

## Prevalence and Risk Factors for Gallstone Disease in Hail Region

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### ABSTRACT

**Aim of the work:** this study was carried out to determine the prevalence and risk factors of the occurrence of gallstone disease among the Saudi Arabian population. Patients and methods: a retrospective survey was done among 100 patients with gallstone disease from November 2016 to March 2017 using a structured data collection tool. Results: The results showed that 60% of those with the disease were women, while only 40% were men and 29% belonged to age group 30-39 years old. Among the risk factors studied, there was a statistically significant association between the disease and fever and lipid profile, total cholesterol, LDL, and TAG (p-value,<.01). In addition to fever, majority of the patients also complained for right upper quadrant pain. Perhaps primary health care physicians should consider fever with right upper quadrant pain as warning signs for gallstone disease which should warrant more sensitive procedures like ultrasonography for early detection of the disease. Fundamental knowledge of gallstone disease is essential for clinicians so as proper management be offered to ailing patients.

**Keywords:** gallstone disease, cholelithiasis, cholecystectomy.

### INTRODUCTION

Gallstone disease or cholelithiasis is prevalent worldwide and is a major cause of morbidity and sometimes mortality among the affected individuals. A study in Western countries revealed that the prevalence of gallstone disease reportedly ranged from approximately 7.9% in men to 16.6% in women<sup>(1)</sup>. In Asians it ranged from approximately 3% to 15%, it is nearly non-existent among Africans (less than 5%) and ranged from 4.21% to 11% in China<sup>(2)</sup>. Gallstone disease became increasingly prevalent in Saudi Arabia, where cholecystectomy was among the most common abdominal operations<sup>(3)</sup>. A study in Asir Region, KSA documented 320 cholecystectomy procedures per year which only reflected the magnitude of symptomatic gallstone disease cases in this region<sup>(4)</sup>.

In other reports, more than 70% of individuals had asymptomatic gallstone disease<sup>(5,6)</sup>. From a medical economic perspective, gallstone disease was among the most common reason for hospitalization<sup>(7)</sup>. Many studies reported that gallstone disease was related to age, sex and metabolic disorders, such as obesity, dydlipidemia and type 2 diabetes<sup>(8-10)</sup>.

A study among female teachers in Northern Jordan revealed that gallstone disease was positively associated with age and body mass index (BMI)<sup>(11)</sup>. The pathogenesis of gallstone disease was suggested to be multifactorial and probably developed from complex interactions between many genetic and environmental factors<sup>(12,13)</sup>. With the change in lifestyle such as the Westernization of dietary habits and a decrease in physical activity among Saudis in recent years, it can be suggested that gallstone disease

is of increasing health importance. There is scarcity of studies on the prevalence of gallstone at a community level in Saudi Arabia. Looking at the public health standpoint, it is not only important to study the background prevalence of gallstone disease, but also to explore the demographic and biological markers related to its development. As gallstone disease can result in serious outcomes, such as acute gallstone pancreatitis and gallbladder cancer, knowing the factors that can contribute to its development may help people to modify their lifestyle and other relevant activities. Hence, this study was carried out to determine the prevalence of the disease among the Saudi population and to explore the potential risk factors for gallstone disease and to improve the understanding of the overall pathogenesis of this disease.

### METHODS

This study utilized a retrospective study design where data of patients with diagnosed gallstone were extracted and collated using the structured data collection tool. A total of 100 cases were reviewed during the months of November 2016 to March 2017.

**The study was done after approval of ethical board of Hail university.**

### RESULTS

**Table 1** summarized the demographic characteristics of the patients with gallstones. Sixty percent (60%) were females, while the remainder (40%) were males; 28% belonged to age-group 30 to 39, 23% belonged to age-group 40-49; 98% were Saudis and 88% were married.

**Table 1. Demographic characteristics of the patients diagnosed with gallstones (n=100)**

Demographic Characteristics	Frequency	Percentage	
<b>Gender</b>	Male	40	40%
	Female	60	60%
<b>Age</b>	19-29 yrs old	18	18%
	30 – 39 yrs old	28	28%
	40-49 yrs old	23	23%
	50 – 59 yrs old	18	18%
	>60 yrs old	12	12%
<b>Nationality</b>	Saudi	98	98%
	Ethubian	1	1%
	Yemeni	1	1%
<b>Marital status</b>	Married	88	88%
	Single	12	12%

**Table 2** presented the distribution of gallstone cases of the participants against the identified risk factors. It was evident that 35% has a normal body mass index (BMI, 20.1 - 25); 31% made carbohydrate as a major constituent of their diet, while caffeine was claimed by 25% of the participants. It is significant to note that nearly 46% of the patients had family history of gallstones, 19% were diagnosed to have type 2 diabetes and none of the patients had been diagnosed with liver, chron and hemolysis. The table also showed that 40% had sedentary life style, 19% are taking prescribed medications, 15% had previous similar condition and 13% either smoke or took alcohol.

**Table 2. Distribution of gallstone cases across risk factors (n=99)**

Risk Factors	Frequency	Percentage		
<b>Body mass index (BMI)</b>	0 to 20	5	5%	
	20.1 to 25	35	35%	
	25.1 to 29.4	25	25%	
	30.1 to 39.9	31	31%	
	41.4 to 58.8	3	3%	
<b>Diet</b>	Fatty Meals	23	23%	
	Carbohydrates	33	33%	
	Salad	15	15%	
	Low Fiber	4	4%	
	Caffeine	25	25%	
<b>Family History</b>	Yes	46	46%	
	No	53	54%	
<b>Chronic Diseases</b>	Diabetes Type 2	Yes	19	19%
		No	80	81%
Liver Diseases	Yes	0	0%	
	No	99	100%	
Chron's Disease	Yes	0	0%	
	No	99	100%	
Hemolysis	Yes	0	0%	
	No	99	100%	
<b>Sedentary Life Style</b>	Yes	39	40%	
	No	60	60%	
<b>Drugs</b>	Yes	19	19%	
	No	80	81%	
<b>Previous similar condition</b>	Yes	15	15%	
	No	84	85%	
<b>Smoking/ Alcohol</b>	Yes	13	13%	
	No	86	87%	

**Table 3** showed the laboratory results of patients associated with cholecystitis. As can be seen from the table, fever was significantly correlated with cholecystitis ( $p=0.001$ ). All other laboratory results revealed no significant relationship with cholecystitis.

**Table 3. Correlations between cholecystitis and patient's laboratory results (n=99)**

Laboratory Results	Median	Mean	SD	p-value
Fever				.001*
Lipid Profile				
Total cholesterol	4.4	4.9	0.7	.123
HDL	1.5	1.5	0.2	.958
TAG	1.3	1.6	0.4	.107
LDL	3.1	3.3	0.5	.613
Electrolytes				
Na <sup>+</sup>	131	138	3.5	.875
K <sup>+</sup>	4.0	4.2	0.4	.583
Hb	13	13	2	.462
WBC	9	9	2	.172
HbA1c	6	6	1.4	
RBC	4.8	4.7	.6	

**Table 4** revealed that using t-test for equality of means, there was no significant difference of the occurrence of gallstones between the male and female participants with a p-value of .057 ( $p>.05$ ).

**Table 4. Significant difference on the body mass index (BMI) of the participants as to gender (n=100)**

Gender	Occurrence	Mean Difference	t- values	p-value
Male	40%	-.12956	1.081	.057
Female	60%			

## DISCUSSION

Gallstone disease continued to increase globally making it one of the most common reasons for admission in hospitals which impacted public health in general. In Saudi Arabia, cholecystectomy was one of the most common abdominal operations in general surgical units. A study in Abha City revealed that cholecystectomy constitute about 47% of major and 23% of total general surgical operations<sup>(4)</sup> and about 15%-50% of all laparotomies in 2 different studies in Medina City<sup>(5,15)</sup>. These data only suggested that gallstone disease was really common among the Saudi Arabian population.

In this current investigation, occurrence of gallstone disease among the participants was 60% in females and only 40% in males. In congruence with the findings of previous studies, female sex hormone was also a major risk factor which may be attributed to extraneous risk factors such as pregnancy and sex

hormones. The number of deliveries seemingly was the most relevant factor as it increased levels of the female hormones which increased biliary cholesterol secretion causing cholesterol super saturation of bile, consequently causing gallstone disease<sup>(7)</sup>.

The findings of this study also revealed that 29% of the cases occurred in age group 30-39 years old. Many studies revealed that age and gender are among the risk factors for gallstone disease<sup>(8-10)</sup>. However, our result is not conformed with reports from Western countries and other regions of Asia, where older age has higher cases of gallstone disease<sup>(15-17)</sup>. This may be explained on the possibility of long-term exposure to many risk factors among the elderly which increased the risk of gallstone disease such as sedentary lifestyle.

Our findings also revealed that majority of the participants with gallstone has a BMI of 20.1 to

25 (interpreted as healthy on BMI scale), with no family history of gallstone disease, with no diabetes mellitus, no liver disease, no sedentary lifestyle, no hemolysis, no Chron's disease, and were non-smokers. Interestingly, many published studies reported that these are risk factors of gallstone disease<sup>(8-13)</sup>. A study in China documented a positive association between DM and gallstone disease in men, but not in women<sup>(7)</sup>. This is inconsistent with the finding of a study in Italy where they found no significant relation between DM and the disease in men and women combined<sup>(18)</sup>. The mechanism underlying the association of DM with gallstone disease may be fasting hyperinsulinemia, which can overly activate the rate-limiting enzyme for cholesterol synthesis<sup>(19)</sup> leading to cholesterol saturation in the bile.

In our study, there is no significant difference on the BMI value of the male and female participants which may mean that they belong to a similar population. Previous studies have found positive correlation of BMI with gallstone disease in women, but not in men<sup>(7,18,20,21)</sup>. The discrepant findings of men with gallstone disease have not been fully explained though. The China study pointed out that a possible reason for this observation was that BMI was not a suitable standard of obesity in men<sup>(7)</sup>. It is believed that obese persons may have increased bile secretion of cholesterol which likely was a result of the perceived higher synthesis rate of cholesterol among obese persons<sup>(22)</sup>.

This retrospective study also reviewed the lipid profile, electrolytes, hemoglobin, temperature, site of pain and even WBC and RBC counts of the participants. It is noteworthy that majority of results of the participants fall within the normal range, or near the borderline. Moreover, majority complained a right upper quadrant pain. This study also found a significant relationship between the occurrence of gallstone disease and fever, total cholesterol, LDL, and TAG (p-value < .01, 99% confidence level), while no significant association was found in other blood analytes. These findings are in accordance with many published studies which showed a positive correlation between the lipid profile of the participants and the occurrence of gallstone disease<sup>(22)</sup>, however, it deviated from the findings of the study in China<sup>(7)</sup> which reported otherwise.

Discrepancies of our findings with those published may be attributed to the potential self-selection bias

as data were only retrieved from the hospital that was not a representative of the general population of Saudi Arabia or even the region, but we firmly believed that our data can be a starting point to launch a large-scale study involving all regions of Saudi.

## CONCLUSION

In conclusion, gallstone disease was more prevalent in women than in men and majority of those who have the disease belong to age group 30-39 years old (generally a young population). There was significant association between gallstone disease and fever and lipid profile. Perhaps primary health care physicians should consider fever with right upper quadrant pain as warning signs for gallstone disease which should warrant more sensitive procedures like ultrasonography for early detection of the disease. Fundamental knowledge of gallstone disease is essential for clinicians so as proper management be offered to ailing patients.

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