultrasonography [6].

**Aims & objectives:** At a tertiary medical facility, the goal of the current research was to investigate the factors related to gall-stones.

### Material and Methods

The current investigation was a prospective observational research carried out in a general surgery department in a hospital in central India. The research lasted for two years. The institutional ethical committee gave its clearance for the research.

**Inclusion criteria:** All individuals with a confirmed diagnosis of gall-stone disease who visit the outpatient department or emergency room. Willing to take part in the current research.

**Exclusion criteria:** Patients had cholecystectomy procedures. Patients who refused to give their permission to participate.

Patients were told about the research and provided with signed consent. All participants' information was gathered, including demographic details including age, gender, literacy, occupation, religion, and current concerns. Additionally noted were lifestyle factors and food patterns (vegetarian/non-vegetarian). It was noticed that the patient had a history of diabetes, CAD, and cholecystitis. Menstrual and obstetric history was observed in female patients. By dividing weight (kg) by the square of height, the body mass index (BMI) was determined (m<sup>2</sup>). Significant discoveries were found during the clinical evaluation. Ultrasonography was used to confirm the diagnosis of gall-stone disease, and additional USG findings such as the number of gall-stones (single/multiple) were documented. Patients had CBCs, urine analyses, LFTs, RFTs, fasting BSLs, and fasting lipid profiles performed. Data were entered into a Microsoft Excel spreadsheet. Descriptive statistics were used in the statistical analysis.

### Results

328 cases were examined with a confirmed diagnosis of gall-stones during the research period. The age group 41–50 years had the second-highest percentage of patients (31.83%), followed by 51–60 years (31.1%). Males made up 34.15 percent of the population, while females outnumbered men (65.85%).

**Table 1: General Characteristics.**

Characteristics	No. of cases (n=328)	Percentage
Age group (years)		
≤ 20	6	1.83%

21-30	32	9.76%
31-40	68	20.73%
41-50	88	26.83%
51-60	102	31.10%
≥ 61	32	9.76%
Gender		
Male	112	34.15%
Female	216	65.85%

Gall stone patients frequently have concomitant conditions such diabetes (35.37%), gastro-esophageal reflux disease (34.15%), hypertension (27.44%), ischemic heart disease (20.12%), and renal calculi (10.37%).

**Table 2: Co-morbidities**

Co-morbidities	No. of cases (n=328)	Percentage
Diabetes mellitus	116	35.37%
Gastro-esophageal reflux disease	112	34.15%
Hypertension	90	27.44%
Ischemic heart disease	66	20.12%
Renal calculus	34	10.37%

Right hypochondrial pain (74.39%), nausea (49.39%), epigastric pain (46.95%), vomiting (35.37%), and jaundice (9.15%) were the most prevalent clinical symptoms among patients with gall stone illness.

**Table 3: Clinical symptoms**

Clinical symptoms	No. of cases (n=328)	Percentage
Right hypochondrial pain	244	74.39%
Nausea	162	49.39%
Epigastric pain	154	46.95%
Vomiting	116	35.37%
Jaundice	30	9.15%

Multiple stones were found on USG in 46.95% of patients; other findings included two to three stones (19.51%), biliary sludge (18.90%), a single stone (12.80%), choledocholithiasis (2.44%), and cancer of the gall-bladder (1.22%).

**Table 4: USG findings.**

Findings	No. of patients	%
Multiple stones	114	46.95%
Two to three stones	64	19.51%
Biliary sludge	62	18.90%
Single stone	42	12.80%
Choledocholithiasis	8	2.44%
Carcinoma gall bladder	4	1.22%

Patients with gall stone disease frequently have the following risk factors: sedentary lifestyle (67.07%), female gender

(65.85%), obesity (BMI > 25 kg/m<sup>2</sup>) (57.93%), age > 50 years (40.85%), and family history (38.41%). Parity 3

(29.27%), h/o rapid weight loss owing to fasting, illness (27.44%), alcohol consumption (23.17%), smoking (20.73%), and medicines including

ceftriaxone, octreotide, and thiazide diuretics were less often reported risk factors. (6.10%).

**Table 5: Risk Factors**

Risk Factors	Number of patients	Percentage
Sedentary lifestyle	220	67.07%
Female gender	216	65.85%
Obesity (BMI > 25 kg/m <sup>2</sup> )	190	57.93%
Age > 50 years	134	40.85%
Family history	126	38.41%
Parity ≥ 3	96	29.27%
H/o Rapid weight loss due to Fasting, illness	90	27.44%
Alcohol drinking	76	23.17%
Smoking	68	20.73%
Drugs like ceftriaxone, octreotide and thiazide diuretics.	20	6.10%

## Discussion

One of the most prevalent illnesses among patients who visit emergency rooms complaining of stomach pain is gall-stone disease (GSD), which places a considerable burden on health care systems around the world [7]. Personal risk factors like a sedentary lifestyle, being overweight or obese, and having a high W/H ratio were found to be significantly linked to the development of GSD. This finding may be explained by the fact that obesity increases cholesterol synthesis, biliary cholesterol secretion, and cholesterol supersaturation [8]. Similar findings were found in other studies, but in only a small number of them, there was no significant link found between these personal risk factors and GSD. In a research by Veerabhadrapa PS et al., the age range of 51–60 years accounted for the majority (26.6%) of cases, while the age range of 41–50 years accounted for 21.6% of cases. 63.3% of the population was female. Most patients (71.7%) complained of pain in the hypochondral region, which was followed by nausea in 46.6% of cases. The least frequent presenting symptom, displayed by 6.6% of patients, was jaundice [9]. According to Saxena P. et al.,

the majority of cholelithiasis patients (59.6%) are between the ages of 41 and 60. The female gender predominated, with a male to female ratio of 1:1.7. Middle-class patients (45.0%) were the most often impacted category [10]. The majority of the patients (78.1%) had a history of cholecystitis symptoms. Increasing age, female gender, family history or genetics, obesity, rapid weight loss, sedentary lifestyle, pregnancy, drugs like ceftriaxone, octreotide, and thiazide diuretics, total parenteral nutrition or fasting, and diseases like cirrhosis, chronic hemolysis, and ileal Crohn's disease are risk factors that are frequently linked to cholelithiasis [11]. In a research by Sayeed Unisa et al., ultrasonography was done on 5100 and 1448 individuals—respectively—with and without symptoms. And demonstrated a 6.20% prevalence of GBD [12]. In comparison to 1448 people without symptoms, 5100 people with symptoms had a higher prevalence of GBD (7.1%) (P 0.05). Females over 50 were shown to have a considerably higher risk of GBD, with adjusted odds ratios (ORs) [95% confidence intervals (CI)] of 1.703 (1.292-2.245), multiparity (1.862, 1.306-2.655), and genetic history (1.564). (CI 1.049–2.334). Males with diabetes had an

elevated risk of 4.271 (CI 2.130-8.566), eating chickpeas increased it to 2.546 (CI 1.563-4.146), and drinking contaminated water increased it to 3.835. (CI 2.368–6.209) [13-15] Gall-stone prevalence was 4.15%, with females having 5.59% greater than males having 1.99% (P 0.05). High parity, high w/h ratio, physical inactivity, current smoking, smokeless tobacco use, and high BMI were revealed to be risk factors for the onset of gall-stone disease in a research by Dhamnetiya D et al. Plasma total cholesterol, triglyceride levels, and LDL cholesterol levels were all independently linked to GSD. 62 (68.89%) of the 92 patients evaluated by Pimpale R et al. had a mean age of 45.03 years plus 13.59. 54 individuals (58.69%) had a BMI greater than 25. The most frequent complaint among all patients was pain. 13 patients (14.13%) with an accompanying CBD calculus experienced jaundice. 8.69% of patients had positive sickling tests. 71 (77.17%) patients underwent lap cholecystectomy, with a conversion rate of 6.57%. Two patients had a lap cholestomy, and 19 (20.6%) underwent an open cholecystectomy with or without CBD investigation. Infection at the surgical site was observed in 3 patients (4.22%) following laparoscopic cholecystectomy, 5 patients (26.31%) following open cholecystectomy, and 3 patients (15.78%) following open cholecystectomy. In 70 individuals (77.77%), the gall-bladder's histopathology revealed chronic cholecystitis; malignancy was found in 5 patients (5.55%); and Xanthogranulomatous cholecystitis was found in 2 patients (2.22%) [16-18].

There were 13,437 GBD cases in a research by Jane C. Figueiredo et al. after a median 10.7 years of follow-up. Across ethnic/racial communities, BMI > 25 kg/m<sup>2</sup>, diabetes, past and present smoking, red meat consumption, saturated fat, and cholesterol were significant risk factors (p-trends 0.01). Vigorous exercise, drinking alcohol, eating fruits, vegetables, and foods high in dietary fiber were protective

factors (p-trends 0.01). The use of postmenopausal hormones was only found to raise risk in White women (estrogen-alone: HR = 1.24; 95% CI = 1.07-1.43 and estrogen + progesterone: HR = 1.23; 1.06-1.42). Parity was a significant risk factor for women. Gall-stones damage the gall-bladder's mucosal columnar epithelium, which leads to a variety of alterations in the epithelium, including metaplasia, dysplasia, and neoplasia [19]. Larger and bigger stones as well as more stones have been linked to a higher chance of cancer initiation. Gall-bladder stones that are large and heavy inflict mechanical damage on the mucosa, which has been associated to the origin of dysplasia and the development of cancer. Larger and bigger stones as well as more stones have been linked to a higher chance of cancer initiation. The diagnosis of gall-bladder malignancies frequently comes in late stages with a dismal prognosis of less than 10%, so that 5-year survival in many studies is less than 5%. This is due to the anatomical position of the gall-bladder and the non-specificity of the symptoms. The most effective method for treating gall-bladder illness in both elective and urgent surgery is laparoscopic cholecystectomy (LC) [20]. Gall-stone disease can be treated with a variety of techniques, including endoscopic removal, laser fragmentation, extracorporeal shock wave lithotripsy, bile salt dissolution, and traditional surgery. Treatment with bile acids is ineffective for calcium bilirubinate or calcium carbonate/phosphate gall-stones and only somewhat beneficial for cholesterol gall-stones [21]. Therefore, it is ideal to determine the stone's composition before choosing the appropriate treatment. [22]

### Conclusion

One of the most prevalent diseases among people who visit emergency rooms complaining of stomach pain is gall-stone disease. Patients with gall stone disease frequently have the following risk factors:

sedentary lifestyle, female gender, obesity (BMI > 25 kg/m<sup>2</sup>), age > 50 years, and family history.

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