Ultrasonographic frequency of acute cholecystitis in the patients presenting with right hypochondriac pain.

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Abstract

Background: Acute Cholecystitis (AC) is a potentially painful condition, and prompt diagnosis and treatment are essential to reduce the rate of complications. Clinical history, physical examination, and laboratory analysis do not permit a definitive diagnosis of AC. Therefore, clinicians rely heavily on imaging to establish a diagnosis of AC, identify complications, or suggest an alternative diagnosis.

Objective: This study was conducted to find the ultrasonographic frequency of acute cholecystitis in patients presenting with right hypochondriac pain.

Methodology: A descriptive observational study conducted at Radiology Department of Shalamar Hospital for right hypochondriacpain. 101 patients of different age groups were enrolled in this convenient sampling technique. All patients with acute abdominal pain were referred to the radiology department to evaluate gallstones. Pregnant females, Patients with cholangiocarcinoma, Patients with nonprimary (metastatic) lesions to the liver, or any other abdominal disease were excluded. UltrasoundToshiba Xario XG with curvilinear probe 3-5 MHZ was used.

Results: There were total 101 participants in the study in which 52(51.5%) were males and 49(48.5%) were females. The mean age of males was 44.37 ± 15.88 years, and the mean age of females was 49.76 ± 18.39 years. The age difference was not statistically significant. There is no association between gender and gallbladder thickness. There is no association between gender compared with pericholecystic fluid, distension of gall bladder and sonographic Murphy sign. There were total 101 participants of acute cholecystitis in the study in which 79(78.2%) were males and 22(22.8%) were females.

Conclusion: The study concludes that most patients with acute cholecystitis have gallbladder stones. Diagnostic findings include gallbladder wall thickening, pericholecystic fluid, or a sonographic Murphy's sign. There were total 101 participants in the study in which males were high in numbers than female. The mean age of males were low than females.

Keywords: Acute Cholecystitis, Most common finding, Ultrasound.

Introduction

Cholecystitis, or inflammation of the gallbladder, is a frequent condition caused by gallstones or the blockage of the cystic duct that leads to the gallbladder (cholelithiasis). The prognosis is very good for patients with uncomplicated cases of cholecystitis; however, complications such as gangrene or perforation can drastically alter this outlook [1]. Fever, an increased white cell count, and an elevated C-reactive protein level might all point to a systemic inflammatory response. The first and most reliable test is an ultrasound. In some cases, a cholangiopancreatography using magnetic resonance imaging may be necessary. If sepsis in a patient is suspected, CT or MRI can help to determine what is wrong. Antibiotics, pain medication, and fluid replacement are used to treat the condition, with an early cholecystectomy often following [2].

Gallstones are deposits in the gallbladder made of hardened digestive juices; their size can range from that of a single sand grain (called sludge) to that of a golf ball. Pigment stones or cholesterol make up their composition. Cholesterol gallstones are often yellowish-green in hue and are significantly more prevalent in those with diabetes [3]. The breakdown of red blood cells in the liver produces bilirubin, the primary component of pigment stones. Gallstones are not always caused for concern. Gallstones can be completely asymptomatic, meaning they spend their whole lives in the gallbladder before causing any problems. Gallstones that pass through the gallbladder might become trapped in bile ducts (tubes). They prevent bile from leaving the gallbladder, leading to bile accumulation. Inflammation and swelling of the gallbladder's lining are the results of these conditions and can result in a bile infection caused by bacteria [4].

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A network of tubes resembling a tree trunk and branches links the gallbladder to the liver. The liver itself is quite "branched" or complete of ducts. The right and left hepatic ducts are the two major trunks of the liver tree. The expected hepatic duct results from a union between these two ducts (which resembles a tree's trunk) [5]. The cystic duct is one major "tree limb" branching from the common hepatic duct. The gallbladder is the end point of this tube's direct connection. This "tree trunk," or common hepatic duct, is now known as the common bile duct, although it still serves the same function. The duodenum is the first part of the small intestine to receive the contents of the common bile duct. Bile, a liquid substance produced continually by the liver, passes via the duct system and reaches the digestive system at the duodenum [6, 7]. The central duodenal papilla, a valve-like structure at the junction of the common bile duct and the duodenum, is generally closed while we are not eating. With this opening, the bile may flow back into the gallbladder through the cystic duct. When eaten, the gallbladder squeezes, and the valve opens, releasing the bile it has been storing. The bile travels through the cystic duct and the common bile duct before entering the gut. Incompletely digested food is mixed with bile, which aids in the digestion of dietary fat [8].

Upper abdomen discomfort is a typical symptom of acute and chronic inflammatory gallbladder disorders. Even though many of these illnesses can result in considerable morbidity and mortality if left untreated, the prognosis is often quite good if diagnosed and treated quickly. Patients suspected of having gallbladder inflammatory disease are commonly evaluated with the help of imaging [9]. It is unusual for a gallstone to cause intestinal blockage by traveling from the gallbladder to the intestines. The ileocaecal valve is the most frequent location of calculus impaction. On rare occasions, however, gallstones can perforate the bile duct valve and enter the colon, or they might directly travel down the bile duct and damage the distal colon. Frequently, the calculus is just slightly calcified, making it challenging to spot standard radiographs [10].

The Ileus caused by mechanical intestinal blockage due to gallstones is uncommon and primarily affects elderly ladies. This condition can arise from both acute and chronic cholecystitis. Small gallstones can go through the ileocecal valve and cause no symptoms at all, or they might cause recurring cholangitis and possibly gallbladder cancer in the future [11]. This condition is caused by a Cholecysto-Enteric Fistula (CEF); however, no symptoms indicate its presence. In most cases, a diagnosis of CEF is made by accident or through emergency testing [12]. Here, the results of a physical examination, laboratory analysis, and preoperative evaluation are provided for two cases treated in the general surgery clinic and operated on for CEF. Patients' verbal and written informed consents were acquired [13].

Older individuals frequently arrive with the chief symptom of stomach discomfort, which is often acute (lasting less than a week). About a quarter of ER visitors are at least 50 years old [14]. Abdominal discomfort in an elderly patient may manifest significantly differently from a younger one. Patients over 65 typically appear later in their illness, with more vague symptoms [15]. Additionally, in elderly individuals with stomach discomfort, a more comprehensive differential diagnosis should be investigated. Fear of hospitals or death, a lack of health insurance, a lack of transportation, a lack of a secondary caregiver for the patient's spouse or pet, and a fear of losing independence are all reasons elderly persons may put off getting care [16].

Cholecystitis is more likely to occur if: Have a history of gallstones in family. Age 50 or older and a lady. Are 60 years of age or older (male or female). Consume a high-cholesterol and fat-rich diet. To be overweight or obese. Diabetic. Either of Native American, Nordic, or Spanish ancestry. Expecting or have just given birth many times. Employs the use of a contraceptive device or hormone replacement treatment for women, have slimmed down quickly [17].

Most cases of cholecystitis are brought on by gallstones blocking the cystic duct, preventing bile from leaving the gallbladder. The gallbladder swells and may get infected. Scarring of the bile ducts, decreased blood supply to the gallbladder, tumors that restrict the passage of bile from gallbladder, and viral infections that inflame gallbladder are all less frequent reasons [18].

Symptoms can be acute or chronic. Acute cholecystitis is swelling (inflammation) of the gallbladder. It is a potentially serious condition that usually needs to be treated in a hospital. The main symptom of acute cholecystitis is a sudden sharp pain in the upper right side of belly (abdomen) that spreads towards right shoulder. Mostly patient with acute cholecystitis have gallstones. When severe pain lasts for an extended period of time [19]. Chronic cholecystitis is swelling and irritation of the gallbladder that continues over time. The gallbladder is a sac located under the liver. It stores bile that is made in the liver. Bile helps with the digestion of fats in the small intestine. Chronic itching and severe pain. Milder symptoms and shorter-lasting discomfort than acute cholecystitis characterize cholecystitis. The repeated attacks are brought on by gallstones, occasionally blocking the cystic duct [20].

Acute cholecystitis, or gallbladder inflammation, is often caused by a blockage of the cystic duct. Acute cholecystitis is the medical term for gallbladder inflammation (swelling). Hospitalization is often required due to the severity of the condition. It is a rapid, severe gallbladder inflammation that often results from cholelithiasis [21]. As much as 10% of people with gallstone symptoms experience this. In 90% of instances, inflammation of the gallbladder wall is caused by complete obstruction of the cystic duct, often caused by a gallstone stuck in the cystic duct or gallbladder neck. Bile inspissation (from dehydration) or bile stasis (from trauma or severe systemic disease) obstructing the cystic duct are responsible for 5% of all occurrences of cholecystitis [22].

Extreme abdominal discomfort that needs emergency medical attention. Potential causes for this are many. The examination of the acute abdomen benefits greatly from modern imaging techniques. Immediate and accurate diagnosis is crucial for reducing mortality and morbidity [23]. Scanning patients as

soon as feasible is a consensus since physical examination and laboratory testing are pretty standard. A simple abdominal radiograph has traditionally been considered the gold standard for making an initial diagnosis of acute abdominal pain [24].

It is the most common kind of acute inflammatory illness affecting the gallbladder. A clogged cystic duct or gallbladder neck is associated with cholelithiasis in 95% of cases. This disease mostly strikes middle-aged women, specifically overweight women [25]. A gallstone may or may not be visible in the cystic duct or gallbladder neck [26]. Gallstones had a positive predictive value of 88% in a cohort of people with suspected acute cholecystitis. With both gallstones and a positive sonographic Murphy sign, the positive predictive value increased to 92%. Individuals with gallstones, gallbladder wall thickness, and a positive sonographic Murphy sign had a 94% positive predictive value [27].

The inflammation of the gallbladder is called acute cholecystitis. An inflammatory response follows when the cystic duct gets clogged. Gallstones affect between 20 and 25 percent of the American population (10–15 percent). Gall bladder inflammation that does not include gallstones is acute cholecystitis [28].

The most common causes of cystic duct obstruction are gallstones and biliary sludge, although other, less common causes include tumors (primary tumor or gallbladder polyp), parasites, and foreign objects. Stones in the bile duct are the most common reason for an acute cholecystitis attack [29]. Most people with gallstones do not know it since they experience no discomfort. Gallbladder enlargement, inflammation, and a thicker wall on ultrasonography are diagnostic criteria independent of the presence of stones. Patients often complain of pain in the upper right abdomen or epigastric region, nausea, vomiting, and loss of appetite [30]. In many cases, this pain starts as a dull ache in the epigastric region of the stomach. However, it gradually radiates into the back and develops a band-like quality. When gallbladder inflammation worsens, pain is generally felt in the right upper quadrant of the body. Nighttime, or sometimes after consuming a large amount of fat, is when the pain is at its worst [31].

The most sensitive US findings in acute cholecystitis are gall bladder stones (50%), cholelithiasis associated with the sonographic Murphy Sign (26%), and cholelithiasis alone. There were also secondary observations of fatty liver (6%), pericholecystic fluid (6%), and gallbladder wall thickening (>3 mm). Some less specific outcomes included sludge (2%), gallbladder distension (4%), and others. Ultrasound imaging is the gold standard for diagnosing cases of acute cholecystitis [32].

There is a particular danger for women because of their gender. Gallstones are present in about 95% of patients diagnosed with acute cholecystitis because estrogen appears to have a significant role in the increased risk of gallstones during pregnancy, parity, and the use of estrogen replacement therapy [33]. It is estimated that 3-10% of all patients experiencing stomach pain are diagnosed with acute cholecystitis, making this a common cause of hospitalization. The most common cause, cholelithiasis, is responsible for up to 95% of all instances. Ascariasis, as well as HIV/AIDS and the use of fibrates, is another potential danger [34].

Fever, nausea, vomiting, emesis, and pain in the upper right abdominal region above the gallbladder are all possible clinical manifestations. The inspiratory arrest may be detected by firmly palpating the patient's right upper quadrant costal boundary. This is known as the "Murphy sign." Laboratory findings in this setting are often nonspecific and may be either normal or abnormal [35]. Abnormally elevated alkaline phosphatase levels, bilirubin, and serum liver transaminases may indicate a hepatobiliary condition. Despite its prevalence, leukocytosis (often with a left shift) is not always present. When acute cholecystitis is clinically suspected, sonography is often the first imaging modality of choice [36]. Diagnostic sonography for this condition has 80%-100% sensitivity and 60%-100% specificity. Imaging abnormalities such as cholelithiasis, gallbladder wall thickness (> 3-5 mm), pericholecystic fluid, and a positive sonographic Murphy sign are also possibilities. Images showing echogenic bile or gallbladder distention much above the norm are less diagnostic (sludge). Pain in the upper right quadrant that sometimes moves to the shoulder. Pain in the right upper quadrant is often more constant and severe than with biliary colic, which might come and go after six hours or less. Nausea, vomiting, and fever are among the symptoms that often come up in conversations. [37].

Ninety to ninety-five percent of patients have acute cholecystitis as the underlying cause, and the remainder cases also have acute cholecystitis [38]. Acute cholecystitis arises after a chain of events, including: When bile salts irritate the mucosa and create inflammation, gallstones may form and clog the cystic duct, leading to distention and increased intraluminal pressure. Gallbladder wall blood flow is reduced due to increased luminal distention (gallbladder hydrops). Increased wall thickness from swelling and inflammation. Sixty-six percent of individuals have a bacterial infection as a result [39].

Diagnostic imaging techniques like computed tomography (CT) and ultrasound are used to identify acute cholecystitis. When assessing AC, ultrasound is the go-to imaging method. Gallstones often cause no symptoms in the majority of people who have them. If the ultrasound shows an enlarged gallbladder with inflammation and a thicker wall, the diagnosis may be established even if no stones are found [40].

CT scans are the next best imaging test for diagnosing acute cholecystitis, after ultrasounds. However, patients have a radiation risk since CT employs ionizing radiation [41]. The gallbladder is a small, pear-shaped organ on the right side of the abdomen, beneath the liver. The gallbladder holds a digestive fluid released into the small intestine (bile). The gallbladder is divided into the fundus, body, and neck [42]. The fundus is rounded and projects below the inferior margin of the liver, where it comes in contact with the anterior abdominal wall at the tip of the 9th costal cartilage [43]. The body lies in contact with the visceral surface of the liver and is directed upward, backward, and to the left [44]. The neck becomes continuous with the cystic duct.

Inferior border of liver and anterior abdominal posteriorly: Transverse colon and proximal duodenum. Inferiorly: Biliary tree and remaining parts of the duodenum the gallbladder concentrates bile, stores it, and selectively absorbs bile salts while preserving bile acid. It also excretes cholesterol and secretes mucus [45].

The cystic artery, a branch of the right hepatic artery, supplies the gallbladder. A direct connection is made between the cystic vein and the portal vein. Small arteries and veins connect the gallbladder to the liver as well. Most individuals who acquire gallstones do not feel a thing, but those who do may be in for a world of pain when the bile duct is blocked off. Acute cholecystitis, pancreatitis, and intestinal obstruction are all severe consequences of gallstones [46].

When looking for signs of acute cholecystitis, abdominal ultrasonography is the method of choice. Ultrasound is a popular diagnostic tool, and several criteria have been established to analyze the most prevalent findings in patients [47]. If experiencing discomfort in the upper right quadrant, ultrasound should be the first line of defense. Compared to HIDA scintigraphy and CT, it is more sensitive to diagnosing acute cholecystitis and is more widely accessible [48].

Ultrasound is often used to assess abdominal pain when a diagnosis other than acute cholecystitis is considered. An excessively thick gallbladder wall (> 3-5 mm), mural or mucosal hyper enhancement, pericholecystic fluid and adjacent soft-tissue inflammatory stranding, abnormally increased gallbladder distention, and cholelithiasis may all be seen on ultrasonography in the context of acute cholecystitis [49]. Ultrasound, a mechanical, longitudinal pressure wave, has a frequency more significant than the upper limit of human hearing, which is about 20000 Hz. In medical ultrasonography, frequencies higher than 2 MHz are often employed (2 MHz to 16 MHz). Ultrasound is generated by applying an electrical current to piezoelectric crystals, which expand and compress in response to the voltage. One of the most telling ultrasound findings of acute cholecystitis is the presence of cholelithiasis in conjunction with the Murphy sign. Consequent results include an increase in gallbladder wall thickness (>3 mm) and the presence of pericholecystic fluid. Additional, less exact observations include sludge and gallbladder distension. The gallbladder neck or the cystic duct blockage stone should be seen if at all possible [50].

The basic ultrasound machine has the following parts [51]. Transducer probe. Central processing unit. Transducer pulse control. Display. Keyboard. Disk storage device Printer. Electrical energy is transformed into mechanical ultrasonic waves by the transducer's components. The scan hand converts the ultrasonic waves into electrical signals when they are reflected and returned. Higher ultrasonic wave frequencies improve resolution while reducing tissue penetration. Reduce the ultrasound's frequency while increasing its penetration and tissue penetration. A-mode, B-mode, and Doppler mode are only a few ultrasonic imaging modalities utilized in healthcare [52].

Ultrasonography is the preferred imaging technique for cholelithiasis and acute cholecystitis diagnosis. Gallbladder wall thickening, pericholecystic fluid, or a sonographic Murphy's sign are examples of typical diagnostic findings. For the diagnosis of cholelithiasis and acute cholecystitis, ultrasound offers good sensitivity, specificity, and positive and negative predictive values. It is also widely available, reasonably affordable, and radiation-free [53].

Our study was used to determine the prognosis for patients with acute cholecystitis in a short period and decrease scanning time and discomforts faced by patients during the procedure. Ultrasonographic frequencies are essential in taking care of people with this condition. Today, acute cholecystitis is common, and most patients have excellent prognoses. However, issues can develop when there are bile duct stones or when a patient has acute cholecystitis. Patients will benefit from this study on how reliable ultrasonography is for detecting acute cholecystitis in a hospital setting.`

Literature review

One of the many common reasons people require general surgery is acute cholecystitis. Multiple studies have shown that cholecystectomy performed early in the disease process has better outcomes, a shorter hospital stay, and fewer medical expenses. Most people with gallstones do not know it since they experience no discomfort. Gallbladder enlargement, inflammation, and a thicker wall on ultrasonography are diagnostic criteria independent of the presence of stones. Patients often complain of pain in the upper right abdomen or epigastric region, nausea, vomiting, and loss of appetite [36]. This pain often starts as a dull ache in the epigastric region of the stomach and gradually expands until it becomes a band across the lower back. When gallbladder inflammation worsens, pain is generally felt in the right upper quadrant of the body. The pain is at its worst in the middle of the night or maybe just after a big meal. As a result, it is crucial to determine a diagnosis as soon as the patient reaches the emergency department by conducting a thorough clinical examination and any necessary diagnostic tests. False-negative findings from ultrasonography alone are common for diagnosing acute cholecystitis 15. However, ultrasound evidence of cholecystitis and an elevated neutrophil count may aid in making an accurate diagnosis. An estimated 20 million Americans may suffer from gallbladder disease this year, and ER physicians commonly see patients whose abdominal pain may result from acute cholecystitis. Physical examination and laboratory assessment are inadequate to make this diagnosis because of their low sensitivity and specificity [54]. Patients in the emergency department who may have acute cholecystitis are often subjected to ultrasonography as a first line of defense since clinical factors are often erroneous. Patients with suspected biliary colic who had radiological ultrasonography in the emergency department, especially at night, remained much longer than those who received bedside ultrasonography, as shown in a large retrospective study. Further, investigations comparing radiographic ultrasonography (the gold standard) with bedside ultrasonography have demonstrated that skilled emergency physicians may be able to identify gallstones [27].

Acute cholecystitis is a common cause of severe abdominal pain that sends patients to the emergency department.

About a third of people with gallstones may develop acute cholecystitis, and it is estimated that up to 20% of Americans have gallstones [55]. Since cholecystectomy is the preferred therapy for most people with acute cholecystitis 3-6, a diagnosis must be established promptly, preferably in the emergency department (ED). Acute cholecystitis may often be diagnosed with a blood test; however, biliary scintigraphy is more reliable (up to 95% correct). Both ultrasonography and biliary scanning have been used [56]. Large medical dictionaries agree that a high temperature, peritoneal irritation symptoms, leukocytosis, and an increase in liver enzyme levels characterize acute cholecystitis. As far as we could tell from our literature review, there is no proof that specific clinical criteria may be utilized to predict who would develop acute cholecystitis. We pondered whether any clinical markers might be used to determine which individuals should undergo hepatobiliary scintigraphy (HBS). This research aimed to see whether high-risk people for a positive HBS and subsequent acute cholecystitis could be identified based on the presence or absence of specific clinical or laboratory features [57].

Between 2013 and 2015, researchers looked back at previous cases of cholecystitis to see whether there had been any progress in the disease's diagnosis or treatment. Sixty individuals were evaluated and diagnosed by doctors from a variety of fields. Fifty-six males and four women retrospectively enrolled in the research between July 2013 and July 2015. Ultrasound was performed on 56 of these individuals. Ultrasound's NPV (negative predictive value) for identifying AC was 77%, while its sensitivity was 68% [58].

Shahid Beheshti Hospital (Qom, Iran) did a cross-sectional research between 2016 and 2017 to evaluate ultrasonography results of acute cholecystitis. One hundred cases were identified and diagnosed. Thirty-one of the patients were men and sixty-nine was women. A total of 89 of these individuals were diagnosed with gallstones. 56 individuals had favorable pathology results, whereas 44 cases did not. It was calculated that the positive and negative predictive values were 88% and 92%, respectively. Accuracy of ultrasonography in diagnosing acute cholecystitis was reported to be 86% [59].

Acute cholecystitis ultrasonography data were analyzed in a diagnostic investigation conducted between October 2011 and November 2012 at Stockholm South General Hospital. A total of 183 individuals were enlisted for testing; of them, 74 were found to have gallstones and 21 to have acute cholecystitis. IBM SPSS Statistics Version 23 was used for the analyses. The diagnostic accuracy of ultrasonography for gallstones was 97.3%. With a sensitivity of 98.9% and a specificity of 98.2% [60].

Between January 2017 and July 2017, researchers used conventional ultrasonography in a prospective study to compare patients with acute cholecystitis to those with chronic cholecystitis based on demographic factors including age and gender. Statistical analysis was performed using MedCalc Statistical Software, version 17.5.5. There were 54 participants total. Thirteen men and sixteen women out of a total of 29 were diagnosed with acute cholecystitis; the remaining 25 did not have this condition. Since no statistically significant variations in age or sex were found between the acute cholecystitis and non-acute cholecystitis groups, it was concluded that these factors did not contribute to the severity of either condition [61].

Right upper quadrant pain was investigated retrospectively between January and April 2019. 230 women and 89 men, out of a total of 319 patients, made up the experimental group. Software version 9.4 of the statistical package SAS was used for this analysis. Three-and-a-half percent (35) of the 319 patients in the study had acute cholecystitis, sixty percent (60%) had chronic cholecystitis, and twenty-four percent (24%) did not have cholecystitis. Ultrasound was shown to have a sensitivity of 83%, specificity of 88%, and a maximum gall bladder diameter of 3.5 cm [62].

Patients presenting in Iran emergency rooms between 2015 and 2017 with right upper quadrant pain were analyzed as part of a diagnostic investigation on identifying acute cholecystitis. Version 20 of SPSS was used for the analysis of the data. Acute cholecystitis was identified in the 342 individuals who participated in the study by experts in various fields. Acute cholecystitis was reported to have a sensitivity of 89.85% and a specificity of 96.59% when detected by ultrasonography [63].

Evaluation of acute cholecystitis at a significant academic hospital was the subject of retrospective research between May 2018 and March 2020. We computed the sensitivity, specificity, positive predictive value, and negative predictive value using Microsoft Excel. The overall number of participants was 147 patients. The positive predictive value for POCUS was.6 (95% CI:.2266-.8848), specificity was94 (95% CI:.8134-.9932), and sensitivity was33 (95% CI:.0749-.7007) when compared to a RUQ US as the gold standard [64].

Starting in January 2019 and ending in April of 2019, researchers in Saudi Arabian researchers conducted a diagnostic study for the year 2021. Seven hundred seventy-nine people were checked out (462 female, 317 male). Symptoms including right upper quadrant discomfort, fever, bloating, nausea, vomiting, and jaundice were reported by 50% of patients. Percentages and frequency tables were also generated for use in descriptive statistics [65].

Similarly, men accounted for the lowest proportion (20%), while females accounted for the highest (30%)of those diagnosed with acute cholecystitis. This data also revealed that those older than 60 made up the largest age group, 18(36%), while those between the ages of 50 and 60 made up the most minor, 9(18%). In additionally to the presence of stones, 25(50%) of cases with acute calculous cholecystitis had the following primary findings on US: Murphy Sign was seen in 13 patients (26%), gallbladder wall thickening in 3, pericholecystic fluid in 3, fatty liver in 3, distended gallbladder lumen in 2, and gallbladder sludge in 1 [66].

Patients who presented to the emergency rooms of several hospitals in the United States were screened for acute cholecystitis between April 2016 and March 2019. There

were 165 participants in the research. The median unbiased estimating technique was used to determine odds ratios, and 95% confidence intervals were obtained using the mid-p exact technique. A total of 153 patients were considered for this report. Acute cholecystitis was the definitive diagnosis for 24% of these individuals (36/153). In this sample, people were, on average, 43.5 years old (SD 16.5). Men made up 34% (52/153) of the total. Acute cholecystitis patients were likelier to have a higher body mass index (OR 10.2, 95% CI 4.0-28.2) and a history of gallstones (OR 10.2, 95% CI 4.0-5.66) [65].

From January through April 2019, a total of 456 individuals were enrolled in a retrospective study, 319 of whom were part of the research's experimental cohort. The experimental cohort consisted of 319 individuals (median age 48 19 years), with 230(72%) girls and 89(28%) males. Acute cholecystitis affected 35 (11%), chronic cholecystitis affected 60 (19%), and no cholecystitis affected 224 (70%) of patients. A total of 98 people (31%), or cholecystectomies. There were a total of 201 (63%), 45 (14%), 64 (20%), and 9 (3%) ultrasounds. Patients with acute cholecystitis had a mean gallbladder width of 4.4 centimeters, those with chronic cholecystitis of 3.4 centimeters, and those without cholecystitis had a mean gallbladder width of 2.4 centimeters. The minimum gallbladder width was 2.2 cm in those with acute cholecystitis, 1.6 cm in chronic cholecystitis, and 0.4 cm in those without no cholecystitis. There were 14 people who did not have cholecystitis and whose gallbladder width was smaller than 2.2 cm; 5 (36%) had wall thickening, and 2 (14%) had a positive sonographic Murphy's sign. It was determined that a gallbladder width cutoff of 3.5 cm had a sensitivity of 83% and a specificity of 88% in diagnosing acute cholecystitis [67].

As explained by Chang et al., 2018, gallstones are an unusual cause of intestinal blockage that mainly affects the elderly. Researchers have calculated that up to 30% of people might die. Gallstone ileus is challenging to diagnose promptly because of its non-specific appearance. Here, we compare and contrast the strengths and weaknesses of four radiological imaging modalities—plain abdominal radiographs, CT, magnetic resonance imaging (MRI), and ultrasound scanning—used to diagnose gallstone ileus. They conclude that simple abdomen films, although useful as a screening tool, are insufficient for detecting gallstone ileus. CT is the gold standard when dealing with a severely ill patient [68].

Ali and Sadettin 2022 set diagnostic criteria for gallstone ileus on CT to assess its accuracy in confirming or ruling out the diagnosis in patients who first presented with acute small intestinal obstruction. They applied the standards going forward (SBO). The size of the ectopic gallstones was also analyzed to determine if it would affect the treatment strategy. To establish the diagnostic criteria, two radiologists evaluated 14 CT scans of patients with gallstone ileus for the presence or absence of previously known CT abnormalities. These criteria were used to a prospective contrast-enhanced CT study including 165 patients with acute SBO, 14 of whom had gallstone ileus. 165 CT images were reviewed by a second set of radiologists blinded to the patient's final diagnosis. All CT data were subsequently analyzed to determine the diagnostic accuracy of gallstone ileus using CT in the prospective assessment of acute SBO. The CT-measured size of the ectopic gallstone was related to the patient's clinical outcome. CT diagnostic criteria for biliary stone ileus include (1) small bowel obstruction; (2) extrahepatic gallstone; (3) aberrant gall bladder with complete air collection, presence of air-fluid level, or fluid accumulation with an uneven wall, all of which were derived from retrospective studies. Following these three criteria, CT prospectively confirmed the diagnosis of gallstone ileus in 13 cases. There was just a single occurrence of a false negative. There were no false-positive cases found. Thus, the 151 patients who are still living are all natural. Overall, CT's sensitivity was 93%, specificity was 100%, and accuracy was 99% when detecting gallstone ileus. Thirteen patients were surgically examined for gallstone ileus and ectopic stones larger than 3 centimeters. One person with a 2 cm long ectopic stone responded well to conservative treatment. In order to provide an accurate diagnosis of gallstone ileus and guide subsequent therapeutic choices, contrast-enhanced CT imaging is crucial [69].

It was not until 2020 that Aldo et al. documented gallstone ileus, a severe consequence of gallstone disease uncommon but not extraordinary in a busy emergency department. It has a role in mechanical intestinal obstruction, a condition that mainly affects the elderly and the frail and has a high morbidity and mortality rate. Radiologists are often called upon to determine the cause of intestinal blockage; thus, familiarity with the most telling signs of the condition is essential. Ileus caused by gallstones may be difficult to diagnose preoperatively with either abdominal radiography or ultrasonography alone, but combining the findings of the two tests may improve sensitivity. CT is the gold standard for diagnosis because it allows for accurate preoperative planning by identifying the number, size, and location of migrating gallstones and the exact site of intestinal obstruction. MRI may be used to acquire a detailed anatomic description of the fistulous link in certain cases [70].

According to research conducted in 2005 by Lassandro et al., small intestine obstruction due to gallstone impaction is a pathological disease often encountered in older people with a history of cholelithiasis or cholecystitis. Sonography, abdomen plain film, CT, and even magnetic resonance imaging (MRI) have all been used successfully in identifying this entity by radiologists in recent years. When it comes to the care of individuals suspected of having gallstone ileus, diagnostic imaging plays a pivotal role in the accurate prediction diagnosis and the overall treatment of these cases. Recurrence of gallstone ileus is a cause for worry since it increases the likelihood that the patient may need surgery to resolve the problem. Stones present in the gut at the time of surgery but were not noticed or removed, or the migration of additional stones in patients who had not had cholecystectomies in the past, are two potential causes of recurrence. In some instances of acute abdominal pain, it may be essential to establish an effective conservative therapy. This retrospection aimed to compare the diagnostic efficacy of MDCT and helical single-detector scanners for this ailment. Helical single-detector

and MDCT can enhance the diagnosis of gallstone ileus by providing essential information regarding the exact quantity, size, and position of ectopic stones and the site of intestinal blockage or direct vision of a biliary-enteric fistula. As a result, this will help doctors better monitor their patients' treatments [71].

A very unusual but potentially deadly complication of cholelithiasis is ileus caused by gallstones, as reported by Goldfinch and Prowse's 2017 study. This case study discusses the diagnostic difficulties associated with a gallstone ileus caused by a non-calcified gallstone. An 88-year-old woman presented with symptoms of abdominal pain and nausea. A CT scan was ordered and showed that the patient had a worsening intestinal obstruction but no gallstone hyperdensity. Gallstone ileus was ultimately determined to be the cause of the intestinal obstruction after further discussion with the medical personnel and a review of the images. The pathological analysis confirmed that a 41-millimeter obstructive calculus had been removed from the patient's jejunum during the urgent operation [72].

Having an ileus due to gallstones is an unusual complication of cholelithiasis, as documented by Li et al., 2019. A bilio-enteric fistula brings on this disease by gallstone erosion. CT imaging is usually diagnostic and occurs more often in elderly ladies. Rapid relief from the blockage is the goal of surgical surgery, which involves eliminating the gallstone and fixing the fistula. Because it mainly affects the elderly, morbidity and death rates tend to be high. An acute small intestinal obstruction was described in an 88-year-old woman with a history of several chronic conditions but no biliary presentation. CT scans of the abdomen showed a billion-enteric fistula and a gallstone lodged in the jejunum, blocking bile flow. An entero-lithotomy procedure extracted the stone during a laparoscopic procedure. As a result of the severity of the inflammatory adhesions, attempts to manipulate the chole-cysto-duodenal fistula were abandoned. This patient's postoperative course was uneventful, and she showed no signs of distress at the one-year follow-up. Surgery is the mainstay of treatment for ileus caused by gallstones. Gallstone ileus may cause severe complications if not diagnosed and treated promptly. The patient's preoperative health condition can decide which surgical procedure to do. Literature reviews often recommend using entero-lithotomy for high-risk patients and saving cholecystectomy and fistula excision for individuals with fewer comorbidities and amenable anatomy [73].

According to research by Cartwright and Knudson (2018), patients undergoing emergency surgery seldom exhibit symptoms of gallstone ileus. Due to its vague symptoms, it is commonly misdiagnosed for a long time. A case of minor bowel blockage in an 81-year-old man with a history of 2 days is presented (SBO). Aside from a history of gallstone illness, he had never had surgery before. The results of a plain abdomen radiograph followed a diagnosis of SBO. A CT scan is recommended, given the nature of SBO's presentation in a previously unscanned abdomen. Since this probable gallstone ileus was not diagnosed using standard abdominal radiography, it highlights the need for early CT imaging in such cases. The CT abdomen is the gold standard because it can detect minute quantities of gas and differentiate between different soft tissue densities.

Acute abdominal discomfort may indicate anything from a minor, self-limiting sickness to a life-threatening surgical emergency, according to research published in 2015 by Cartwright and Knudson. Methods based on disease probability, patient history, physical examination, laboratory testing, and imaging investigations are necessary for determining the cause of stomach discomfort. When trying to figure out what is wrong, knowing where the pain is coming from is an excellent place to begin. Indicators of appendicitis include discomfort in the right lower quadrant, such as this. Some parts of the history and physical examination are helpful (such as the patient's history of constipation and abdominal distension that strongly imply intestinal blockage), and others are not (e.g., anorexia has little predictive value for appendicitis). The American College of Radiology advises different imaging investigations for evaluating abdominal pain depending on the location of the discomfort. We advise ultrasonography for evaluating discomfort in the right upper quadrant and CT scans for both the right and left lower quadrants. Abdominal discomfort is a common symptom of genitourinary disease in women, and the elderly may exhibit unusual signs of illness. Therefore, it is essential to take these groups into account [74].

Globally, gallstone-related disorders may cause a lot of suffering and mortality, as reported by Murphy et al., 2020. Diseases caused by gallstones are on the rise in developed countries. The numerous clinical signs of gallstone disease vary widely in appearance, diagnosis, and accompanying issues. Radiology plays a significant role in diagnosing, treating, and follow-up of disorders related to gallstones, and imaging has various functions in gallstone-associated sickness. In this study, the author compiles the variety of disorders linked to gallstones into a single anatomical diagram. The advantages and disadvantages of different imaging techniques for the many diseases that might affect each segment of the biliary tree are highlighted [75].

Gallstone ileus may show in many different ways, making diagnosis challenging and often leading to a delay in treatment, as described by Pezzoli et al. (2015). Although surgery is the standard therapy for gallstone ileus, less intrusive methods have been proven beneficial. They present an unusual instance of gallstone ileus and its careful treatment. They present the case of a Caucasian woman, 49 years old, who was treated conservatively for intestinal sub-occlusion. Imaging techniques identified gallstone ileus (simple abdominal X-ray and CT scan). There was no operation performed. The apricot shell was removed endoscopically along with the gallstones, and she had mechanical intestinal dilatation for ileocolic stenosis and extracorporeal shock-wave lithotripsy to shatter the stones. The operation was carried out without a hitch. Due to the unpredictable nature of gallstone ileus presentation, surgery may not be the sole treatment choice for our patient. In this case study, we show that colonoscopy has the potential to be a non-invasive approach for performing both diagnostic

and therapeutic procedures at the same time. Conservative treatment may be helpful for certain people since no evidence indicates that it increases the risk of recurring biliary disease [76].

In 2015, according to Chawla et al., acute cholecystitis was a common cause of right upper quadrant pain in patients presenting to emergency rooms. Even if it may be challenging, early diagnosis and identification of linked disorders are vital for efficient treatment. Patients with symptoms of cholecystitis are increasingly being evaluated using imaging modalities such as CT, MRI, and ultrasonography. This research aids in surgical preparation, issue diagnostics, and detection. Imaging features of acute cholecystitis have been described in the literature, and they may vary according to the degree of inflammation. This page discusses the many imaging signs and their connections to cholecystitis. They also provide a checklist to help physicians identify complications in cases of acute cholecystitis as soon as possible. Patients with acute cholecystitis and concomitant issues present to the emergency department with generalized pain, most often in the right upper quadrant. It is conceivable that the clinical presentation is not always representative of the underlying problems. Cross-sectional imaging is crucial for identifying complications associated with acute cholecystitis. This article describes a spectrum of relevant imaging properties that the emergency radiology team should be acquainted with [77].

In 2013, Pinto et al. studied the case of acute cholecystitismay form even in the absence of ectopic gallstones or a blockage of the small intestine. Potential triggers include IBD, peptic ulcer disease, trauma, and cancers of the intestine and gallbladder. It is believed that adhesions between the gallbladder and colon develop due to chronic cholecystitis, leading to fistula formation. Radiologists may have difficulty diagnosing cholecystoenteric fistulas, particularly when the gallbladder is obstructed. In situations with unexplained pneumonia, they recommend evaluating the gallbladder's connection to the neighboring colon. Regarding revealing fistulas, multiplanar reconstructions are superior to standard axial imaging [78].

In Veterans Administration (VA) hospital improved its capacity to identify and care for patients with AC via the collaborative efforts of a multidisciplinary team in 2018. This investigation aimed to compare the diagnostic accuracy of CT and ultrasound. Sixty people were diagnosed with AC after 62 patient encounters between July 1, 2013, and July 1, 2015. Forty-two of these patients underwent both CT and ultrasound, whereas the other 48 only had an ultrasound. Both ultrasound and CT were performed on 60 individuals who did not have AC throughout the same period to compare the two imaging modalities. For the 42 people who had both CT and ultrasound, 25 showed favorable findings for AC on scans, 10 showed positive CT results but negative ultrasound results, 2 showed positive ultrasound and negative CT results, and 5 showed negative results on both scans. CT has a substantially greater diagnostic sensitivity for AC than ultrasound does. Due to the complementary nature of CT and ultrasound, if one modality turns up harmful data despite a high clinical suspicion of AC, the other modality should be explored.

Ultrasound is the gold standard for diagnosing people who may have gallstones because of how well it detects and rules out other conditions. Positive Murphy's sign (pain caused by the transducer or the sonographer's palpation under supervision in the specific area of the gallbladder) is said to have a sensitivity of up to 88% [79].According to Boland et al. (2000), one of the essential advantages of ultrasound over other imaging modalities in evaluating acute cholecystitis is the ability to identify a sonographic Murphy sign, a reliable predictor of acute cholecystitis with a sensitivity of 92%. More significant than 3.5 mm gallbladder wall thickness has been shown as a reliable and independent predictor of acute cholecystitis [80].

Tran et al., 2022, reported a comprehensive analysis of imaging studies published between 1978 and 1990. They found that ultrasound was 88% sensitive (95% CI: 74%-100%) and 80% specific (95% CI: 62%-98%) for diagnosing acute cholecystitis, whereas cholescintigraphy was 97% sensitive (95% CI: 96%-98%) and 90% specific (95% CI: 86%-95%) for making that determination [81].

Recently, Kiewiet et al. revised the diagnostic accuracy summary estimates for the imaging modalities provided by Shea et al. by employing state-of-the-art methodologies for the meta-analysis of diagnostic accuracy studies. The researchers concluded that cholescintigraphy offers the most significant diagnostic accuracy among imaging techniques for diagnosing acute cholecystitis. Most accurate imaging technique for detecting acute cholecystitis, even though CT scans have not been well researched and ultrasound and MRI both have significant limitations. These results are consistent with the data presented; thus, they are probably reliable [82].

In 2011, gallbladder sonography and cholescintigraphy are sensitive and specific for this condition according to Panico et al., they are generally used as the first imaging evaluation. The diagnosis of acute cholecystitis might be complicated in some instances because of the patient's unusual symptoms. Inflammation of the stomach, pancreatitis, ischemic bowel disease, and abscesses are all possible diagnoses for these people. There is a good chance that many of these people might benefit from an abdominal CT scan. CT scans are helpful in diagnosing the complications of acute cholecystitis include emphysematous cholecystitis, gangrenous cholecystitis, hemorrhage, and gallstone ileus. In addition, CT is useful for making a definitive diagnosis when ultrasonography is hampered by factors such as obesity or stomach distention [83].Panico et al. found that ultrasonography was more effective than MR cholangiography at identifying gallbladder wall thickening in situations of acute cholecystitis. While ultrasonography is the go-to for assessing cystic duct obstruction, MR cholangiography is superior in revealing gallbladder neck calculi and cystic duct calculi. As a result of its high price and restricted availability, magnetic resonance

imaging is not routinely employed as a diagnostic technique [84].

Several features of the veterans in our quality improvement study set them apart from the randomly chosen groups with acute cholecystitis seen in most studies. Although gallstones and cholecystitis are more frequent in women, the veteran population is unique in that the vast majority of VA patients are male, resulting in an exceptionally high ratio of male to female patients. During the study period, 60 patients were diagnosed with acute cholecystitis at the Raymond G. Murphy VA Medical Center. The average age of this group was 66, with a range of 31-94. The patients included 4 females and 56 males. Many of the population was elderly or male, which caused several problems. A tiny subset of people presented with the classic symptoms of right upper quadrant pain, fever, nausea, vomiting, and loss of appetite. Among the most frequently reported symptoms were a pain in the back, loss of appetite, abdominal pain of unknown origin, and chest pain. Although ultrasound (US) is recommended as the primary diagnostic tool for acute cholecystitis, our VA clinic tended to use CT instead due to patients' out-of-the-ordinary presentations [85].

Operational definitions

Cholecystitis

Cholecystitis is inflammation of the gallbladder [86].

Wall thickness: In acute cholecystitis, the wall thickness of the laparoscopic cholecystectomy group ranged from 2 to 9 mm (average of 4 mm), and the wall thickness of the conversion group was 4-7 mm (average of 6 mm). Post-operative fluid accumulation was noted in 28 (63.6%) cases.

Materials and methods

Study Design

This was a descriptive observational study.

Settings

Shalamar Hospital, Radiology Department, Lahore.

Duration of Study

4 months.

Sample Size

Data of patients with right hypochondriac pain within 4 months.

Sampling Technique

Convenient sampling technique.

Sample Selection

Inclusion Criteria: All patients with acute hypochondriac pain were referred to the radiology department to evaluate gallstones.

Exclusion Criteria: Pregnant females, Patients with cholangiocarcinoma, Patients with nonprimary (metastatic) lesions to the liver, or any other abdominal disease.

Equipment

Ultrasound Toshiba Xario XG with curvilinear probe 3-5 MHZ.

Ethical considerations

The rules and regulations set by the ethical committee of the university of Lahore were followed while conducting the research, and the research participants' rights were respected.

- Written informed consent (attached) was taken from all the participants.
- All information and data collection were kept confidential.
- Participants remained anonymous throughout the study.
- The subjects were informed that there were no disadvantages or risks in the procedure of the study.
- They were also informed that they could withdraw at any time during the study.

Data collection procedure

A data collection sheet collected data.

Data will be collected according to age, gender, and clinical findings such as abdominal pain, vomiting, dilatation of gall bladder, thickening of the gall bladder, and gall stones. All variables were formed in an excel data sheet.

Scanning technique

- The patient was not eating or drinking for 8 to 10 hours before the test. If patients eat, the gallbladder and ducts was empty to help digest food and were not easily seen during the test.
- The sonologist performing the test was likely to have lie down face-up.
- Apply a gel to the abdomen that prevents air pockets from forming between the transducer and the skin.
- The transducer sends and receives sound waves that reveal details such as the size and appearance of organs.
- Right upper quadrant (RUQ) or the epigastric region, often with guarding or rebound.

Data analysis procedure

Data were analyzed using Statistical Package for Social Science (SPSS) version 24. All the quantitative variableswere presented in the form of Mean±SD, depending upon the distribution of the data. All the qualitative variableswere presented in the form of frequency and percentage. Pie charts and bar charts was also used to display categorical data. Collected data was store in Microsoft Excel.

Results

The most common finding of acute cholecystitis in the patients presenting with right hypochondriac pain in the Radiology Department of Shalamar Hospital is the presence of gallstones (Table 1, Figure 1), Table 2, (Table 3, Figure 2), (Table 4, Figure 3), (Table 5, Figure 4), (Table 6, Figure 5), (Table 7, Figure 6,7), Table 8, Figure 8-31 .

Table 1. *Frequency distribution based on gender.*

Gender	Frequency	Percent
Male	52	51.5
Female	49	48.5
Total	101	100

There were total 101 participants in the study in which 52(51.5%) were males and 49(48.5%) were females.

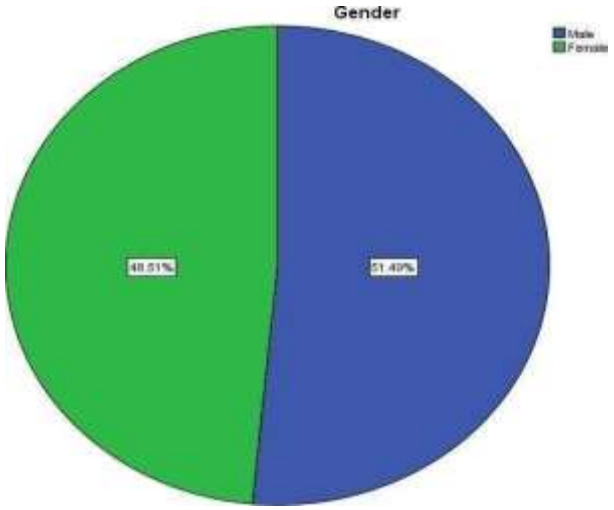

Figure 1. *Pie chart showing frequency distribution based on gender.*

Table 2. *Age distribution of research participants.*

Age				
Gender	N	Mean	Std. Deviation	p-value
Male	52	44.365	15.8807	0.117
Female	49	49.755	18.3865	

The mean ages of males were 44.37 ± 15.88 years, and the mean age of females were 49.76 ± 18.39 years. The age difference was not statistically significant (p-value 0.117).

Table 3. *Cross table between gender and Gallbladder thickness > 3mm.*

		Gall bladder thickness > 3mm		
		Yes	**No**	**Total**
	Male	26	26	52
Gender	**Female**	18	31	49
Total		44	57	101
Pearson Chi-Square 1.806a				

There is no association between gender and gallbladder thickness (p-value.179)

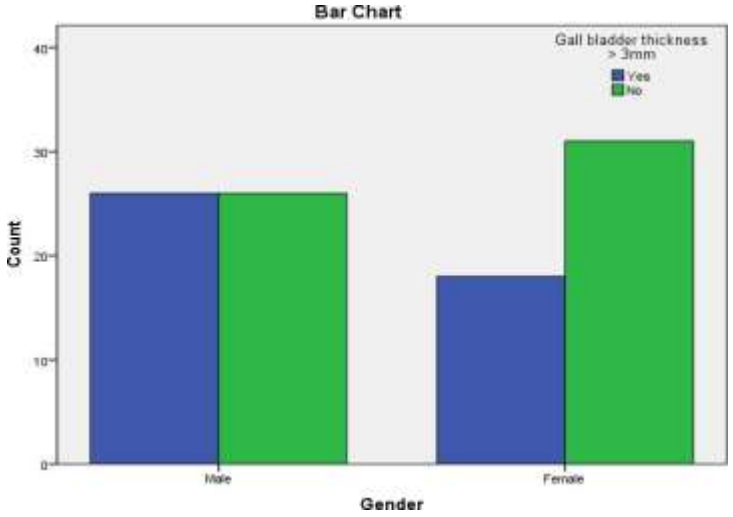

Figure 2. *Bar chart showing the association between gender and gallbladder wall thickness >3mm.*

Citation: *Hassan T. Ultrasonographic frequency of acute cholecystitis in the patients presenting with right hypochondriac pain. Arch Gen Intern Med. 2023;7(4):186*

Table 4. *Cross table between gender and Pericholecystic Fluid.*

		Pericholecystic Fluid		Total
		Yes	No	
Gender	**Male**	22	30	52
	Female	14	35	49
Total		36	65	101
Pearson Chi-Square 2.075[a]				

There is no association between gender and pericholecystic fluid (p-value 0.05)

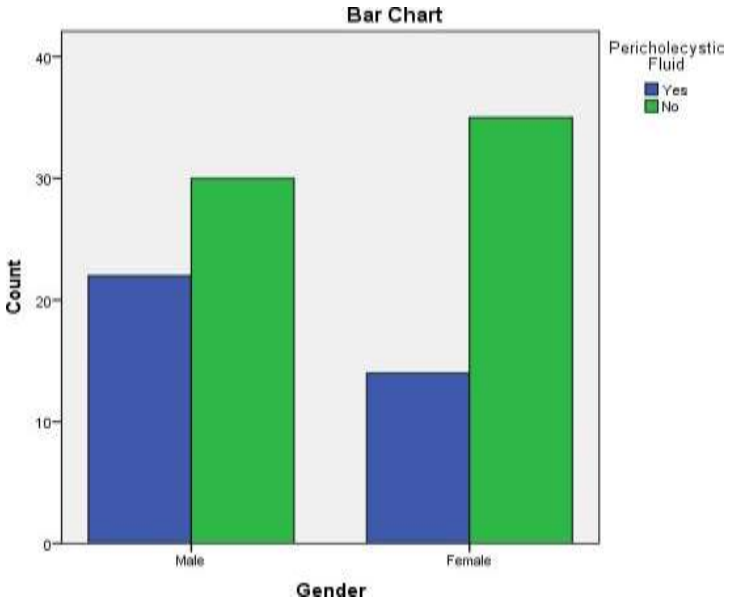

Figure 3. *Bar chart showing association between gender and pericholecystic fluid.*

Table 5. *Cross table between gender and presence of gallstone.*

Gender	Presence of gallstones		Total
	Yes	No	
Male	38	14	52
Female	40	9	49
Total	78	23	101
Pearson Chi-Square 1.050[a]			

There is no association between gender and presence of gallstones (p-value .305)s

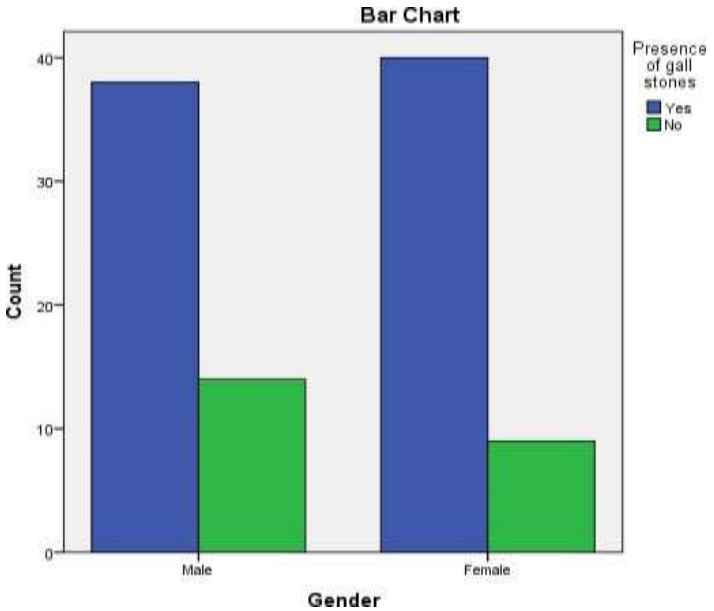

Figure 4. *Bar chart showing the association between gender and the presence of gallstones.*

Citation: *Hassan T. Ultrasonographic frequency of acute cholecystitis in the patients presenting with right hypochondriac pain. Arch Gen Intern Med. 2023;7(4):186*

Table 6. *Cross Table between gender and Distension of gallbladder.*

	Distension of gallbladder		Total
	Yes	No	
Male	24	28	52
Female	19	30	49
Total	43	58	101
Pearson Chi-Square .562[a]			

There is no association between gender and distension of gall bladder (p- value .454)

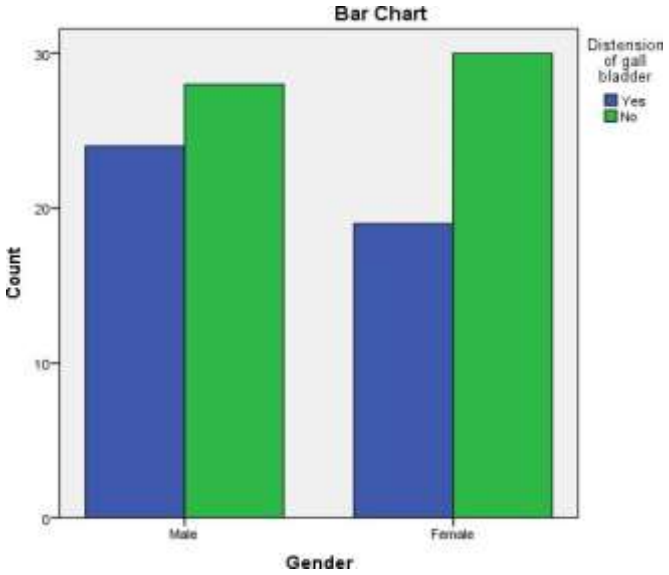

Figure 5. *BBar chart showing association between gender and gall bladder distension.*

Table 7. *Crosstable between gender and Sonographic Murphy Sign.*

Gender	Sonographic Murphy Sign		Total
	Yes	No	
Male	18	34	52
Female	12	37	49
Total	30	71	101
Pearson Chi-Square 1.239[a]			

There is no association between gender and sonographic Murphy sign (p- value .266)

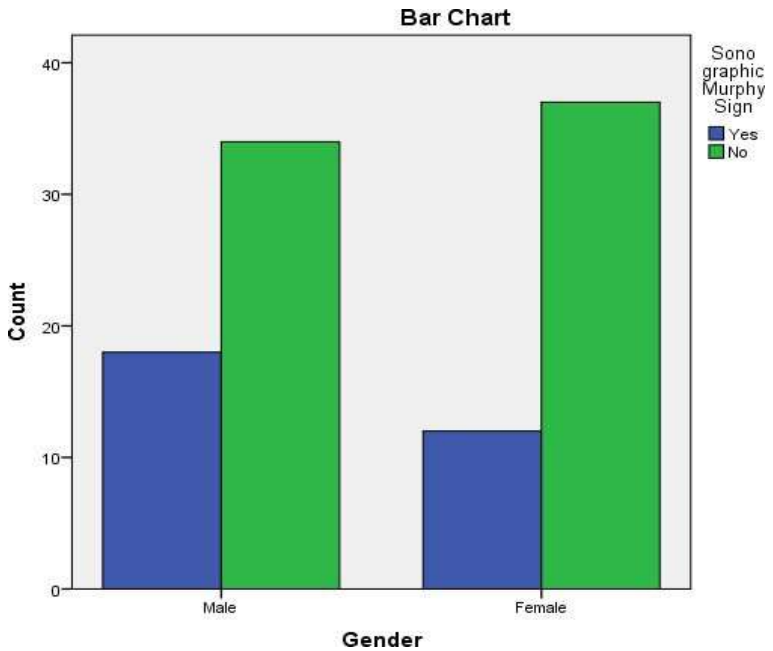

Figure 6. *Bar chart showing the association between gender and Sonographic Murphy Sign.*

Citation: *Hassan T. Ultrasonographic frequency of acute cholecystitis in the patients presenting with right hypochondriac pain. Arch Gen Intern Med. 2023;7(4):186*

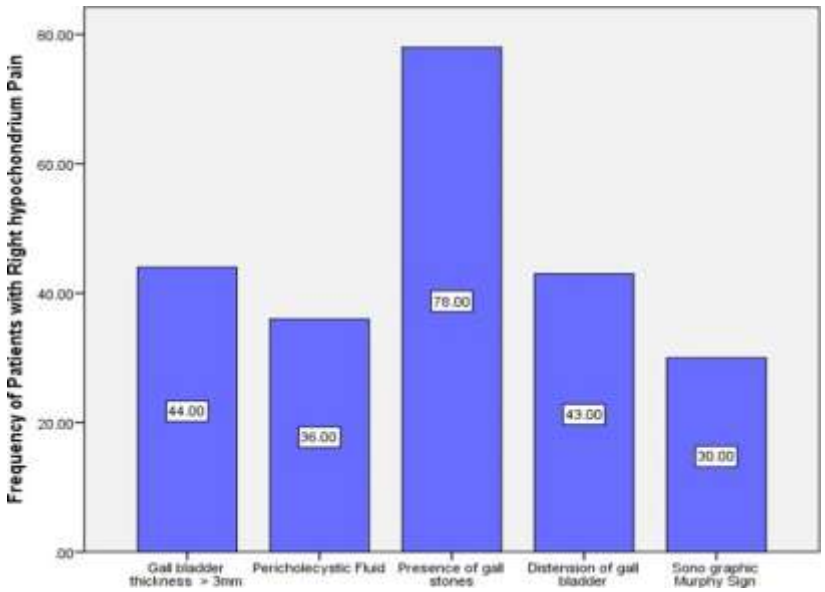

Figure 7. *Right hypochondriac pain and sonographic characteristics are shown in a bar graph.*

Table 8. *Gender distribution based on acute cholecystitis.*

Gender	Acute cholecystitis			Total
	Yes	No		
Male	36	16		52
Female	37	12		49
Total	78	23	101	

There were total 101 participants in the study in which 36(69.23%) males and 37(75.51%) females had acute cholecystitis.

Figure 8. *Ultrasound of the right upper quadrant in a patient with acute cholecystitis reveals marked thickening of the gallbladder wall (arrow) with fluid surrounding the distended gallbladder (arrowhead)*

Figure 9. *Large obstructing stone within gallbladder neck and thick hypoechoic gallbladder wall.*

Citation: *Hassan T. Ultrasonographic frequency of acute cholecystitis in the patients presenting with right hypochondriac pain. Arch Gen Intern Med. 2023;7(4):186*

Figure 10. *Striated wall with alternating echogenic & hypoechoic layers.Striated wall in setting of acute cholecystitis. Striated wall without evidence of acute cholecystitis*

Figure 11. *Impacted stone in cystic duct or Gallbladder neck.*

Figure 12. *Impacted stone in cystic duct or Gallbladder neck.*

Citation: *Hassan T. Ultrasonographic frequency of acute cholecystitis in the patients presenting with right hypochondriac pain. Arch Gen Intern Med. 2023;7(4):186*

Figure 13. *Impacted stone in cystic duct or Gallbladder neck.*

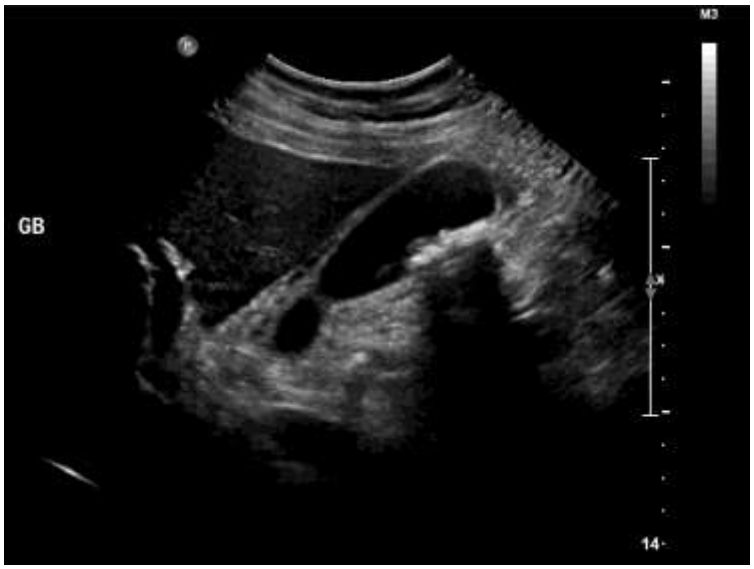

Figure 14. *Ultrasound of the abdomen demonstrating multiple stones in the gallbladder with mild prominence of the gallbladder wall concerning for acute cholecystitis*

Figure 15. *Gallbladder neck obstruction of large size and thick hypoechoic gallbladder wall.*

Citation: *Hassan T. Ultrasonographic frequency of acute cholecystitis in the patients presenting with right hypochondriac pain. Arch Gen Intern Med. 2023;7(4):186*

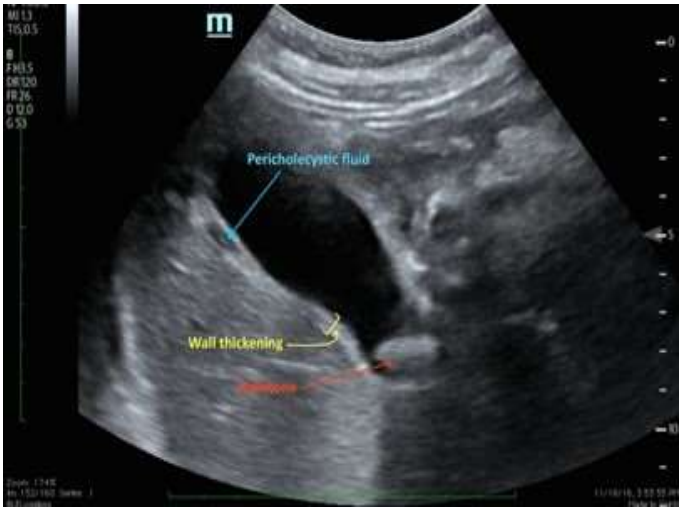

Figure 16. *Ultrasound of the abdomen demonstrating gallbladder wall thickening (arrow) and layering sludge, concerning for acute cholecystitis.*

Figure 17. *Large stone blocking gallbladder neck and thick gallbladder wall that is not echogenic.*

Figure 18. *A sonogram of the abdomen shows small gallstones with echogenic sludge and a thickening of the gallbladder wall.*

Citation: *Hassan T. Ultrasonographic frequency of acute cholecystitis in the patients presenting with right hypochondriac pain. Arch Gen Intern Med. 2023;7(4):186*

Figure 19. *Small gallstones with echogenic sludge and thickening of the gallbladder wall as seen on abdominal ultrasound.*

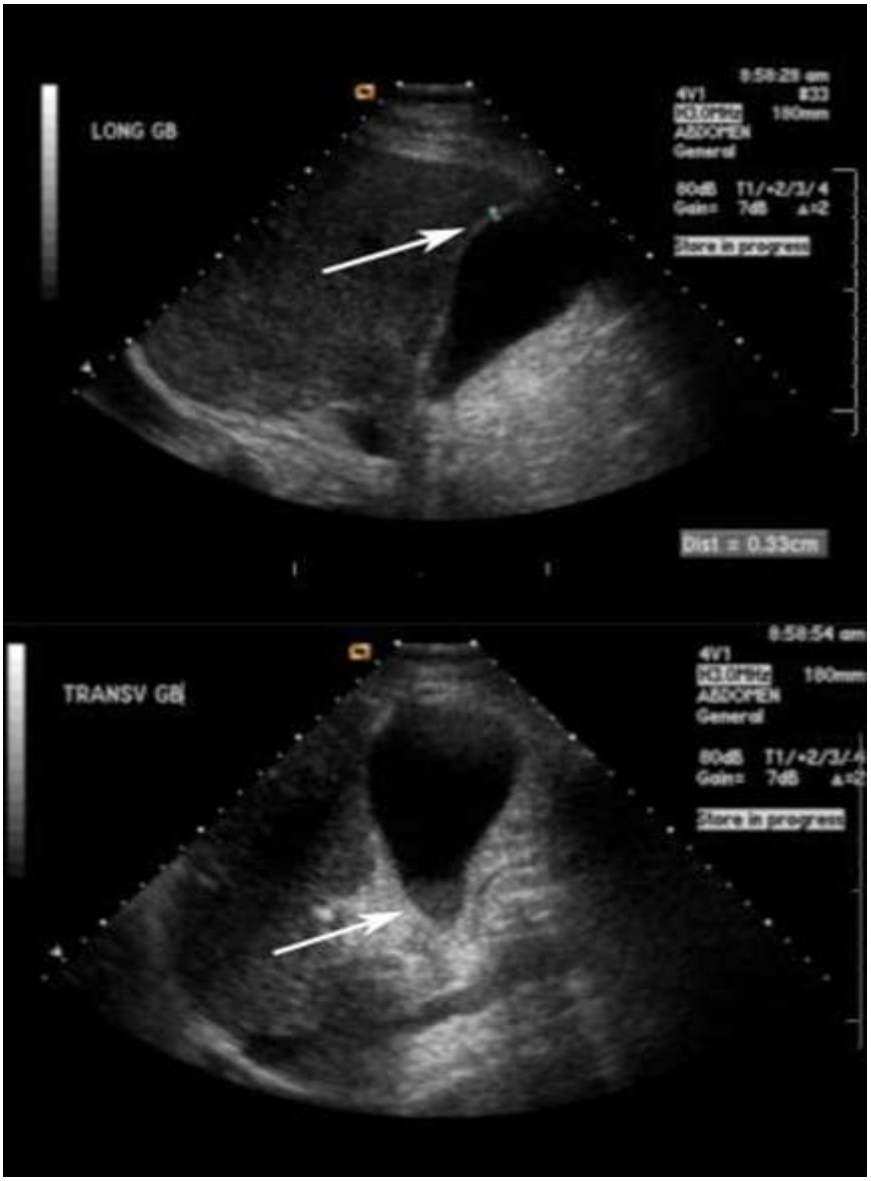

Figure 20. *(a and b) Abdominal ultrasound findings of a patient with neutropenic cholecystitis. Longitudinal and transversal sections of the gallbladder. Striated wall thickening up to 8.3 mm.*

Citation: *Hassan T. Ultrasonographic frequency of acute cholecystitis in the patients presenting with right hypochondriac pain. Arch Gen Intern Med. 2023;7(4):186*

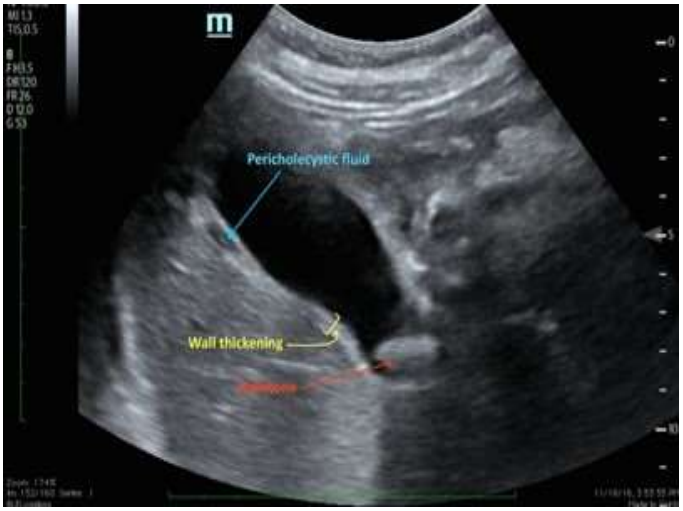

Figure 21. *Presence of gallstones (absence of stones has a high negative predictive value for cholecystitis. Thickened gallbladder wall (> 3 mm).*

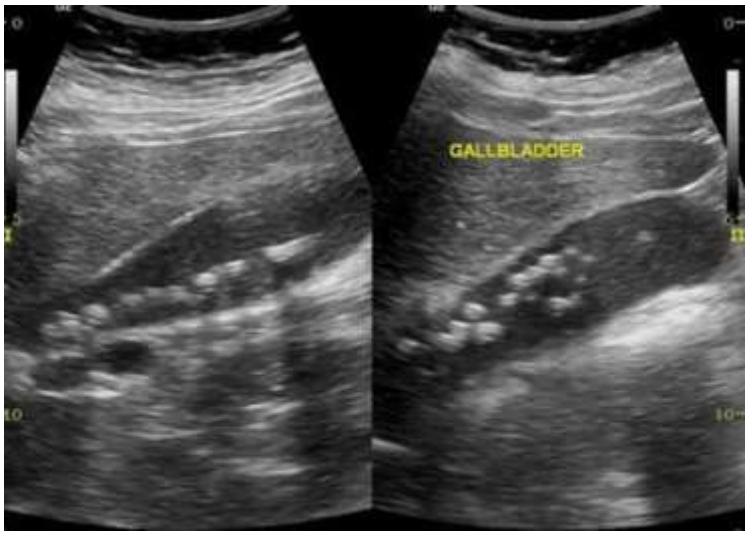

Figure 22. *Thickened gallbladder wall. wall thickening (>3 mm), pericholecystic fluid and inflammation in the pericholecystic fat.*

Figure 23. *Gallstones should be present since their absence has a strong negative predictive value for acute cholecystitis.*

Citation: *Hassan T. Ultrasonographic frequency of acute cholecystitis in the patients presenting with right hypochondriac pain. Arch Gen Intern Med. 2023;7(4):186*

Figure 24. *Lack of movement of impacted echogenic gallstones. Gallbladder distension (diameters: longitudinal >9 cm and transverse >4 cm).*

Figure 25. *Ultrasound of the abdomen showing small gallstones with echogenic sludge with gallbladder wall thickening.*

Figure 26. *Longitudinal ultrasound image of the gallbladder demonstrates multiple small shadowing gallstones and thickened gallbladder wall measuring up to 1 cm.*

Citation: *Hassan T. Ultrasonographic frequency of acute cholecystitis in the patients presenting with right hypochondriac pain. Arch Gen Intern Med. 2023;7(4):186*

Figure 27. *Large stone blocking gallbladder neck and thick gallbladder wall that is not echogenic.*

Figure 28. *Ultrasound image showing GB wall thickening in a patient.*

Figure 29. *Ultrasound images showing diffuse GB wall thickening. Intraluminal content of sludge and gallstones filling the GB.*

Citation: *Hassan T. Ultrasonographic frequency of acute cholecystitis in the patients presenting with right hypochondriac pain. Arch Gen Intern Med. 2023;7(4):186*

Figure 30. *Presence of gallstones (absence of stones has a high negative predictive value for cholecystitis).*

Figure 31. *Ultrasound images showing diffuse GB wall thickening. Intraluminal content of sludge and gallstones filling the GB.*

Discussion

This study helped to rule out the most common findings of acute cholecystitis on ultrasound and may guide future strategies. This study was conducted on 101 patients who presented with right upper quadrant pain in the radiology department of Shalamar Hospital. The statistical analysis of this study showed that the frequency of most common finding of acute cholecystitis on ultrasound was the presence of gallstones. The second common finding was the gallbladder wall thickness, which is more than 3mm; the others included the distention of the gallbladder and pericholecystic fluid; the least common finding was the sonographic murphy sign.

Comparing this study with the previous one conducted at Al-Mostaqbal Hospital Department. This study was performed on 50 patients. The most common finding in acute cholecystitis patients was the presence of gallstones, and the second most common finding was the positive sonographic murphy sign. The other two common findings were gallbladder wall thickness and pericholecystic fluid, and the least common in those patients was gallbladder distention66.A diagnostic study was conducted in America from April 2016 to March 2019 to evaluate the presence of acute cholecystitis in patients presenting to the emergency department of multiple hospitals. 165 patients were enrolled for this study. Odds-ratios were calculated by the median unbiased estimation method with 95% confidence intervals generated with the mid-p exact method. 153 patients were included in the final analysis. 24% (36/153) of these patients had a final diagnosis of acute cholecystitis. The average age of the cohort was 43.5 years (SD 16.5). 34% (52/153) were male. Those with acute cholecystitis were more likely to have a higher BMI (difference 3.17, 95% CI 0.69–5.66) and a history of gallstones (OR 10.2, 95% CI 4.0–28.2)65.

A retrospective study was performed between July 2013 to July 2015to determine the improvement in the diagnosis and treatment of cholecystitis. Specialists of different specialties diagnosed 60 patients. Among them,the study included 56 men and 4 women retrospectively. Of these patients, 56 underwent

ultrasound. The sensitivity of ultrasound for detecting Acute Cholecystitis was significant at 68% and a negative predictive value (NPV) of 77% 58.

From the discussion mentioned above, we have concluded that the results of the previous study conducted at Al- Mostaqbal Hospital Department of ultrasound Radiology in Jeddah, Saudi Arabia, and the results of the recent study conducted at the Radiology Department of Shalamar Hospital are quite similar in the sense that the frequency of the most common finding of acute cholecystitis in the patients with right hypochondriac pain is the presence of gallstones.

This study is also compared with the results of the previous study on 456 patients with right upper quadrant pain [87]. One hundred thirty-seven patients were excluded due to a lack of at least one month of clinical follow-up with the resolution of symptoms or cholecystectomy, resulting in 319 studies and patients to be included in the experimental cohort at the Department of Radiology, Columbia University Medical Center. The study was retrospective and out of which eleven percent of the patients had acute cholecystitis. The mean gall bladder width was 4.4 cm, and gallbladder stones were seen as one of the most common findings, ultrasonographic Murphy sign and pericholecystic fluid being the other two common findings [88].

We compare the previous study with the study recently conducted. We conclude that the most common finding between the previous study and our study is similar, i.e., the presence of gallbladder stones [89].By comparing all the above studies with the one performed at Shalamar Hospital, we cansee the presence of gallbladder stones.

Conclusion

Currently, ultrasound is the recommended imaging modality for the diagnosis of cholelithiasis and acute cholecystitis. Diagnostic findings include gallbladder wall thickening, pericholecystic fluid, or a sonographic Murphy's sign. There were total 101 participants in the study in which males were high in numbers than females. The mean ages of males were 44.37 + 15.88 years, and the mean age of females were 49.76 + 18.39 years. The age difference was not statistically significant. There is no association between gender and gallbladder thickness. There is no association between gender compared with pericholecystic fluid, distension of gall bladder and sonographic Murphy sign. From this study, it has been concluded that the most common finding of acute cholecystitis is the presence of gallbladder stones.

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