

## Prevalence and Risk Factors for Gallstones among Population in Riyadh City, KSA 2017

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### ABSTRACT

**Background:** The most common risk factors for gallstones formations are old age, female gender, obesity and diabetes mellitus. However, information about the prevalence and significant risk factors in Kingdom of Saudi Arabia (KSA) are limited. **Objectives:** Evaluating the prevalence and risk factors of gallstone disease among Saudi population in Riyadh, Kingdom of Saudi Arabia (KSA). **Methods:** A cross sectional study that included 500 subjects adult Saudi population who were randomly chosen from February –June 2017. The volunteers were subjected to clinical evaluation, laboratory investigations and ultrasound examination. **Results:** The overall prevalence of gallstone disease was 8.6%. The older age, female gender, physical activities and obesity are key factors in the gallstones progression. Also, diabetes, liver enzymes and the lipid profile were modifiable risk factors for gallstones. **Conclusion:** The risk factors for gallstones formation are old age, female gender, physical activities and obesity were key factors in the gallstones progression.

**Key words:** Gallstones, prevalence, Risk Factors.

### INTRODUCTION

Gall stones are the most common risk factor for admission to emergency room that impose a significant worldwide health issue and economic burden <sup>(1)</sup>. It is defined as aggregation of solid material as bile acids, cholesterol and pigmented materials in the biliary tract parts<sup>(2-4)</sup>.

The well-known risk factors for gallstones are advanced age, female gender, obesity and inactivity <sup>(5-7)</sup>. Also, high levels of serum lipids and high glucose levels are associated with gallstone disease <sup>(8)</sup>. In addition, the risk disease occurrence increases with getting older in both genders <sup>(9, 10)</sup> and a more significant prevalence among females than males <sup>(11, 12)</sup>.

Data suggest that physical activity, modifying life style, decreasing weight gain and avoiding spicy and fried foods would result in prevention of gallstones prevalence <sup>(13-16)</sup>. However, scarce data are present in KSA regarding the prevalence and risk factors of gallstone formation.

### AIM OF THE STUDY

The study aimed at assessing the prevalence and risk factors for gallstone formation disease among adult Saudi population in Riyadh.

### SUBJECTS AND METHODS

#### *Study design*

The study was based on a cross sectional study for assessing the prevalence and risk factors for

gallstone from the period of February 2017 to June 2017 in Riyadh, Kingdom of Saudi Arabia (KSA).

#### *Sample size and population:*

The included subjects were chosen using a multistage sampling method where 50 subjects aged  $\geq 30$  years old were randomly enrolled in the study from 100 shopping malls in Riyadh region and 500 subjects participated. Non Saudi subjects and subjects who undergone cholecystectomy were excluded from the study.

Each participant was interviewed alone and asked to fill out a reliable questionnaire that was based on the study of Bilal *et al.* <sup>(17)</sup>.

#### *Study tools*

- 1- A predesigned questionnaire that included the age, gender, education level, Body mass index (BMI) and physical activity.
- All enrolled volunteers were asked to visit the out-patient clinic where they were subjected to the following:
  - A venous blood sample was taken from each participant for assessing the random blood sugar level, liver function tests and serum lipids.
  - Abdominal Ultrasonography: abdominal ultrasound (US) was performed for all volunteers by two experienced sonologists with an experience of at least 5 years. The radiological evidence of gallstone was done using scanner that has a 3.5-MHz transducer (Philips Medical Systems, Inc., Bothell,

WA, USA). After US diagnosis, the subjects were divided into two groups either having gallstones or control subjects.

**Ethical considerations**

The participants gave an informed consent after explanation of the purpose and procedure of the study. The ethical committee of Faculty of Medicine, King Abdulaziz University approved the study design.

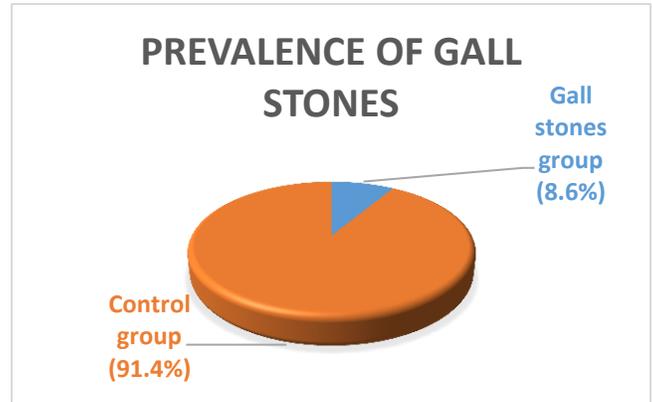
**Statistical analysis**

The extracted data were entered in the Statistical Package for Social Science (SPSS) program version 22. Using univariate logistic regression was used for testing the association between risk factors and gallstones.

**RESULTS**

**Prevalence of gallstone**

The subjects were divided into two groups according to suffering from gallstones or not. About 43 subjects were diagnosed as having echogenic mass on ultrasound revealing 8.6% prevalence of gallstones among volunteers (Figure. 1).



**Figure 1:** prevalence of gallstones among included subjects

**Correlation between risk factors and gallstones:**

The correlation between socio-demographic and risk factors of gallstones among groups are represented in Table. 1. The older age of included subjects is significantly associated with gallstone group as 88.4% of gallstone group aged more than 45 years old compared with 11.6% in the young age (30-45 years old). The female gender showed a significant association with gallstones where 72.1% of females suffered from gallstones compared with 27.9% of males and 51% of females in the control group. The education level, income and working status showed no significant association with prevalence of gallstones. The inactive subjects showed a significant association with prevalence of gallstones.

**Table (1): univariate logistic regression for risk factors correlation with gallstones (n=500)**

		Control group (457)	Gallstone group (43)	P value
Age (year)	30-45	275 (60.2%)	5 (11.6%)	0.033*
	>45	182 (39.8%)	38 (88.4%)	
Gender	Female	237 (51.9%)	31 (72.1%)	0.004*
	Male	220 (48.1%)	12 (27.9%)	
Educational Level	Collage	211 (46.2%)	19 (44.2%)	0.072
	Primary/Secondary School	246 (53.8%)	24 (55.8%)	
Income	Low	150 (32.8%)	12 (27.9%)	0.217
	Moderate	200 (43.8%)	18 (41.9%)	
	High	107 (23.4%)	13 (30.2%)	
Working status	Working	265 (58%)	24 (55.8%)	0.715
	Jobless	192 (42%)	19 (44.2%)	
Physical activity	Inactive	327 (71.6%)	35 (81.4%)	0.031*
	Daily practice	130 (28.4%)	8 (18.6%)	
BMI	Obese	137 (30%)	29 (67.4%)	0.04*
	Normal weight	320 (53.6%)	14 (32.6%)	

**Correlation between biochemical tests and gallstones:**

Table. 2 indicates the correlation between biochemical tests and gallstones. There was a highly significant association between the prevalence of gallstones and diabetes, alanine transferase, alkaline phosphatase, cholesterol and high density lipoprotein (HDL). There was no significant correlation between gallstones and triglycerides.

**Table (2): univariate logistic regression for biochemical tests correlation with gallstones (n=500)**

	Control group (457)	Gallstone group (43)	P value
<b>Fasting blood sugar</b>			
Normal	324 (70.9%)	14 (32.6%)	0.001*
Diabetic	133 (29.1%)	29 (67.4%)	
<b>Liver status:</b>			
<b>- Alanine transferase(ALT)</b>			
Normal	305 (66.7%)	10 (32.3%)	0.001*
Abnormal	152 (33.3%)	33 (76.7%)	
<b>- Alkaline phosphatase</b>			
Normal	297 (65%)	12 (27.9%)	0.001*
Abnormal	160 (35%)	31 (72.1%)	
<b>Lipid profile</b>			
<b>- Cholesterol</b>			
Normal	298 (65.2%)	9 (20.9%)	0.001*
Abnormal	159 (34.8%)	34 (79.1%)	
<b>- Triglycerides</b>			
Normal	300 (65.6%)	25 (58.1%)	0.13
Abnormal	157 (34.4%)	18 (41.9%)	
<b>- HDL</b>			
Normal	267 (58.4%)	12 (28%)	0.001*
Abnormal	190 (41.6%)	31 (72%)	

**DISCUSSION**

Gallstones is a significant cause of death that would result in a costly pathological conditions. The prevalence of gallstones in the present study was 8.6% among respondents. This prevalence was slightly lower than another study conducted in KSA where the overall prevalence of gallstones was 11.7%<sup>(18)</sup>.

Many studies also showed high prevalence rates which was consistent with our study<sup>(6, 19)</sup>. Also, the average of the prevalence was 4-12% in Middle Eastern countries<sup>(20)</sup>. On the other hand, the prevalence was higher than other reported from different parts in the world as in (Baghdad) 3.3%,<sup>(21)</sup> China (3.2%)<sup>(22)</sup> and Tiwan (6.12%)<sup>(23)</sup>.

The prevalence of gallstones was significantly high in the adult population aged more than 45 years old and female gender was a significant risk factor for gallstones. Also, physical inactivity and obesity were associated with a higher prevalence of gallstone disease. In the same contest, older age and female gender were prominently associated with gallstone disease<sup>(20, 22, 24)</sup>. Similar results were also reported from other previous studies where the disease showed a significant prevalence in females which could be due to the estrogen hormone that would increase the saturation of cholesterol in the bile which in turn enhance the formation of gallstone<sup>(25-27)</sup>.

Also, a recent study showed that inactivity was significantly associated with higher risks for

gallstones which is in the same respect with the present results<sup>(24)</sup>. Correspondingly, many studies showed that that daily physical activity could protect from gallstones formations<sup>(5, 28)</sup> and obesity would increase the risks for gallstones for all age groups<sup>(7, 29)</sup>. Contrast studies showed no obvious correlation between physical activity with disease<sup>(30)</sup>.

The present study showed a highly significant association between the prevalence of gallstones and diabetes, alanine transferase, alkaline phosphatase, cholesterol and high density lipoprotein (HDL). Accordingly, control of cholesterol and increasing then levels of HDL with improving the eating habits would prevent from the increase of biliary cholesterol levels to protect from formations of stones<sup>(31)</sup>. The mechanism of stones formation may be due to decrease in the HDL cholesterol which could result from physical inactivity, weight gain and unhealthy food habits<sup>(5, 32)</sup>.

Also, diabetes is a well-known risk factor for gallstones formation in many studies<sup>(18, 24, 33, 34)</sup>. In addition, the prevalence of gallstones was associated with increased Alkaline Phosphatase level<sup>(35, 36)</sup>. Furthermore, high levels of ALT were associated with high prevalence of gallstones<sup>(8, 37)</sup>.

## CONCLUSION

The overall prevalence of gallstone disease was 8.6%. The older age, female gender, physical activities and obesity are key factors in the gallstones progression. Also, diabetes, liver enzymes and the lipid profile are modifiable risk factors for gallstones. Thus understanding the gallstones pathogenesis would result in enhancing physical activities and life style which would decrease the rates of the disease.

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