



## Ultrasonographic Association of Cholelithiasis with Obstructive Jaundice in 18-35 years Patients

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**Background:** Cholelithiasis is the most common cause of obstructive jaundice. Obstructive jaundice is usually caused by biliary obstruction, which is a blockage of the common bile duct or any duct that carries bile from the liver to the gallbladder and then reaches the small intestine. And ultrasound is a gold standard modality for the investigation of cholelithiasis and obstructive jaundice.

**Objective:** To determine ultrasonographic association of cholelithiasis with obstructive jaundice in 18-35 years patients.

**Methodology:** A study was conducted among 140 individuals and it was a cross sectional study. They were all young adults between 18 and 35 years of age. Data was collected from Civil Hospital Gujranwala city using a simple random sampling technique. Gallbladder scan was started with the patient in the supine position, both subcostal and intercostal approaches. The examination was performed with Toshiba Xario 3.5-5MHz curvilinear transducer. It was analyzed by SPSS version 24.0 and presented by frequency and percentages.

**Results:** A total of 140 individuals were included in this study. Out of 140 subjects, 70 individuals had cholelithiasis, and 25 of these 70 were individuals with obstructive jaundice. The other 70 individuals presented without cholelithiasis, of which 26 were suspected to have jaundice. Females were found to be affected more frequently than males.

**Conclusion:** It was concluded that one of the main causes of obstructive jaundice is cholelithiasis. And ultrasound can easily diagnose the cases of cholelithiasis. Females were found to be affected more frequently than males.

**Key words:** obstructive jaundice, cholelithiasis, jaundice, ultrasound.

## Introduction:

The gallbladder is a fluid-filled, pear-shaped organ that resides in a shallow fossa called the gallbladder fossa at the intersection of the right-hand and left-hand hepatic lobes. Average adult gallbladder is 7 to 10 cm long and may hold up to 50 ml of bile.<sup>1</sup> Gallbladder has three parts; fundus, body and neck.<sup>2</sup> The fundus is generally the most caudal and anterior in position, often projecting below the anterior margin of the liver.<sup>3</sup> The gallbladder fundus is most caudal and anterior in position, and it is located underneath the anterior margin of the liver. A smooth wall of the gallbladder is 2mm thick and neck region thickness is 3mm in measure.<sup>4</sup> It is composed in three layers; serosa layer, fibromuscular layer and mucosa layer.<sup>5</sup> Types of gallstone. Cholesterol stones, brown and black stones, mixed stones and pigmentedstones.<sup>6</sup> The associated organ system which affects the physiology of the gallbladder includes the stomach, duodenum, pancreas, and liver. Bile is formed in the liver and deposited into the gallbladder afterwards. The high concentrations of bile salts, cholesterol, or calcium can result in gallstone formation. The absence of from the stomach and duodenum cause the bile to vacuum into duodenum. The patient's long-term condition without appetite can lead to inflammation of the gallbladder and to development of gallstones.<sup>7</sup> Risk factors for the formation of gallstone cholesterol include age, gender, diet, obesity, decrease physical activity, rapid weight loss, and oral contraceptive use.<sup>8</sup> Gallstone is one such specific disease and its causes, such as cholangitis, cholecystitis and pancreatitis are significant public health issues around the world.<sup>9</sup> Gallstones are small as a grain of sand to large as a golf ball like solid calculi found in the gallbladder, known as cholelithiasis.<sup>10</sup> The problem starts when the stones enter the bile duct and prevent bile from passing. Many bile stones less than 2.5 cm pass through the normal gastrointestinal tract spontaneously and are excreted into the stools.<sup>11</sup> And when the stone is 2 to 5 cm in diameter, it may get stuck in the bile duct and cause obstructive jaundice.<sup>12</sup> Gallstones are well known to have risk factors in various studies that include 5 F's made of flatulence, fertile, fat, female and 40 F's.<sup>13</sup> Western studies have shown that ethnicity, genetics, gender, age, obesity, fertility, metabolic disease, liver diseases such as hepatitis C and cirrhosis, high caloric intake are the contributing risk factors for gallstones.<sup>14,15</sup> Some other research decreases the risk of gallstone diseases due to the intake of fruits and vegetable. And increase the risk of gallstone diseases due to spicy foods, fried foods and cooking oils.<sup>16</sup> Age and gender have been significantly associated with obstructive jaundice.<sup>17,18</sup> Obstructive jaundice is a common form of jaundice that occurs as bile flows into the intestine through bile ducts blocked by either gall stones, sludge or tumors. The most common cause of biliary obstruction is gallstones.<sup>19</sup>

To find the relationship between obstructive jaundice and gallstones in patients and also to create awareness of the possible complications, so that morbidity can be reduced in the society.

## Methodology:

The study was a cross sectional – simple random sampling study design. The study was carried out on one forty patients of radiology department, Civil Hospital Gujranwala from September 2019 to December 2019. A cross section study was conducted among 140 individuals. They were all young adults between the ages of 18 and 35 years. Data was collected from Civil Hospital Gujranwala city using a simple random sampling technique. Patients should

fast 8 hours after midnight before they undergo gallbladder sonogram to ensure adequate gallbladder distention and to reduce upper abdominal bowel gas. The gallbladder scan started with the patient in the supine position, both subcostal and intercostal approaches. The examination was performed with Toshiba Xario 3.5-5MHz curvilinear transducer. It was analyzed by SPSS version 24.0 and presented by frequency and percentages. The inclusion criteria; patients with cholelithiasis were included in this study and patients with clinically suspected jaundice. The individuals ranging from 18-35 year ages of both genders. The exclusion criteria; all patients with gallbladder pathologies.

**Results:**

A cross sectional study was conducted among 140 individuals in Civil Hospital, Gujranwala, using a simple random sampling technique. The participants were all young adults between the ages of 18 and 35 years.

**Table 1**

**Age**

Cholelithiasis	Obstructive jaundice	Mean	N	Std. Deviation	Minimum	Maximum
Absent	Absent	26.2794	69	4.72164	19.00	35.00
	Present	19.0000	1	.	19.00	19.00
	Total	26.1739	70	4.76802	19.00	35.00
Present	Absent	26.8913	46	4.66775	18.00	35.00
	Present	29.5652	24	4.38827	21.00	35.00
	Total	27.7826	70	4.71814	18.00	35.00
Total	Absent	26.5263	115	4.68893	18.00	35.00
	Present	29.1250	25	4.80319	19.00	35.00
	Total	26.9783	140	4.79426	18.00	35.00

The minimum and maximum age along with the mean and standard deviation are shown in (table1) above.

A total of 140 individuals participated in this study, their minimum age being 18 years, and maximum 35 years, of which 70 patients were without cholelithiasis, and 70 patients with cholelithiasis, having a mean age of 26.17 (SD + 4.76) and 27.78 (SD±4.71) respectively. Out of the 70 individuals without cholelithiasis, 69 were found with no obstructive jaundice and 1 individual was found with obstructive jaundice, and had a mean age of 26.27 (SD± 4.72) and 19

years respectively. Out of 70 patients with cholelithiasis, of which 46 had no obstructive jaundice and 24 had obstructive jaundice, the mean age was 26.89 (SD± 4.66) and 29.56(SD± 4.38) respectively (Table 1).

**TABLE NO 2**  
**GALLBLADDER STONES SIZE (in cm)**

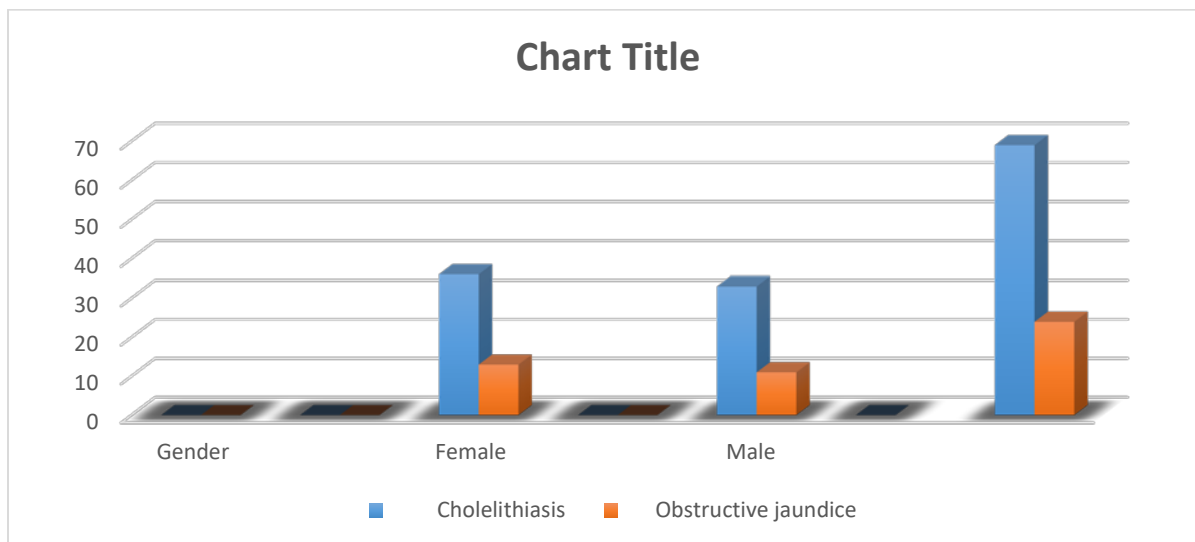
Stones	Frequency	Percentage
no stone	70	50
single stone	39	27.8
two stone	5	3.6
multiple stones	26	18.8
Total	140	100.0

From a total of 140 subjects, 70 subjects (or 50% of them), were found to have no stones, 39 subjects (27.8%) had solitary stones, 5 subjects (3.6%) had two stones, and 26 of them (18.8%) had multiple stones, as shown in the table above (Table2).

**TABLE NO 3**  
**GENDER**

	Obstructive jaundice	Cholelithiasis
Gender	Present	Present
Male	11	33
Female	14	37
	25	70

## GRAPH



Out of 140 individuals, 70 presented with cholelithiasis, and of these 70, 37 subjects were females and 33 of them were males. Furthermore, 25 of these 70 individuals presented with obstructive jaundice, of which 14 were females and 11 were males. (Table 3)

From the subject pool of 140 individuals, 115 were found with no obstructive jaundice, and 25 patients with obstructive jaundice. Out of 115 individuals without obstructive jaundice, 81 individuals did not have yellowing of their sclera, whereas 34 did present with yellowing of their sclera. As regards the 25 individuals with obstructive jaundice, all of the cases were found to have yellowing of the sclera. (Table 4)

Of the 115 individuals without obstructive jaundice, 55 of them had no symptom of fever, while 60 of the patients presented with a fever. In addition, of the 25 individuals with obstructive jaundice, all 25 cases presented with a fever. (Table 5)

Out of 115 individuals with no obstructive jaundice, 36 individuals had no abdominal pain, as opposed to 79 of them that did have abdominal pain. Regarding the 25 individuals with obstructive jaundice, all 25 cases were found to have presented with abdominal pain. (Table 6)

Out of 140 subjects, 89 individuals (63.5%) did not have jaundice, and 51 individuals (36.4%), had jaundice. (Table 7)

To conclude, the association between cholelithiasis and obstructive jaundice was significant, with a p-value of 0.000, which is less than 0.05.

### Discussion:

Obstructive jaundice is a particular type of jaundice caused by gallstones, or bile duct tumors. Jaundice can be broken down into three categories: pre-hepatic, intrahepatic, and post-hepatic. Pre-hepatic and intrahepatic causes are called therapeutic jaundice whereas post-hepatic causes or obstructive jaundice may be known as surgical jaundice. Patients with obstructed jaundice

show sclera yellowing, dark yellow-brown urine, yellowish skin, anemia and elevated bilirubin levels. Ultrasound is a common technique to detect gallstones. A total of 140 individuals aged between 18 and 35 years in this study. Of 140 individuals, 70 had cholelithiasis, and women were more affected than males. And women are substantially more affected by gallstones than men, according to Shaffer et al.<sup>20</sup>

Total subjects were 140 in our sample, the age of these subjects was 18 to 35 years and mainly 35 year olds were more affected by obstructive jaundice. Women are the most often impacted gender than men. Of 140 people, 26 were affected with categories of jaundice (pre-hepatic, intra-hepatic) and 25 with an obstructive jaundice. This is similar to another study by Gameradin et al, which has shown that women have a more obstructive jaundice than men.<sup>21</sup>

In this study 140 subjects were included. Of the 140 subjects, 70 had cholelithiasis, and of the 70, 25 had obstructive jaundice, which is the most common cause of biliary obstruction. Khurram et al have also found that gallstones were the study's most common cause of biliary obstruction.<sup>22</sup>

In this study, a total of 140 individuals out of 140, 114 were identified without obstructive jaundice, and 25 with obstructive jaundice. For 115 people without obstructive jaundice, 36 have no abdominal pain and 79 have abdominal pain, abdominal pain and 25 cases of abdominal pain have been found in 25 people with jaundice blockage. According to Williet et al abdominal pain was the other major presenting symptoms.<sup>23</sup>

## Conclusion:

It was concluded that cholelithiasis is one of the main causes of obstructive jaundice and ultrasound can easily diagnose the cases of cholelithiasis. Females were more commonly affected than males.



**Fig 1: Ultrasound image of gallbladder shows multiple beads form stones collectively measuring 3 cm in size with posterior acoustic shadowing.**



**Fig 2: On ultrasound image of gallbladder shows 2.1cm stone with posterior acoustic shadowing**



**Fig 3: On ultrasound image of gallbladder shows a single calculi measuring 2.4cm in size with posterior acoustic shadowing**

### **Recommendation:**

Most of the asymptomatic gallstones were incidentally observed. This makes them more life-threatening to the patients than symptomatic gallstones. It is therefore advisable that every patient presenting for abdominal and pelvic ultrasound investigation should always have his or her gallbladder examined. Due to this insidious nature of gallstones people should be advised by clinicians to always undergo ultrasound examination of the gallbladder at regular intervals. It was noted that females were significantly more affected by gallstones than males. Therefore females should be advised to avoid the spicy, oily food, reduce weight and adopt better dietary habits.

## Limitations:

- Chronic Liver Disease
- Post-operative (cholecystectomy) patients.
- Doppler ultrasound.
- Abdominal X-ray, CT scans were not included in this study.

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