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Gallbladder stones and their contributing factors in Saudi Arabian population: Knowledge and awareness assessment

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ABSTRACT

Background: In 90% of cases, the main cause of acute cholecystitis is gallbladder stones. The majority of Saudis are still unaware about Put, and there aren't enough papers in Saudi Arabia about gallstone disease knowledge. The aim of our study is to assess the awareness and knowledge of the general population of Saudi Arabia towards gallbladder stones and its risk factors. *Methodology*: In Saudi Arabia, an observational cross-sectional questionnaire study was done. The period runs from January 2020 through September 2021. The total number of participants in the study was 1540 Saudis. Data was collected using structured self-administered questionnaires as a study method. Data was input into excel, and then analyzed using the SPSS program. *Results:* There were 1540 participants in the study, with 65% of them being girls and 34.9% being males. Between the ages of 20 and 30, 47.9% of the population is between the ages of 20 and 30. Gallstones are known by 88.7% of the people in the study. A positive history of gallstones was reported by 39.9% of individuals, either directly or in a family member. Gallstones were found to cause stomach discomfort in 76.6% of cases, fever in 21.7%, pale skin in 36.7% of cases, jaundice in 36.7% of cases, exhaustion in 41.9% of cases, nausea in 40.1% of cases. *Conclusion:* There was a strong relationship between participants' awareness of gallbladder stones and their age, gender, and educational level. To promote awareness of the disorders, future health awareness programs and conferences are proposed.

Keywords: Gallbladder Stones, Gallstone Diseases, Risk Factors, Cholecystitis

1. INTRODUCTION

Gallstone (cholelithiasis) which defined as a hard crystalline deposit in the gall bladder as a result of mis-imbalance between chemical and physical

composition of bile where in cooperation hereditary and environmental factors play a role have role in this commonest biliary tract disease over the world (Al-Amedy et al., 2020). Gallstones considered the primary triggering factor for acute cholecystitis in 90% of cases. Cholecystitis defined as the inflammation of gallbladder, and it is the most common cause of right upper quadrant (RUQ) pain and consider one of the most common emergency admissions in surgery moreover, most common indication of abdominal surgery in elderly people is acute cholecystitis (Alghamdi et al., 2018). Gallstones affect around 20 percent of individuals in affluent nations, and the annual incidence rate of gallstones is 0.60–1.39% , and gallstone prevalence rises with age and is much greater in female than in male (Di Ciaula et al., 2019). Gallstones were the second most frequent gastrointestinal discharge diagnosis among U.S. hospitals in 2009, accounting for nearly 300,000 doctor visits. Additionally, it is predicted that almost 3,000 gallstone-related fatalities occur in the United States each year in the female sex, and Overweight (Pak & Lindseth, 2016). The prevalence of gallstones is high around the world. It estimated that 9 in 100 females and 6 in 100 males were affected with this condition in U.S (Shabanzadeh, 2018).

Several studies were conducted to assess the knowledge toward gallstones. For example, a study pointed to evaluate the information of female affected by gallstones toward about this disease. Lack of knowledge is a major factor that cause gallstone as indicated by this study. Small sample size that includes only female considered imitation (Al-Amedy et al., 2020). A study was conducted in Egypt showed that there is poor knowledge about gallstone disease in patients who are going to laparoscopic cholecystectomy (Alaa Eldin et al., 2019). In 2020 a study based on online questionnaire was conducted aimed to assess the awareness of gallstones in Saudi Arabia in Najran city showed that there is unsatisfactory level of knowledge toward this condition. There was a significant statistical association between overall knowing score and education level (Alshahrani et al., 2020). Similarly, in 2021 a study conducted to assess the knowledge of general population toward gallstones in Saudi Arabia. The results showed that majority of participants were aware of different aspects of gallbladder stones. The data was collected through online survey and sample size was 429. The study emphasizes the importance of educating the community about risk factors of the disease (Mohammad et al., 2021).

Gallstone diseases are still unknown to the majority of Saudis, and there aren't enough articles regarding gallstone disease knowledge in Saudi Arabia. The objective of our study is to assess the awareness and knowledge of the general population of Saudi Arabia towards gallbladder stones and its risk factors.

2. METHODS

Study design

This is an observational cross-sectional questionnaire survey conducted in Saudi Arabia from January 2020 to September 2021.

Subject

The study's population consisted of Saudi general population of both gender from different regions of Saudi Arabia
Inclusion criteria: Age: 18-year-old and above, Male and Female and agreed to participate
Exclusion criteria: Age: Younger than 18 and did not agree to participate

Sample size

The size of the sample was calculated by using formula: $n = P(1-P) * Z\alpha^2 / d^2$ with a 95 % confidence level.
n: Calculated sample size
Z: The z-value for the selected level of confidence (1- a) = 1.96.
P: An estimated prevalence of knowledge
Q: (1 – 0.50) = 50%, i.e., 0.50
D: The maximum acceptable error = 0.05.
So, the calculated minimum sample size was:
$n = (1.96)^2 \times 0.50 \times 0.50 / (0.05)^2 = 384$.

Method for data collection and instrument

The researchers have developed an electronic google form for data collection during the period of three months. The questionnaire was distributed online via WhatsApp, Facebook, and Twitter). The participant's information and answers were reviewed one by one by the research team thru the Gmail access re-assuring that they did not repeat filling up.

Demographic characteristics such as gender and level of education were included in the survey. The respondents were quizzed on their understanding of gallbladder stones and their symptoms, as well as predisposing factors, consequences, and treatment options.

Data management and analysis

Data was collected and enter on the "Microsoft Office excel software" program (2016) for windows then analyzed using Statistical Package of Social Science Software. The frequencies, percentage, mean and standard deviation were computed for statements and variables. Pearson correlation was conducted to test the correlation between sociodemographic characters and knowledge. Regression test was conducted to test the prediction of demographic factors on awareness and knowledge. Statistical significance was defined as a p value of less than 0.05.

3. RESULTS

The studied sample included 1540 participants, 65% of them were females and 34.9% were males. 47.9% aged between 20- 30 years old, 24% were less than 20 years old and 15.5% were 31- 40 years old. 93.3% of all samples were Saudi nationality. Regarding education, 35.9% had high school certificate, 58.8% had bachelor degree and only 3.4% had master degree of higher. 42.2% of our sample was from western region of the kingdom while 12.6% were from southern region as illustrated in table (1).

Table 1 Sociodemographic characteristics of participants (n=1540)

Parameter		No.	Percent
Age	Less than 20	373	24.2
	20 - 30 years old	737	47.9
	31 - 40 years old	239	15.5
	41 – 50 years old	126	8.2
	51 - 60years old	55	3.6
	More than 60	10	.6
Gender	Male	537	34.9
	Female	1003	65.1
Nationality	Saudi	1437	93.3
	Non-Saudi	103	6.7
Education level	Illiterate	2	.1
	Primary	6	.4
	Intermediate	22	1.4
	High school	553	35.9
	Bachelor	905	58.8
	Master degree or higher	52	3.4
Region	Northern	228	14.8
	Southern	194	12.6
	Western	650	42.2
	Eastern	166	10.8
	Middle	302	19.6

Table (2) shows that; of all studied sample, 88.7% know what gallstones is. 39.9% of participants reported positive history of gallstone personally or in a family member (16.6% in mothers, 11.3% in sisters, 9.2% in fathers and only 6.4% in brothers). Regarding knowledge of normal function of the bladder, 27.8% reported bile production, 27.8% reported store and concentrate bile, 11.2% break down large fat droplets into smaller droplets, and 6.8% secrete hormones that help digestion run smoothly. Presentation of gallstones was reported as abdominal pain by 76.6%, fever, 21.7%, pale skin 36.7%, jaundice 36.7%, fatigue 41.9%,

nausea 40.1%, and vomiting 39.8%. Type of food that aggravate gallstones symptoms were reported as fats and sugars-rich meals by 49.2%, 6.7% coffee, 6.2% bean and 6% meat.

Table 2 Knowledge of participants of gallstones, its symptoms and aggravating factors (n=1540).

Parameter		No.	Percent
Know gallstones	Yes	1366	88.7
	No	151	9.8
	I don't know	23	1.5
History of gallstone personally or in a family member	Yes	615	39.9
	No	778	50.5
	I don't know	147	9.5
If the answer is yes, relative relation	Father	142	9.2
	Mother	256	16.6
	Brother	99	6.4
	Sister	175	11.3
	Wife	23	1.4
	Husband	17	1.1
	Son	3	0.1
	Daughter	10	0.6
Normal functions of gallbladder	It breaks down large fat droplets into smaller droplets	173	11.2
	It neutralizes acidic chime	22	1.4
	It produces bile	428	27.8
	It secretes hormones that help digestion run smoothly	104	6.8
	It stores and concentrates bile	428	27.8
	I don't know	385	25.0
Presentation of gallstones(Overlapping present)	Abdominal pain	1181	76.6
	Fever	335	21.7
	Pale skin	566	36.7
	Jaundice	566	36.7
	Fatigue	646	41.9
	Change in urine color	544	35.3
	Nausea	618	40.1
	Weight loss	254	16.4
	Dizziness	15	0.9
	Vomiting	613	39.8
	I don't know	205	13.3
Type of food that aggravate gallstones symptoms	Beans	96	6.2
	Chocolate	20	1.3

	Coffee	103	6.7
	I don't know	420	27.3
	Fish	5	.3
	Foods's high in fats and sugars	757	49.2
	Fruits and vegetables	18	1.2
	Meat	93	6.0
	Whole grains	28	1.8

Regarding knowledge of risk factors of gallstones in table (3) and figure 1, 12.7% reported that it is a hereditary disease, 29.8% reported that prevalence is higher among women than men, and 39.7% reported it is most common in 21- 40 years old age group. 23.6% reported that gallstone is a life-threatening condition. 50.3% reported that surgical removal of gallstone is necessary. Only 36.1% reported presence of medication for this case. Intestinal obstruction was identified as a complication by 19.4% of our participants, inflammations of pancreas or gallbladder 53.6%, obstruction of common bile ducts 57.9% and tumor of pancreas were identified by 12.7%. According to table (4); there was a significant correlation between knowledge of gallbladder stones with age (20- 30 years old), female gender, and higher educational levels of participants.

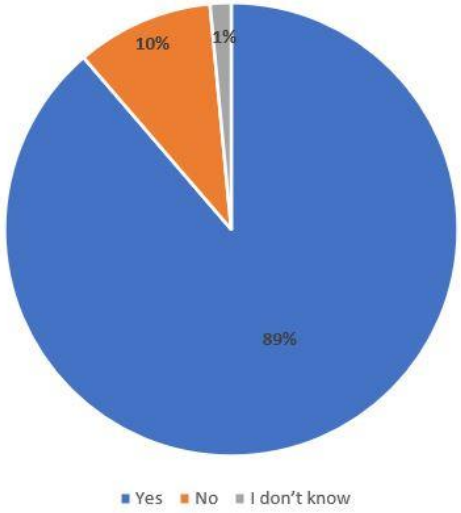

Figure 1 Knowledge of gallstones among participants

Table 3 Knowledge of causes, risk factors, diagnosis, and management of gallstones (N= 1540)

Parameter		No.	Percent
Gallstones is hereditary disease	yes	196	12.7
	no	1006	65.3
	I don't know	338	21.9
Gallstones affect women more than men	yes	459	29.8
	no	286	18.6
	I don't know	795	51.6
Gallstones is a life-threatening disease	yes	363	23.6
	no	777	50.5
	I don't know	400	26.0
Surgical removal of gallstone is necessary in all cases	yes	774	50.3
	no	504	32.7
	I don't know	262	17.0
Presence of medication that can remove gallstones	yes	556	36.1
	no	417	27.1

	I don't know	567	36.8
Complications of gallstones(Overlapping present)	intestinal obstruction	299	19.4
	inflammations of pancreas or gallbladder	826	53.6
	obstruction of common bile ducts	893	57.9
	tumor of pancreas	196	12.7
	I don't know	406	26.3
Cause of gallstone (Overlapping present)	Some medications	463	30.0
	Tumors	74	4.8
	Obesity	592	38.4
	High cholesterol	710	46.1
	High triglycerides	749	48.6
	Genetic factors	273	17.7
	Aging	126	8.1
	Diabetes Mellitus	203	13.1
	Infections	316	20.4
	Vascular problems	100	6.4
	Pregnancy	127	8.2
	I.V line for long time	54	3.5
	I don't know	420	27.2
Common age affected by gallstones	less than 20 years	18	1.2
	Between 21 to 40 years	611	39.7
	Between 41 to 60 years	570	37.0
	more than 60 years	50	3.2
	I don't know	291	18.9
Best way to diagnosis of gallstones	urine analysis	528	34.2
	History taking	332	21.5
	physical examinations	665	43.1
	liver function test	564	36.6
	CBC	291	18.8
	imaging	531	34.4
	I don't know	309	20.0
Regular exercise and active lifestyle can help in reducing risk of gallstone	yes	1319	85.6
	no	221	14.4

Table 4 Association between participant's knowledge of gallbladder stones and sociodemographic characters of participants.

Parameter		Knowledge of gallstones			Total (N=1540)	P value
		Yes	No	I don't know		
Age	Less than 20	296	64	13	373	0.001
		21.7%	42.4%	56.5%	24.2%	
	20 - 30 years old	661	67	9	737	
		48.4%	44.4%	39.1%	47.9%	
	31 - 40 years old	225	13	1	239	
		16.5%	8.6%	4.3%	15.5%	
	41 – 50 years old	122	4	0	126	
		8.9%	2.6%	0.0%	8.2%	
	51 - 60 years old	52	3	0	55	
		3.8%	2.0%	0.0%	3.6%	
	More than 60	10	0	0	10	
		0.7%	0.0%	0.0%	0.6%	
Gender	Male	445	75	17	537	0.001
		32.6%	49.7%	73.9%	34.9%	
	Female	921	76	6	1003	
		67.4%	50.3%	26.1%	65.1%	
Nationality	Saudi	1270	145	22	1437	0.327
		93.0%	96.0%	95.7%	93.3%	
	Non-Saudi	96	6	1	103	
		7.0%	4.0%	4.3%	6.7%	
Education	Illiterate	2	0	0	2	0.001
		0.1%	0.0%	0.0%	0.1%	
	Primary	4	1	1	6	
		0.3%	0.7%	4.3%	0.4%	
	Intermediate	15	4	3	22	
		1.1%	2.6%	13.0%	1.4%	
	High school	471	69	13	553	
		34.5%	45.7%	56.5%	35.9%	
	Bachelor	827	73	5	905	
		60.5%	48.3%	21.7%	58.8%	
	Master degree or higher	47	4	1	52	
		3.4%	2.6%	4.3%	3.4%	
Region	Eastern	148	15	3	166	0.577
		10.8%	9.9%	13.0%	10.8%	
	Middle	275	23	4	302	

	20.1%	15.2%	17.4%	19.6%
Northern	200	26	2	228
	14.6%	17.2%	8.7%	14.8%
Southern	164	26	4	194
	12.0%	17.2%	17.4%	12.6%
Western	579	61	10	650
	42.4%	40.4%	43.5%	42.2%

4. DISCUSSION

The prevalence of gallstones is high around the world. In the United States, it estimated that 9 in 100 females and 6 in 100 males were affected with this condition (Stinton & Shaffer, 2012). Several studies were conducted to assess the knowledge toward gallstones. This study was conducted to assess the awareness and knowledge of the general population of Saudi Arabia towards gallbladder stones and its risk factors. In our study, 88.7% know what gallstones is, which was higher than reported in a Saudi study reported that subjects who had good knowledge of gallstone were (58.8%) (Alshahrani et al., 2020). Another Saudi study reported comparable results as (63.3%) participants were aware of gallstones and its complications. Almost three-quarter of the participants (72.8%) already knew what gallstones meant (Mohammad et al., 2021). In Riyadh, a study reported that all participants have heard about gallstone but majority of participant don't know if gallstone could be existed without symptoms or not (39.3%) (Alsaihati et al., 2018).

According to our results, 39.9% of participants reported positive history of gallstone personally or in a family member (16.6% in mothers, 11.3% in sisters, 9.2% in fathers and only 6.4% in brothers). A study in Saudi Arabia reported comparable results as (46.9%) of subjects had a family member with gallstones and (32.3%) of them were fathers, (27.7%) of them were mothers, (21.5%) brother, and (18.5%) were a sister (Alshahrani et al., 2020). Another study reported that almost 65% of participants were diagnosed with gallstones before while (60.9%) of had a relative already diagnosed with gallstones (Alsaihati et al., 2018). It may be accompanied by diaphoresis, nausea, and vomiting. Abdominal pain was identified as a symptom by 76.6%, followed by fever, 21.7%, pale skin 36.7%, jaundice 36.7%, fatigue 41.9%, nausea 40.1%, and vomiting 39.8%.

A Saudi study reported participants identified changes in urine color as a symptom (72.6%) followed by abdominal pain (71.1%) (Alshahrani et al., 2020). Another study reported that 59.5% of participants recognized upper abdominal pain as a symptom for gallbladder stones (Alsaihati et al., 2018). A cohort study was also conducted on the general population in Copenhagen, Denmark, to determine their level of awareness about gallstones, and most respondents were unaware of the symptoms and signs of gallstones, but the current results demonstrated that 59.5% of the participants declared upper abdominal pain as a symptom of gallstones (Shabanzadeh, 2018). A similar study in Saudi Arabia was conducted to assess the public's level of knowledge about gallbladder stones, almost half of participants know that stomach pain is the most common symptoms of gallstone (47.3%). more than half of the participants had no idea if nausea or vomiting could be the symptoms of gallstone (Alsaihati et al., 2018).

Overweight, ageing, feminine gender, maternity, heredity, complete parenteral nutrition, fast weight reduction, and certain drugs are all known risk factors for gall bladder stones (oral contraceptives, clofibrate, and somatostatin analogs). 12.7% of our study participants reported that disease is hereditary, 29.8% reported that prevalence is higher among women than men, and 39.7% reported it is most common in 21- 40 years old age group. Comparable results were reported in previous literature as a study reported that participants who thought that gallstones were hereditary disease was (13.4%) and individuals who think that gallstones affected women more than men were (59%) (Alshahrani et al., 2020), while another study reported that around 63% agreed that gallstones are related to genetic factors and 68.0% knew that females have a higher risk to develop gallstones (Mohammad et al., 2021).

Fatty meals are a common trigger for gallbladder contraction. The frequency of recurrent episodes is variable, though most patients do not have symptoms daily. Type of food that aggravate gallstones symptoms were reported as fats and sugars-rich meals by 49.2%. Higher result was reported in another Saudi study as 70.7% knew that fatty rich food increases (Mohammad et al., 2021). Results on the line with ours were also reported in another Saudi study as half of participants I don't know if fatty food could be triggering the pain (Alsaihati et al., 2018). Complications of the disease result when stones obstruct the cystic duct, bile ducts or both. A gallstone may pass through the cystic duct and lodge in the common bile duct, causing blockage and jaundice, a condition known as choledocholithiasis (Sridhar et al., 2021). Following an elective laparoscopic cholecystectomy, the mortality rate is <1%.

Emergency cholecystectomy, on the other hand, is linked to a high fatality rate. Other issues include bile duct stones following surgery, incisional hernia, and bile duct damage (Lehrskov et al., 2020).

Intestinal obstruction was identified as a complication by 19.4% of our participants, inflammations of pancreas or gallbladder 53.6%, obstruction of common bile ducts 57.9% and tumor of pancreas were identified by 12.7%. The most frequent complication reported in another Saudi study was tumor of pancreas (26%), obstruction of common bile ducts (25.3%) followed by inflammations of pancreas and gallbladder (23.8%) (Alshahrani et al., 2020). On the contrary, a study conducted by Alsaihati et al., (2018) in Saudi Arabia stated that, "majority of the participants had no idea about any complication associated with gallstone disease (54.3%)".

According to our findings, there was a significant correlation between knowledge of gallbladder stones with age, gender, and educational level of participants. In a separate investigation, Egypt's cholelithiasis knowledge was found to be inadequate, and a significant statistically positive association was observed between the level of knowledge and patients' parameters, including age and educational level (Alaa Eldin et al., 2019). Similarly, another study found a significant association between level of awareness, age, and level of education (P = 0.000 for each), respectively (Mohammad et al., 2021).

5. CONCLUSION

The level of awareness of Saudi general population about gallbladder stones in this study was moderate, among the previously reported figures in Saudi Arabia and other nationwide studies. There was a significant correlation between knowledge of gallbladder stones with age, gender, and educational level of participants. Future health awareness campaigns and conferences are recommended to raise the awareness of the diseases.

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Author Contributions

This work was carried out in collaboration among all authors. Hyder Mirghani is a principal investigator in this study. All Author collaboration to designed the study data collection, statistical analysis, manuscript preparation and prepared the first draft of the manuscript.

Ethical consideration

Ethical approval was obtained from Research Ethics Committee at Tabuk University with the IRB approval number (21-097).

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Conflict of interests

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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