بسم الله الرحمن الرحيم

Sudan University of Sciences and Technology
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Sonographic Measurement Of Gallbladder Wall Thickness Among Symptomatic Adults In Atbara city

قياس سمك جدار المرارة للبالغين الذين لديهم أعراض باستخدام الموجات فوق الصوتية بمدينة عطبرة

A thesis submitted for partial fulfillment for the requirement of M.Sc. degree in medical diagnostic ultrasound

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march 2019

الآية

قال تعالى :

بسم الله الرحمن الرحيم

سورة طه ، الآية (144)

Dedication

I dedicated this work to..

SPIRIT FATHER
MY MOTHER
MY HUSBAND
MY BROTHER
MY SONS
AND MY FRIENDS

Acknowledgement

First and above all, thanks and praises to Allah, the almighty for providing me this opportunity and granting me the capability to proceed successfully, and the prayers and peace be upon the merciful prophet Mohamed .

I want to express my sincere thanks and deep graduate to my faithful supervisor Dr .Asmaa Ibrahim Ahmed Elamin-for has guidance throughout this thesis and sharing his knowledge through the entire study .

I would also like to pass my special thanks my friends and colleagues .who help me especially my husband Mortada Abdelgader .

Abstract

This was a descriptive cross sectional study carried out during the period from September 2018 to march 2019 .

This study was conducted in Atbara state in the ultrasound department of Atbara hospital .

The study aimed to characterize the gallbladder measurement in symptomatic patients 50 patients with clinical suspected of gallbladder disease/ hepatitis cirrhosis and renal failure (26 male- 24 female) were enrolled in the study . The study showed that the male are common affected than female (52%) were males and (48%) were female . the collected data were analyzed using the SPSS statistical program .

The result of this study showed that gall bladder wall was commen affected by gall bladder disease/ hepatitis cirrhosis and renal failure that measure up to (3mm) . the length and width of gall bladder showed were most commen affected by the GB disease only that measure up to (3cm) width and up to (10 cm) length .

The study recommend that future studies with large samples could be done in the same topic to know more about the role of ultrasound reply in the evaluation of gall bladder measurement in symptomatic patient in Sudan in general .

الخلاصه

هذه الدراسة وصفية أجريت بقسم الموجات فوق الصوتية في مستشفى عطبرة التعليمي – السودان – في الفترة من سبتمبر 2018 الي مارس 2019م .

تكمن الدراسة في قياس طول وعرض وسمك جدار المرارة ، للمرضي الذين يعانون من التهاب المراره والتهاب الكبد الوبائي و تليف الكبد والفشل الكلوي ، والهدف من هذه الدراسة هو تأكيد دور وأداء الموجات فوق الصوتيه في فعالية قياس جدار المراره . تم جمع البيانات من 50 مريض ، فقد كان عدد الرجال 26 ، وعدد النساء 24 ، وقد تراوحت أعمارهم بين 25 – 50 سنة . أظهرت الدراسة أن نسبة الرجال المتأثرين بالمرض 52% ،ونسبة النساء 48% ، أي ان نسبة الرجال اكثر من النساء .

تم جمع البيانات وتصنيفها وتحليلها بواسطة برنامج الحزم الإحصائية للعلوم الاجتماعية (SPSS) .

أفادت الدراسة أن سمك جدار المراره أكثر تأثيرا بالأمراض المتعلقة بالمرارة ، والتهاب الكبد الوبائي وتليف الكبد والفشل الكلوي ، وذلك بأن كان قياسه اكثر من (ثلاثه ملليمتر) . اما طول وعرض المرارة اكثر تأثيرا بالامراض المتعلقه بالمراره فقط وذلك بان كانت اكثر من (ثلاثه سنتميتر) للعرض و (عشره سنتميتر) للطول .

أوصت الدراسة بعمل بحوث أخري في المستقبل باختبار عينات أكبر من مجتمع الدراسه لمعرفة الكثير عن دور التصوير بالموجات فوق الصوتيه في تقويم قياس جدار المراره للمرضي في السودان بصورة عامه .

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List of abbreviations

AC	Acute cholecystitis
GB	Gall Bladder
HBV	Hepatitis B virus
HCV	Hepatitis C virus
PHT	Portal Hypertension
PV	Portal Vein
RUQ	Right Upper Quadrant
UQP	Upper Quadrant Pain

Chapter One

Introduction

Chapter One

Introduction

1.1 Introduction:

The gallbladder is a hollow pear-shaped viscera with thin and regular walls, located in the gallbladder fossa between the IV and V segments of the liver, an area which is devoid of the visceral peritoneum (Patton, 2015).

The normal gallbladder wall appears as a pencil-thin echogenic line at sonography. The thickness of the gallbladder wall depends on the degree of gallbladder distention and pseudo thickening can occur in the postprandial state.

sonography, CT and MRI all allow direct visualization of the normal and thickened gallbladder wall . Traditionally, sonography is used as the initial imaging technique for evaluating patients with suspected gallbladder disease, because of its high sensitivity in the detection of gallbladder stones, its real-time character, speed and portability (Rumack CM, Wilson SR, Charboneau JW.1998).

Thickening of the gallbladder wall is a relatively frequent finding at diagnostic imaging studies. A thickened gallbladder wall measures more than 3mm, typically has a layered appearance at sonography . and at CT frequently contains a hypodense layer of subserosal oedema that mimics pericholecystic fluid

(Zissin R, Osadchy A, Shapiro M, Gayer G.2003) . Among the different diseases that cause gallbladder walls thickening besides acute cholecystitis, pancreatitis, diverticulitis, heart failure, pyelonephritis and hepatitis can be mentioned. The appropriate characterization and interpretation of such finding is of utmost importance, considering that the correct diagnosis has a direct impact on the treatment and that in some cases some of these diseases require surgical approach (Wibbenmeyer LA, Sharafuddin MJ, Wolverson MK, et al.1995).

1.2 The problem :

Gallbladder wall thickening is nonspecific common finding that can occur in a wide range of gallbladder diseases and extra cholecystic condition ، distinguish among the wide variety of conditions is important for diagnosis and directing appropriate management **.**

1.3 Objectives of the study :

1.3.1 General objectives

The purpose of this study is to check the GB wall thickness looking for the abnormal wall thickness and the causes abnormality .

1.3.2 Specific objectives :

- To determine the sonographic gallbladder wall thickness .
- To find out the correlation between GB wall thicking and gender.
- To find out the correlation between GB wall thicking and age.
- To find out the disease affected to the GB wall.

1.4 Over view of the study:

This study was concerned with characterize of GB wall thicking sonographically. Using gallbladder texture and gallbladder wall thickness, murphy sign , analysis accordingly , it falls into five chapters.

Chapter one is an introduction which include introductory notes on GB wall thicking causes and complications, role of ultrasound as well as the problem and objectives, while chapter two include gallbladder anatomy, physiology and pathology, chapter three deals with the methodology, were it provides of material and methods used to acquire the data in this study as well as the methods analysis approach .While the results were presented in chapter four and finally chapter five include discussion of the results conclusion and recommendation followed by references and appendices.

Chapter Two

Literature review and Theoretical background

Chapter two

Literature review and Theoretical background

2.1 Anatomy:

The gallbladder is a pear-shaped organ which lies on the visceral inferior surface of the liver between segments IV and V of the liver. The first and second parts of the duodenum lie behind it and the transverse colon lies below. It is covered with peritoneum except where it is adherent to a depression in the liver surface known as the gallbladder fossa. The expanded lower end of the gallbladder, or fundus, may or may not project beyond the inferior border of the liver in the region of the right ninth costal cartilage and the body of the organ narrows to form the neck which terminates in the cystic duct. The dilated area proximal to the junction of the neck and cystic duct is known as Hartmann's pouch. The cystic duct arises from the neck of the gallbladder and joins the common hepatic duct. It is typically of 1-3 mm diameter although may be much wider in some individuals. The mucosa is arranged in spiral folds known as the valve of heister. It most frequently is 3-4 cm in length and joins the common hepatic duct at a slight angle . (Patton, 2015).

The main blood supply to the gallbladder is provided by the cystic artery, which arises from the right branch of the hepatic artery posterior to the common hepatic duct 400,000. The cystic artery runs above and behind the cystic duct to reach the neck of the gallbladder where it divides into an anterior and a posterior branch. The gallbladder also receives a variable blood supply from the liver through its bed.

A major portion of the venous drainage passes directly to the liver through the gallbladder fossa but veins may be .seen around the cystic artery and these drain directly into the portal vein . (Patton, 2015).

The cystic lymph node lies adjacent to the cystic artery where it meets the gallbladder wall, and is therefore a useful landmark during cholecystectomy.

Lymph from the gallbladder and bile ducts passes through the cystic node and into other hepatic nodes in the edge of the lesser omentum.

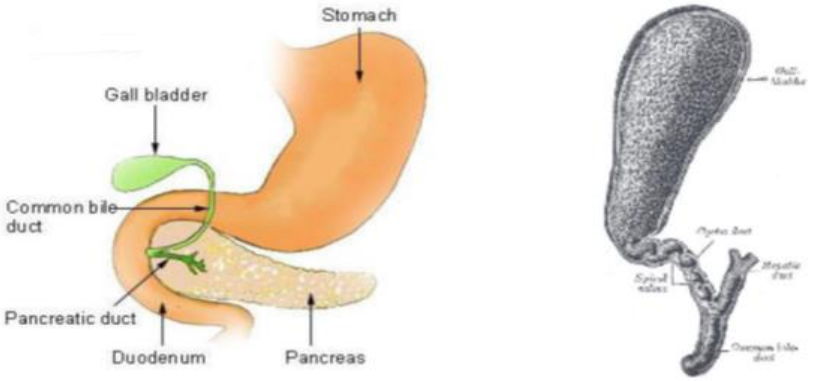


Figure (2.1): Richards Snell clinical anatomy

2.1.1 Bile ducts:

The right and left hepatic bile ducts fuse at a variable distance below the liver to form the common hepatic duct. The area between the common hepatic duct which lies within the edge of the lesser omentum, the liver and the cystic duct, is called calot's triangle. Its contents are the cystic artery and lymph node and its accurate identification and dissection are crucial to the safe performance of cholecystectomy. calot actually described the triangle lying between the cystic artery, cystic duct and hepatic duct but the above description is the one usually referred to and of more practical relevance . (Patton, 2015 -1327)

The hepatic artery lies on the left of the common hepatic duct and the portal vein lies posteriorly. The cystic duct joins the common hepatic duct to form the common bile duct approximately 2cm above the duodenum. as it passes behind the first part of the duodenum and the head of the pancreas the bile duct loses its peritoneal covering, and it enters the duodenum through the posteromedial wall to join the main pancreatic duct

within the ampulla of vater, which then opens into the duodenum via a papilla in the second part of the duodenum approximately 10cm beyond the pylorus. circular muscle fibers are present around the terminal portion of the bile and pancreatic ducts and their confluence at the ampulla. The combination of all these sphincteric mechanisms is known as the sphincter of oddi . (Patton, 2015)

The blood supply to the bile ducts is complex and branches are received from the gastroduodenal, hepatic and cystic arteries, as well as the coeliac and superior mesenteric vessels. two vessels run along the lateral borders of the supraduodenal segment and 60% of their blood supply is provided from arteries below, mainly from the retroduodenal and retroportal vessels. The right hepatic artery provides most of the blood supply of the main bile duct from above and only 2% of the blood is derived from the common hepatic artery. This arrangement of the blood supply suggests that bile duct damage during surgery can be minimized by restricting dissection at the lateral margins of the common bile duct so as to avoid damaging the axial vessels. flush ligation of the cystic duct on the common bile duct is also best avoided for the same reason. Anastomotic complications after transplant surgery may also be related to arterial damage . (Saladin, 1998)

The nerves to the extra hepatic bile ducts are derived from segments 7-9 of the thoracic sympathetic chain and from the parasympathetic vagi. Afferent nerves which include pain fibers from the biliary tract run in sympathetic nerves and pass through the coeliac plexus and the greater splanchnic nerves to reach the thoracic spinal cord via the white rami communicants and dorsal ganglia .

The preganglionic efferent nerves from the spinal cord relay with cell bodies in the coeliac plexus and the post-ganglionic fibers run with the hepatic artery to supply the biliary tract. A small contribution of pain afferents may travel within the right phrenic nerve and peritoneum below the right diaphragm. These fibers may account for the radiation of gallbladder pain to the right shoulder tip during attacks of gallstone colic. vagal fibers supply the hilum of the liver and the bile ducts. Although vagal stimulation

results in gallbladder contraction and relaxation of the sphincter of Oddi, the effects are overshadowed by the action of gastrointestinal hormones such as cholecystokinin **.** (Saladin, 1998)

2.1.2 Variations and anomalies of gallbladder:

The gallbladder may rarely be absent or rudimentary, and when this occurs it may be associated with other congenital anomalies such as tracheo-oesophageal fistula or imperforate anus. Left-sided or intrahepatic gallbladders and double and triple gallbladders have also been reported. discovery of duplications at operation, usually by operative cholangiography, should be followed by removal of both gallbladders. a second operation may be necessary later if only one organ is removed . The gallbladder may be abnormal in structure, for example the body may be divided completely or partially by a septum. complete division may result in two separate cavities fused at their necks to form a single cystic duct or they may drain by two separate ducts. Partial separation of the fundus from the body seen at surgery or during pre-operative imaging is known as a Phrygian cap, and is caused by a localised thickening of the gallbladder wall. It is of little significance and gallbladder function is usually normal. complete investment of the gallbladder with peritoneum can predispose to torsion around its associated mesentery, particularly when this is restricted to the neck of the organ so that the body and fundus remain free. bile ducts major variations in bile duct anatomy are common, and their frequency has been analyzed in a large series of operative cholangiograms. The most important anatomical variations from an operative viewpoint are those pertaining to the cystic duct. The most important, and potentially dangerous, variations involve different types of right sub-segmental ducts and their drainage into the biliary tract via, or close to, the cystic duct.

A few examples of the commoner variations include :-

A high insertion of the cystic duct into the region of the common bile duct bifurcation (3.1%) . an accessory hepatic duct, defined as a separate channel draining a segment of

the right lobe of the liver into the common hepatic duct, cystic duct or gallbladder. The incidence is between 1 and 4% and it may be the only drainage from the relevant segment. an injury can easily occur to these ducts during cholecystectomy and may result in partial or total occlusion of a portion of the biliary tract as there is a lack of interductal communications within the liver . The cystic duct entering the right hepatic duct. This is an uncommon variation (0.2%), but increases the risk of transection or ligation of the right duct during surgery . (Center, 2009)

The right and left hepatic ducts may join the common hepatic duct in a variable manner, and occasionally this junction may be truly intrahepatic. The right duct occasionally fuses with the cystic duct . Duplication of the cystic ducts is very rare. Intraoperative cholangiography is used for the recognition of these anomalies. Accessory ducts may be tied off if small, but larger ducts should be preserved and implanted into a roux loop if necessary. bile peritonitis or fistula may be a consequence of the unrecognized division of such a duct anomalies of the common bile duct itself are very rare but ectopic drainage of accessory ducts into the stomach has been described on five occasions, including an original report by vesalius in 1543 . The anomaly has been associated with symptomatic biliary gastritis . Occasionally during cholecystectomy an accessory duct (or ducts) is encountered in the gallbladder bed a duct of luschka. when missed these ducts may present as bile leaks in the post-operative period . once thought to be intrahepatic ducts draining directly into the gallbladder, anatomical studies and the common finding of two transacted ducts confirms that they are segmental or sub-segmental ducts lying superficially in the gallbladder bed. They should be clipped or sutured to prevent leakage . (Mariat et al. 2000)

2.1.3 Hepatic and cystic arteries:

Major anomalies of vessel origin are particularly important during hepatectomy and pancreatectomy. The left hepatic artery arises from the left gastric, splenic or superior mesenteric in 3-6% of the population and may be especially at risk during gastrectomy

and laparoscopic fundoplication. The right hepatic artery arises from the superior mesenteric artery in 10-20% and an accessory right hepatic artery arising from the superior mesenteric is found in 5% of patients. The right hepatic artery is particularly at risk during cholecystectomy if it takes a tortuous course close to the cystic duct and neck of the gallbladder, as the cystic artery may be very short in this variation. Anatomical variations of the cystic artery itself are common, and it may arise from the left, common or accessory hepatic arteries and pass anterior or posterior to the main bile duct. more than one cystic artery is present in some patients . The cystic artery not uncommonly runs in front of the common bile duct, which increases its risk of damage to the bile duct during cystic artery dissection and ligation . (Patton , 2015)

2.2 Gallbladder physiology:

The gallbladder is a pear-shaped , hollow structure located under the liver and on the right side of the abdomen. Its primary function is to store and concentrate bile, a yellow-brown digestive enzyme produced by the liver. The gallbladder is part of the biliary tract.

The gallbladder serves as a reservoir for bile while it's not being used for digestion. The gallbladder's absorbent lining concentrates the stored bile. When food enters the small intestine, a hormone called cholecystokinin is released, signaling the gallbladder to contract and secrete bile into the small intestine through the common bile duct . (Simeone et al , 1989)

The bile helps the digestive process by breaking up fats. It also drains waste products from the liver into the duodenum, a part of the small intestine.

2.3 Gallbladder Pathology :

The majority of gallbladder diseases are caused by inflammation due to irritation of the gallbladder wall, which is known as cholecystitis. This inflammation is often due to gallstones blocking the ducts leading to the small intestine and causing bile to build up. It may eventually lead to necrosis (tissue destruction) or gangrene. other diseases of the gallbladder include gallbladder polyps and gallbladder cancer.

2.3.1 Gallstones:

Gallstones develop when substances in the bile **(**such as cholesterol, bile salts, and calcium**)** form hard particles that block the passageway to the gallbladder. gallstones also tend to form when the gallbladder doesn't empty completely or often enough. They can be as small as a grain of sand or as large as a golf ball. (Center, 2009)

Numerous factors contribute to risk of gallstones include :-

- Being overweight or obese
- Eating a high-fat or high-cholesterol diet
- Having diabetes
- Being age 60 or older
- Taking medications that contain estrogen. having a family history of gallstones
- Being female

2.3.2 Cholecystitis:

Cholecystitis is the most common type of gallbladder disease. It presents itself as either an acute or chronic inflammation of the gallbladder.

2.3.2.1 Acute cholecystitis:

Acute cholecystitis is generally caused by gallstones, but it may also be the result of tumors or various other illnesses. It may present with pain in the upper right side or upper middle part of the abdomen. The pain tends to occur right after. a meal and ranges from sharp pangs to dull aches that can radiate to the right shoulder.

Acute cholecystitis can also cause :-

- Fever
- Nausea
- Vomiting
- Jaundice
- Different colored stools.

2.3.2.2 Chronic cholecystitis:

After several attacks of acute cholecystitis, the gallbladder will shrink and lose its ability to store and release bile. abdominal pain, nausea, and vomiting may occur.

2.3.3 Choledocholithiasis (gallstones) :

Gallstones may become lodged in the neck of the gallbladder or in the bile ducts. when the gallbladder is plugged in this way, bile can't exit. This may lead to the gallbladder becoming inflamed or distended . The plugged bile ducts will further prevent bile from traveling from the liver to the intestines. Choledocholithiasis **can cause** :-

- Extreme pain in the middle of your upper abdomen
- Fever
- Chills
- Nausea
- Vomiting

2.3.4 Acalculous gallbladder disease:

Acalculous gallbladder disease, or biliary dyskinesia, occurs without the presence of gallstones. It can be chronic or acute and may result from the gallbladder muscles or valve not working properly. The symptoms can include abdominal pain on the right side of the body that radiates to the shoulder .

Eating foods high in fat often triggers this. Related symptoms may include :-

- Nausea
- Vomiting
- Bloating
- Loose stools

2.3.5 Sclerosing cholangitis:

Inflammation, scarring, and damage to the bile ducts is referred to as sclerosing cholangitis. It's unknown what causes the disease. People with sclerosing cholangitis may

have an enlarged liver or spleen along with a decrease in appetite and weight loss . (Mc Gillicuddy et al., 2011)

2.3.6 Gallbladder Cancer:

Cancer of the gallbladder is a relatively rare disease. If it's not treated, however, it can spread from the inner walls of the gallbladder to the outer layers and then to the other organs and ducts. The symptoms of gallbladder cancer may be similar to those of acute cholecystitis . (Center, 2009)

2.3.7 Gallbladder Polyps :

Gallbladder polyps are lesions or growths that occur in the gallbladder. They're usually benign and have no symptoms.

2.3.8 Gangrene of the gallbladder:

Gangrene develops when the gallbladder stops functioning due to inadequate blood flow. This may occur due to infections, injury, diabetes, surgery or diseases related to blood circulation .

The symptoms of gallbladder gangrene can include :-

- Pain in the gallbladder region
- Fever
- Nausea or vomiting
- Gas disorientation
- Low blood pressure

2.3.9 Abscess of the gallbladder :

Abscess of the gallbladder results when an area of the body becomes inflamed with pus. Pus is the accumulation of white blood cells, dead tissue, and bacteria It may present with upper right-sided pain in the abdomen .(Center, 2009).

2.4 Methods of diagnosing acutecholecystitis :

Acute cholecystitis scan be diagnosed by ultrasound, CT-scan, MRI.

2.4.1 Ultrasound:

Ultrasound is more sensitive and specific method in diagnosing the gall bladdertexture and gallbladder wallthickness, Murphysign **.** (Singh et al., 2014)**.**

2.5 Sonographic appearance of the gall bladder disease affected of wall thicking:

The two most useful secondary supporting signs in patients with suspected acutecholecystitis are gallbladder wall thickening (> 3mm) and a positive sonographic Murphy sign. A positive sonographic murphy sign consists of maximum reproducible tenderness over the sonographically localized gallbladder Tenderness is inconsistently present over the gallbladder . (Mendler et al., 1998)

In a patient with suspected acute cholecystitis the presence of gallstones plus either a thickened GB wall or a positive Murphy sign has a positive predictive value of greater than 99% for patients whose pain is cured by cholecystectomy.

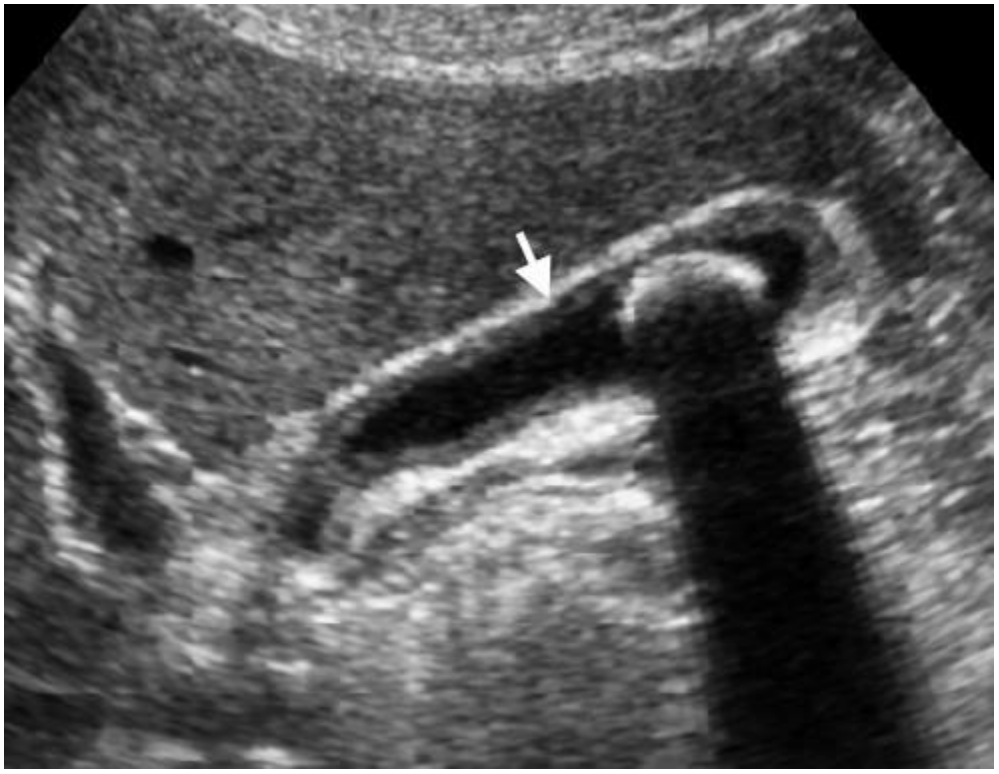


Figure (2.2): ultrasound image shows gallstones plus a thickened GB wall

Ultrasound findings of acalculous cholecystitis are nonspecific. whenever a hospitalized patient who subsequently develops abdominal pain and they have one or more of the following criteria, consider acalculous cholecystitis :-

- Gallbladder wall thickening
- A positive sonographic Murphy sign
- Pericholecystic fluid

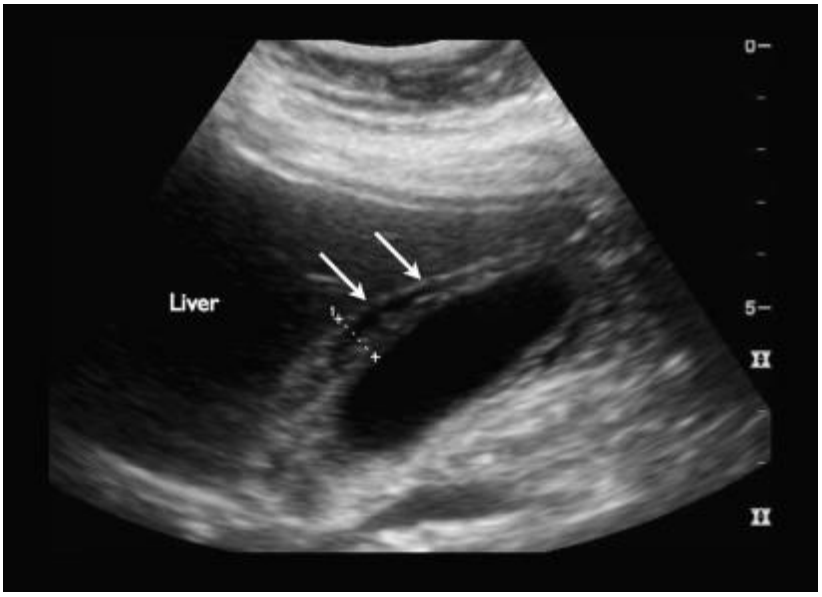
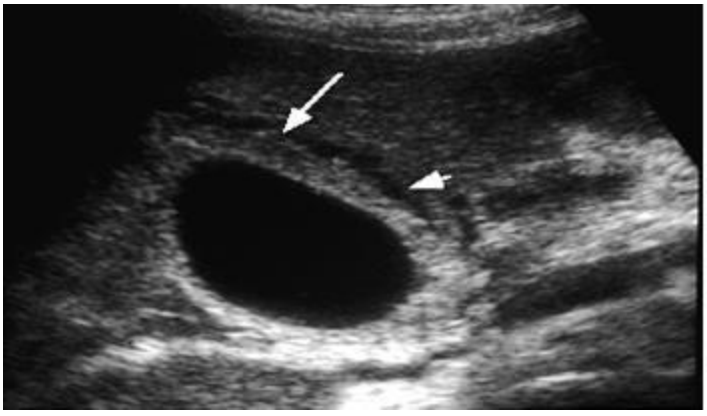


Figure (2.3): ultrasound image shows gallbladder wall thickening with pericholecystic fluid



http://www.ualberta.ca

Figure (2.4): ultrasound image of right upper quadrant in patient with acute cholecystitis reveals edematous marked thickening of GB wall

2.6 Acut hepatitis:

Although some histological features are suggestive of the aetiological factor, most of the changes are essentially similar whatever the cause. hepatocytes show degenerative changes (swelling, cytoplasmic granularity, vacuolation), undergo necrosis (becoming shrunken, eosinophilic Councilman bodies) and are rapidly removed. The distribution of these changes varies somewhat with the aetiological agent, but necrosis is usually maximal in zone 3. The extent of the damage is very variable between individuals affected by the same agent: at one end of the spectrum, single and small groups of hepatocytes die (spotty or focal necrosis), while at the other end there is multiacinar necrosis involving a substantial part of the liver (massive hepatic necrosis) resulting in fulminant hepatic failure. between these extremes there is limited confluent necrosis with collapse of the reticulin framework resulting in linking (bridging) between the central veins, the central veins and portal tracts, and between the portal tracts. The extent of the inflammatory infiltrate is also variable, but portal tracts and lobules are infiltrated mainly by lymphocytes. other variable features include cholestasis in zone 3 and fatty change, the latter being prominent in hepatitis that is due to alcohol or certain drugs . (Kumar et al . 2007)

2.7 Chronic hepatitis :

Chronic inflammatory cell infiltrates comprising lymphocytes, plasma cells and sometimes lymphoid follicles are usually present in the portal tracts. The amount of inflammation varies from mild to severe. In addition, there may be :-

- loss of definition of the portal/periportal limiting plate – interface hepatitis

(damage is due to apoptosis rather than necrosis)

- lobular change, focal lytic necrosis, apoptosis and focal inflammation
- confluent necrosis
- fibrosis which may be mild, bridging (across portal tracts) or severe cirrhosis.

The overall severity of the hepatitis is judged by the degree of the hepatitis and inflammation (grading) and the severity of the fibrosis or cirrhosis (staging) using various scoring systems . (Kumar et al . 2007)

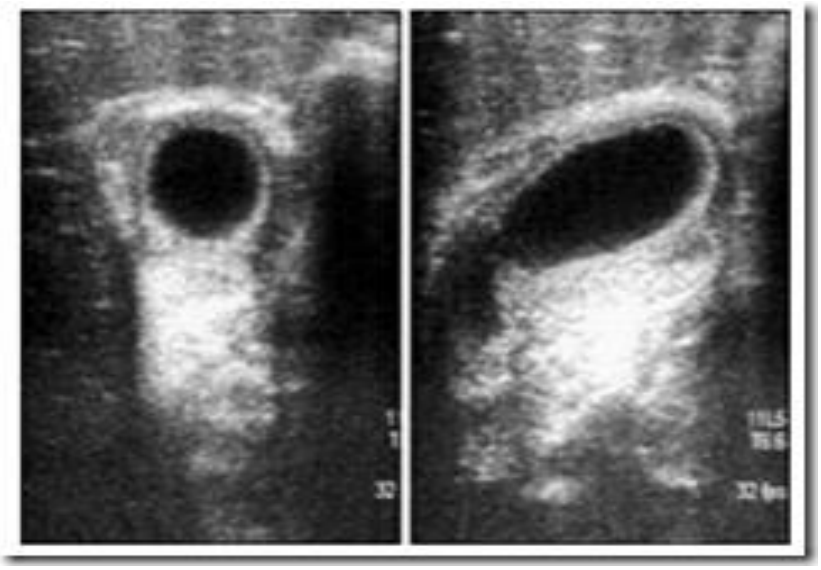


Figure (2.5): US of patient with positive HCV showed odematous GB wall Thickening.

2.8 Chronic Renal Failure :

Chronic renal failure is defined as either kidney damage or glomerular filtration rate less than 60 ml/min for three months or more. This is invariably a progressive process that results in end stage renal disease.

serum creatinine is commonly used to estimate creatinine clearance but is a poor predictor of glomerular filtration rate, as it may be influenced in unpredictable ways by assay techniques, endogenous and exogenous substances, renal tubular handling of creatinine, and other factors (age, sex, body weight, muscle mass, diet, drugs). Glomerular filtration rate is the "gold standard" for determining kidney function, but its measurement remains cumbersome. for practical purposes, calculated creatinine clearance is used as a correlate of glomerular filtration rate and is commonly estimated by

using the cockcroft-gault formula or the recently described modification of diet in renal disease equation . (Robbin,1993) .

2.9 Previous studies:

Previous literature has reported different degrees of gallbladder wall thickening and a range of underlying pathologies. for example, the mural thickening reported in acute cholecystitis is secondary to edema and inflammatory changes and is often associated with cholelithiasis and gallbladder distension. In contrast, the edematous changes seen as a result of systemic disease, such as heart or renal failure, are not associated with gallbladder inflammation and are thought to be due to raised portal pressures. The degree of wall thickening in these cases may be much more impressive and has been reported as >10 mm . (G. Runner, M. Corwin, B. Siewert, R.2014)

In addition, Baik et al . reported a mean wall thickness of 5.6 mm, which was due to serosal and muscular hypertrophy, associated with acute hepatitis Lastly, a very pronounced wall thickening shown on ultrasound or computed tomography (CT) (>10 mm) should raise concern about the possibility of malignancy, which is often associated with mural irregularity .

(G. Runner, M. Corwin, B. Siewert, R.2014)

Mild gallbladder wall thickening is conventionally defined as 4-7 mm. Previous studies have reported thickening of up to 6 mm in acute hepatitis .

(S.K. Baik, S.J. Park, H.S. Kim, D.K. Lee, S.O 2000)

A comprehensive prospective ultrasonographic study was performed in 93 patients to investigate gallbladder wall thickness and gallbladder volumes in various nonbiliary disease states. Without changes in gallbladder volume, mean gallbladder wall thickness was significantly increased in patients with liver cirrhosis, viral hepatitis, chronic congestive heart failure, hypoalbuminemia, and chronic renal failure but not in patients with diabetes mellitus.

(Martin Wegener MD , Gereon Borsch MD , Jost Schneider MD et al -1987)

Chapter Three

Materials and Method

Chapter three

Materials and Method

3.1 Materials:

3.1.1 Subjects:

50 patients with gall bladder disease , hepatitis ,cirrhosis and renal failure were enrolled in the study. clinically, patient came with right upper quadrant (RUQ) pain, positive murphy sign and fever. the patient must be fasting for (8-12) hrs . This study was conducted in Atbara hospital, in the department of ultrasonography from September 2018 to March 2019.

The procedure of the scanning with ultrasound was explained to the patient and the purpose of incorporating his data in the study. Permission from the hospital and the department was granted.

3.1.2 Machine used:

Ultrasound machines with transducer frequency 3.5 MHz, these include :-

MINDRAY ultrasound machine. model DP 2200 made in Germany with convex transducer 3.5MHz .

FUKUDA 4100 ultrasound machine-made in Japan .1995 with convex transducer 3.5 MHz .

3.2 Method:

3.2.1 Technique used:

Gallbladder was examined in numerous patient positions; supine, left lateral decubitus and left posterior oblique position in order to demonstrate stone mobility, scans may need to be performed in prone position or erect position to show acoustic shadow of calculi it is essential to use the highest frequency possible and to have the transducer focused in the region of the suspected calculi. The sound beam is directed through the most depended portion of the gallbladder. In most supine patients this is the region of the gall bladder neck and cystic duct. In prone and erect positions the fundus is the most depended region.

Every study of the gallbladder was included an image demonstrating the gallbladder neck to prove or rule out the presence of a stone in this location.

Scanning with high resolution high frequency curved liner or linear array transducers is mandatory in patients when gall stones are not detected, this minimizes missing tiny stone, especially in the fundus of superficial gall bladder.

3.2.2 Data collection:

The data was collected using the following variables:-

Size and texture of gallbladder

Gallbladder wall measurement.

Murphy sign.

Patient's age, gender and residence.

Association of other Pathology.

3.2.3 Data analysis:

The data was analyzed using statistical packaged for social science (SPSS), frequency distribution as well as cross tabulation were performed.

Chapter four

Results

Chapter four
Results

Table 4-1: Diseases Frequency distribution

Diseases	Frequency	Percent	Valid Percent	Cumulative Percent
Hepatitis	15	30.0	30.0	30.0
gall bladder disease	15	30.0	30.0	60.0
Cirrhosis	10	20.0	20.0	80.0
renal failure	10	20.0	20.0	100.0
Total	50	100.0	100.0	

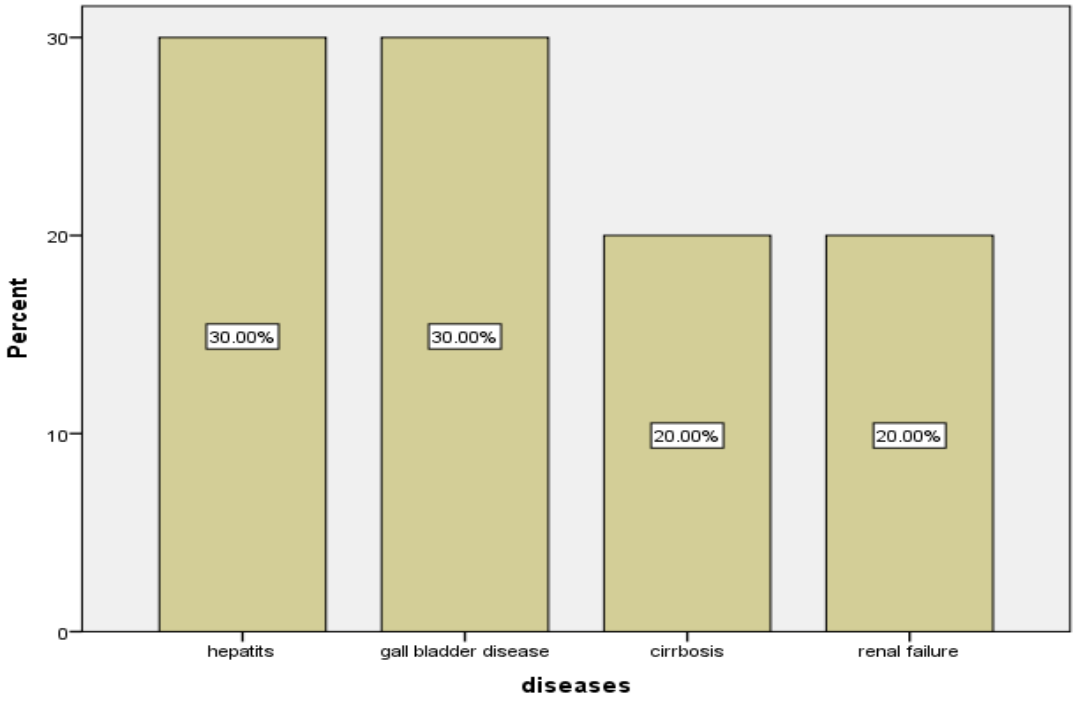


Figure 4-1: Diseases distribution

Table 4-2: Gender Frequency distribution

gender	Frequency	Percent	Valid Percent	Cumulative Percent
male	26	52.0	52.0	52.0
female	24	48.0	48.0	100.0
Total	50	100.0	100.0	

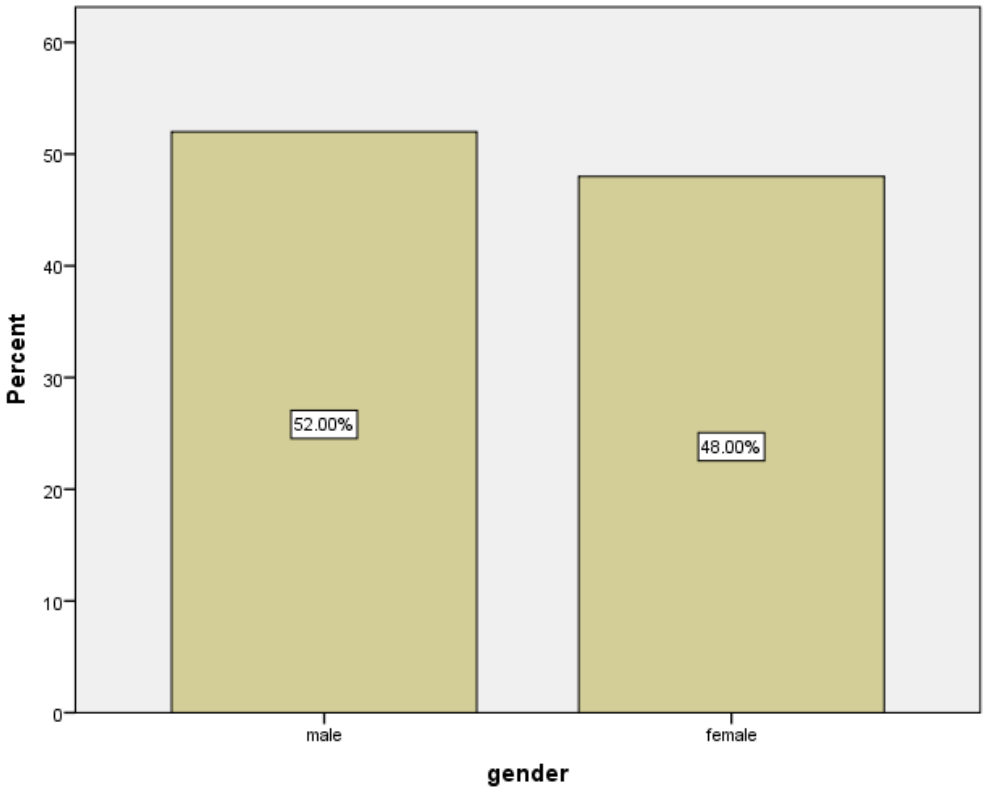


Figure 4-2: Gender distribution

Table 4-3: Age Group Frequency distribution

age Group	Frequency	Percent	Valid Percent	Cumulative Percent
25-30	12	24.0	24.0	24.0
31-35	6	12.0	12.0	36.0
36-40	23	46.0	46.0	82.0
41-45	4	8.0	8.0	90.0
46-50	5	10.0	10.0	100.0
Total	50	100.0	100.0	

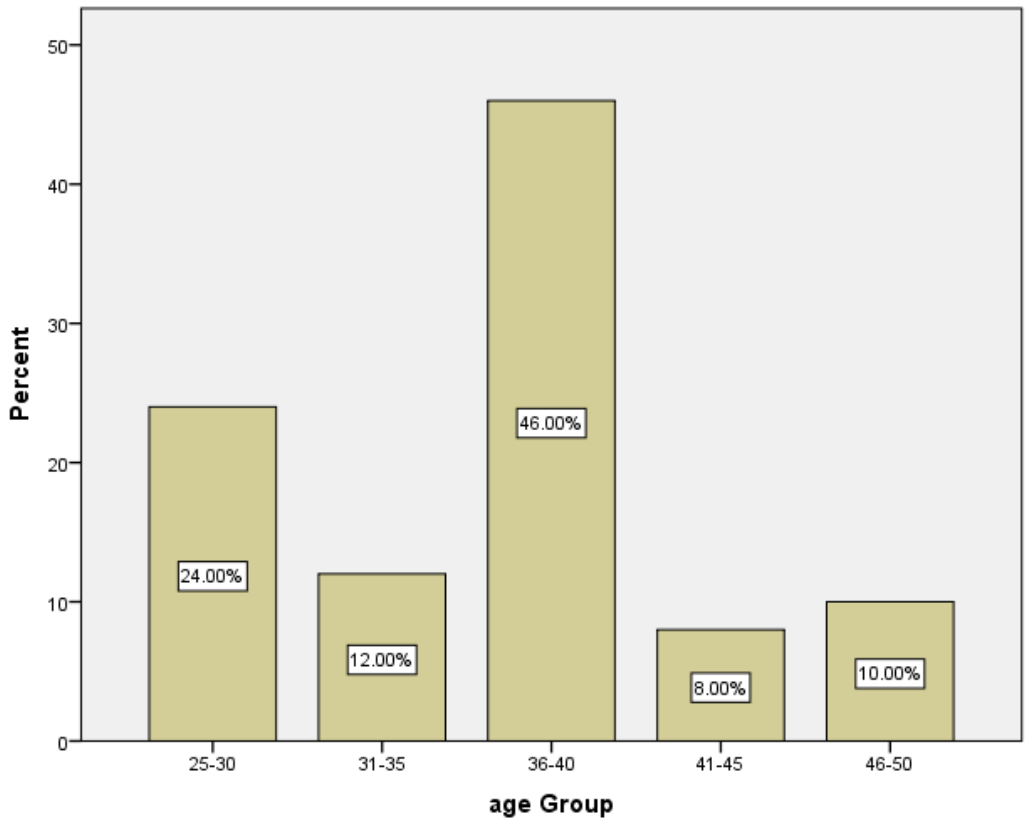


Figure 4-3: Age Group distribution

Table 4-4: Anterior Wall Frequency distribution

anterior wall	Frequency	Percent	Valid Percent	Cumulative Percent
4.00	2	4.0	4.0	4.0
4.30	3	6.0	6.0	10.0
4.50	2	4.0	4.0	14.0
4.60	3	6.0	6.0	20.0
4.80	6	12.0	12.0	32.0
5.00	4	8.0	8.0	40.0
5.30	2	4.0	4.0	44.0
5.60	1	2.0	2.0	46.0
5.80	1	2.0	2.0	48.0
6.00	12	24.0	24.0	72.0
6.20	1	2.0	2.0	74.0
6.30	4	8.0	8.0	82.0
7.00	4	8.0	8.0	90.0
7.20	1	2.0	2.0	92.0
8.00	2	4.0	4.0	96.0
40.00	1	2.0	2.0	98.0
48.00	1	2.0	2.0	100.0
Total	50	100.0	100.0	

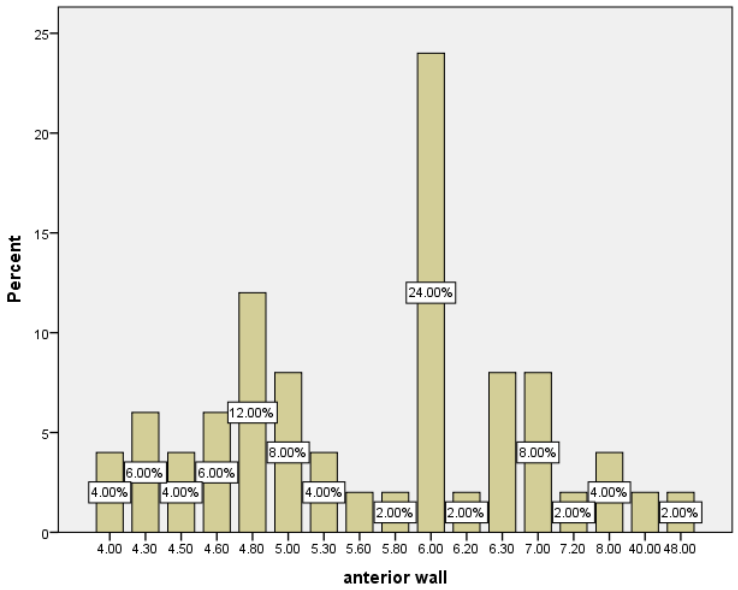


Figure 4-4: Anterior Wall distribution

Table 4-5: Tall Frequency distribution

Tall	Frequency	Percent	Valid Percent	Cumulative Percent
5.80	1	2.0	2.0	2.0
6.00	2	4.0	4.0	6.0
6.30	1	2.0	2.0	8.0
6.70	1	2.0	2.0	10.0
7.00	6	12.0	12.0	22.0
7.50	1	2.0	2.0	24.0
7.60	2	4.0	4.0	28.0
7.80	4	8.0	8.0	36.0
8.00	5	10.0	10.0	46.0
8.30	4	8.0	8.0	54.0
8.40	1	2.0	2.0	56.0
8.60	2	4.0	4.0	60.0
8.80	2	4.0	4.0	64.0
9.00	5	10.0	10.0	74.0
9.40	2	4.0	4.0	78.0
10.00	6	12.0	12.0	90.0
10.80	2	4.0	4.0	94.0
11.00	3	6.0	6.0	100.0
Total	50	100.0	100.0	

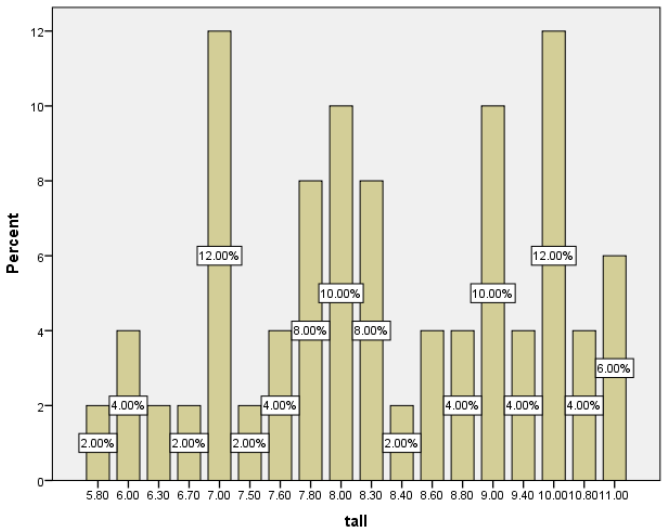


Figure 4-5: Tall distribution

Table 4-6: Width Frequency distribution

Width	Frequency	Percent	Valid Percent	Cumulative Percent
3.60	1	2.0	2.0	2.0
3.80	3	6.0	6.0	8.0
3.90	1	2.0	2.0	10.0
4.00	3	6.0	6.0	16.0
4.20	2	4.0	4.0	20.0
4.30	7	14.0	14.0	34.0
4.40	3	6.0	6.0	40.0
4.50	6	12.0	12.0	52.0
4.60	6	12.0	12.0	64.0
4.80	4	8.0	8.0	72.0
5.00	11	22.0	22.0	94.0
5.30	1	2.0	2.0	96.0
5.40	1	2.0	2.0	98.0
5.60	1	2.0	2.0	100.0
Total	50	100.0	100.0	

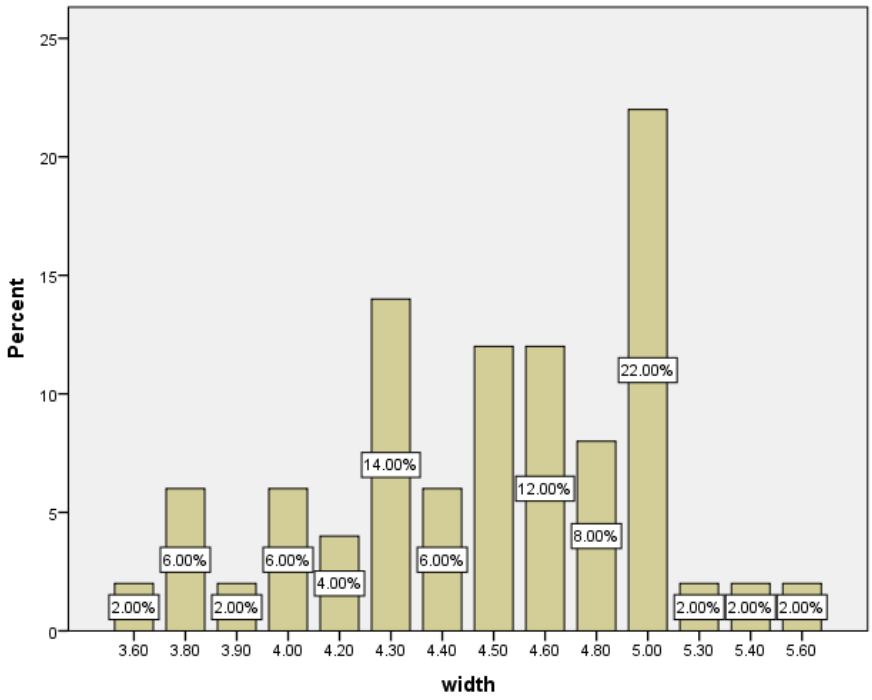


Figure 4-6: Width Frequency distribution

Table 4-7: Relationship between age group and diseases

diseases * age Group Cross tabulation

			age Group					Total
			25-30	31-35	36-40	41-45	46-50	
Diseases	Hepatitis	Count	4	1	10	0	0	15
		% within diseases	26.7%	6.7%	66.7%	0.0%	0.0%	100.0%
	gall bladder disease	Count	4	2	5	0	4	15
		% within diseases	26.7%	13.3%	33.3%	0.0%	26.7%	100.0%
	Cirrhosis	Count	0	2	4	3	1	10
		% within diseases	0.0%	20.0%	40.0%	30.0%	10.0%	100.0%
	renal failure	Count	4	1	4	1	0	10
		% within diseases	40.0%	10.0%	40.0%	10.0%	0.0%	100.0%
Total		Count	12	6	23	4	5	50
		% within diseases	24.0%	12.0%	46.0%	8.0%	10.0%	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.739[a]	12	.041
Likelihood Ratio	24.885	12	.015
Linear-by-Linear Association	.007	1	.933
N of Valid Cases	50		

a. 18 cells (90.0%) have expected count less than 5. The minimum expected count is .80.

Table 4-8: Relationship between age group and gender

gender * age Group Cross tabulation

			age Group					Total
			25-30	31-35	36-40	41-45	46-50	
Gender	Male	Count	9	2	10	1	4	26
		% within gender	34.6%	7.7%	38.5%	3.8%	15.4%	100.0%
	Female	Count	3	4	13	3	1	24
		% within gender	12.5%	16.7%	54.2%	12.5%	4.2%	100.0%
Total		Count	12	6	23	4	5	50
		% within gender	24.0%	12.0%	46.0%	8.0%	10.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.789[a]	4	.147
Likelihood Ratio	7.105	4	.130
Linear-by-Linear Association	.387	1	.534
N of Valid Cases	50		

a. 6 cells (60.0%) have expected count less than 5. The minimum expected count is 1.92.

Table 4-9: Relationship between age group and anterior wall

anterior wall * age Group Cross tabulation

			age Group					Total
			25-30	31-35	36-40	41-45	46-50	
anterior wall	4.00	Count	0	1	0	1	0	2
		% within anterior wall	0.0%	50.0%	0.0%	50.0%	0.0%	100.0%
	4.30	Count	1	1	1	0	0	3
		% within anterior wall	33.3%	33.3%	33.3%	0.0%	0.0%	100.0%
	4.50	Count	0	1	1	0	0	2
		% within anterior wall	0.0%	50.0%	50.0%	0.0%	0.0%	100.0%
	4.60	Count	1	0	2	0	0	3
		% within anterior wall	33.3%	0.0%	66.7%	0.0%	0.0%	100.0%
	4.80	Count	0	0	2	2	2	6
		% within anterior wall	0.0%	0.0%	33.3%	33.3%	33.3%	100.0%
	5.00	Count	1	1	2	0	0	4
		% within anterior wall	25.0%	25.0%	50.0%	0.0%	0.0%	100.0%
	5.30	Count	0	0	0	1	1	2
		% within anterior wall	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
	5.60	Count	0	0	0	0	1	1
		% within anterior wall	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
	5.80	Count	0	0	1	0	0	1
		% within anterior wall	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	6.00	Count	5	0	7	0	0	12
		% within anterior wall	41.7%	0.0%	58.3%	0.0%	0.0%	100.0%
	6.20	Count	0	1	0	0	0	1
		% within anterior wall	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	6.30	Count	0	0	4	0	0	4
		% within anterior wall	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	7.00	Count	2	1	0	0	1	4
		% within anterior wall	50.0%	25.0%	0.0%	0.0%	25.0%	100.0%
	7.20	Count	0	0	1	0	0	1
		% within anterior wall	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	8.00	Count	1	0	1	0	0	2
		% within anterior wall	50.0%	0.0%	50.0%	0.0%	0.0%	100.0%
	40.00	Count	1	0	0	0	0	1
		% within anterior wall	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	48.00	Count	0	0	1	0	0	1
		% within anterior wall	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Total		Count	12	6	23	4	5	50
		% within anterior wall	24.0%	12.0%	46.0%	8.0%	10.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	75.042[a]	64	.163
Likelihood Ratio	71.025	64	.255
Linear-by-Linear Association	.690	1	.406
N of Valid Cases	50		

a. 84 cells (98.8%) have expected count less than 5. The minimum expected count is .08.

Table 4-10: Relationship between age group and tall

tall * age Group Cross tabulation

			age Group					Total
			25-30	31-35	36-40	41-45	46-50	
Tall	5.80	Count	0	0	1	0	0	1
		% within tall	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	6.00	Count	0	0	1	1	0	2
		% within tall	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%
	6.30	Count	0	0	0	0	1	1
		% within tall	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
	6.70	Count	0	0	1	0	0	1
		% within tall	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	7.00	Count	1	1	3	0	1	6
		% within tall	16.7%	16.7%	50.0%	0.0%	16.7%	100.0%
	7.50	Count	0	0	0	1	0	1
		% within tall	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
	7.60	Count	1	0	1	0	0	2
		% within tall	50.0%	0.0%	50.0%	0.0%	0.0%	100.0%
	7.80	Count	1	0	3	0	0	4
		% within tall	25.0%	0.0%	75.0%	0.0%	0.0%	100.0%
	8.00	Count	0	2	2	1	0	5
		% within tall	0.0%	40.0%	40.0%	20.0%	0.0%	100.0%
	8.30	Count	1	0	2	1	0	4
		% within tall	25.0%	0.0%	50.0%	25.0%	0.0%	100.0%
	8.40	Count	0	0	1	0	0	1
		% within tall	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	8.60	Count	0	1	1	0	0	2
		% within tall	0.0%	50.0%	50.0%	0.0%	0.0%	100.0%
	8.80	Count	0	1	1	0	0	2
		% within tall	0.0%	50.0%	50.0%	0.0%	0.0%	100.0%
	9.00	Count	3	0	2	0	0	5
		% within tall	60.0%	0.0%	40.0%	0.0%	0.0%	100.0%
	9.40	Count	0	0	2	0	0	2
		% within tall	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	10.00	Count	2	0	1	0	3	6
		% within tall	33.3%	0.0%	16.7%	0.0%	50.0%	100.0%
	10.80	Count	2	0	0	0	0	2
		% within tall	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	11.00	Count	1	1	1	0	0	3
		% within tall	33.3%	33.3%	33.3%	0.0%	0.0%	100.0%
Total		Count	12	6	23	4	5	50
		% within tall	24.0%	12.0%	46.0%	8.0%	10.0%	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	75.178[a]	68	.257
Likelihood Ratio	63.822	68	.621
Linear-by-Linear Association	3.103	1	.078
N of Valid Cases	50		

a. 90 cells (100.0%) have expected count less than 5. The minimum expected count is .08.

Table 4-11: Relationship between age group and tall

width * age Group Cross tabulation

			age Group					Total
			25-30	31-35	36-40	41-45	46-50	
Width	3.60	Count	1	0	0	0	0	1
		% within width	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	3.80	Count	1	0	2	0	0	3
		% within width	33.3%	0.0%	66.7%	0.0%	0.0%	100.0%
	3.90	Count	0	0	0	0	1	1
		% within width	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
	4.00	Count	1	1	1	0	0	3
		% within width	33.3%	33.3%	33.3%	0.0%	0.0%	100.0%
	4.20	Count	0	0	2	0	0	2
		% within width	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	4.30	Count	2	1	2	1	1	7
		% within width	28.6%	14.3%	28.6%	14.3%	14.3%	100.0%
	4.40	Count	1	1	1	0	0	3
		% within width	33.3%	33.3%	33.3%	0.0%	0.0%	100.0%
	4.50	Count	2	0	0	2	2	6
		% within width	33.3%	0.0%	0.0%	33.3%	33.3%	100.0%
	4.60	Count	0	0	6	0	0	6
		% within width	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	4.80	Count	2	1	1	0	0	4
		% within width	50.0%	25.0%	25.0%	0.0%	0.0%	100.0%
	5.00	Count	2	1	7	0	1	11
		% within width	18.2%	9.1%	63.6%	0.0%	9.1%	100.0%
	5.30	Count	0	0	0	1	0	1
		% within width	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
	5.40	Count	0	1	0	0	0	1
		% within width	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	5.60	Count	0	0	1	0	0	1
		% within width	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
Total		Count	12	6	23	4	5	50
		% within width	24.0%	12.0%	46.0%	8.0%	10.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	64.100[a]	52	.121
Likelihood Ratio	55.706	52	.337
Linear-by-Linear Association	.271	1	.603
N of Valid Cases	50		

a. 69 cells (98.6%) have expected count less than 5. The minimum expected count is .08.

Chapter Five

Discussion, conclusion and recommendations

Chapter Five

Discussion, conclusion and recommendations

5.1 Discussion:

The study done in 50 patients had GB disease / hepatitis / cirrhosis and renal failure by sonographic measurement of gallbladder length width and wall thickness

Regarding to the gender distribution the male are common affect than female that might be due to the more activities of male than female .

The most common GB abnormality detected by sonogram is diffuse thickening . the standard normal wall thickness is up to (3mm) in this study the commonest cause of increase in GB wall thickness is a cute cholecystitis calcular cholecystitis (46%) followed by liver hepatitc and cirrhosis (24%) and renal failure (12%) .

From Table 4.1 : we found that 15 (30%) were infected with hepatitis, gall bladder disease 15 (30%), cirrhosis 10(20%) and renal failure 10(20%).

From Table 4.2 : which shows the gender we found that 26 (52%) males and 24 (48%) females were measuring the thickness of their gallbladder wall.

From Table 4.3: which shows the age group, we find that the majority of respondents in the age group 36-40 years 23 (46%) followed by the age group 25-30 years 12 (24%) and the lowest number was in the age group 41-45 years 4 (8%).

From Table 4.7: which shows the correlation tables between the age group of the disease, we find that the level of confidence less than 0.05.

From Table 4.8: which shows the tables of association between age group and gender, we find that the level of confidence is greater than 0.05.

From Table 4.9 : which shows the tables of association between age group and anterior wall, we find that the level of confidence is greater than 0.05.

From Table 4.10 : which shows the tables of association between age group and tall, we find that the level of confidence is greater than 0.05.

From Table 4.11 : which shows the tables of association between age group and tall, we find that the level of confidence is greater than 0.05.

The ultrasound finagling show that ultra Sonography was excellent and more sensitive modality for diagnosis of the gall bladder measurement .

5.2 Conclusion :

Ultra sound is the initial screening modality of choice for evaluating the gall bladder and bileducts common indications for performing Sonography of the gall bladder and biliary tree include symptoms and signs of cholecystitis history of jaundice abnormal liver function test and renal failure .

By the end of this study shows that gall bladder measurement is highly affected by gallbladder disease hepatitis – cirrhosis and renal failure .

The male more affected than female . the increase of gallbladder wall thickens is see in most of symptomatic patient .

The gallbladder length and width most common affected by a cholecystitis and calcular cholecystitis .

5.3 Recommendations :

- Easy and immediate ultra sound technique should be used to measure of gall bladder .
- Adequate and good sonographic technique with more experience should be applied because ultra sound is operator dependent .
- CT scanning to detect pericholecystic collection and progressive gall bladder wall thickening .
- The gallbladder should be examined in fasting state fore (8 - 12) hrs to guarantee maximum GB and biliary tract dilatation .

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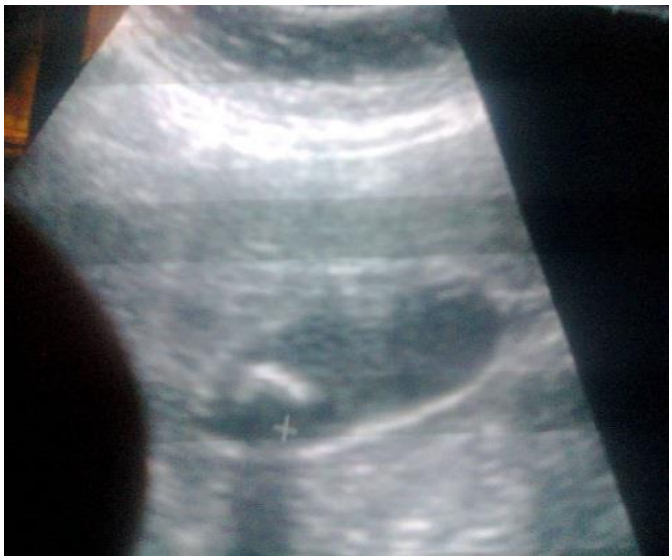
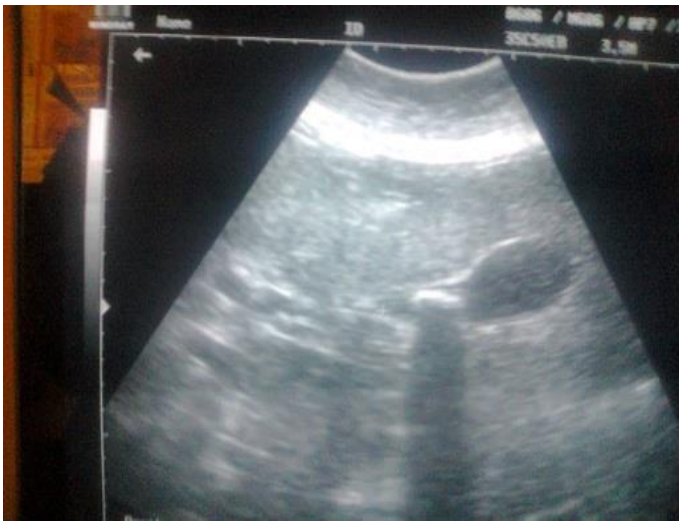
5 .5 Appendix I :

ultrasound images from the sample of the study :



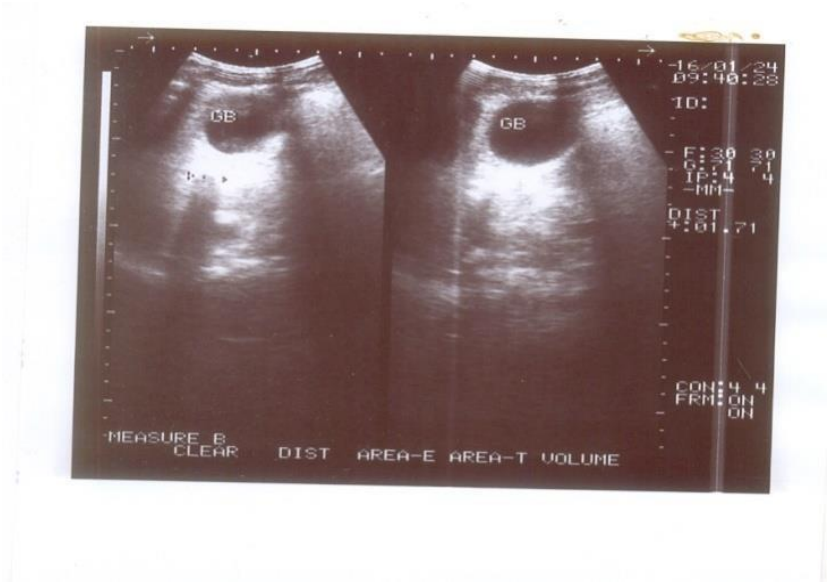
Female with age 42 years

Image (1): Longitudinal transabdominal scan shows gall stone, wall thickening and distension of the gallbladder



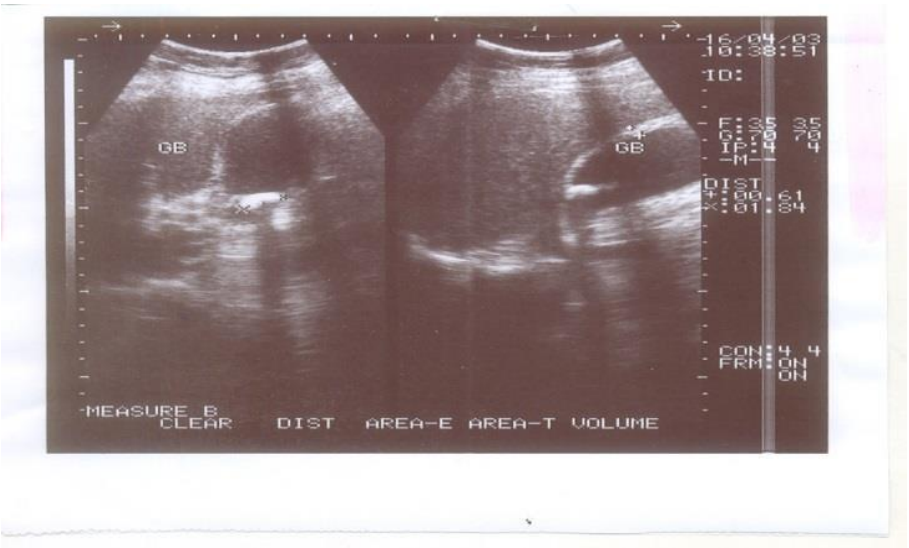
Male with age 38 years

Image (2): Longitudinal transabdominal scan shows gall stone, at the neck of the gallbladder and wall thickening



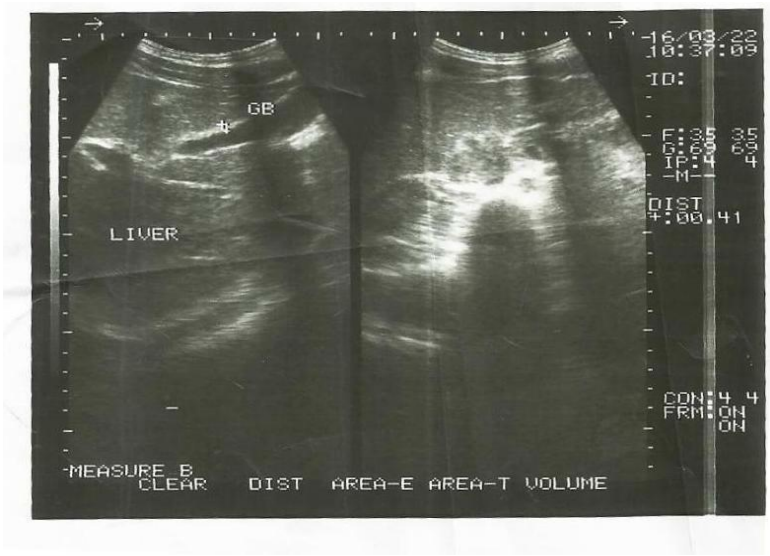
Male with age 36 years

Image (3) : Transverse transabdominal scan shows gall stone, wall thickening, distension in gallbladder



Female with age 43 years

Image (4): Transverse and longitudinal transabdominal scan shows stone at the neck of gallbladder, wall thickening, distension of gallbladder.



Image(5) :Ultrasound of 28y old male,positive HCV showed normal liver finding with thickened GB wall(4mm).

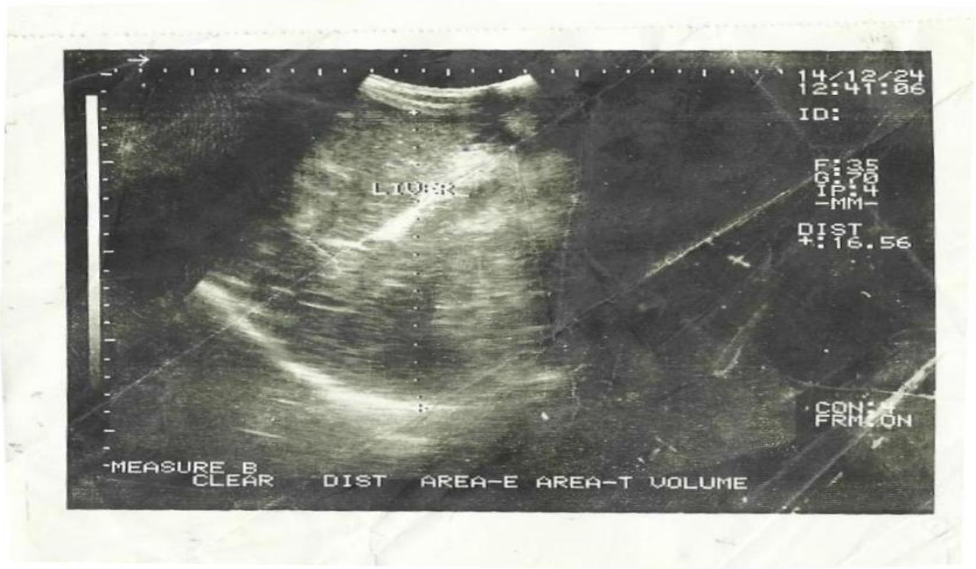


Image (6): 30 y old male complain of Juandice , positive HBV US show enlarged liver with cirrhotic changes and showed thickened edeamatous GB wall (16mm))

Appendix II : Data collection table :

Measurement of Gall bladder at GB Disease-Liver Disease and Renal Diseas

PT NO	PT Sex		PT Age	Gall Blade Disease			Liver Disease						Renal Disease		
	male	femal	25 – 50 year	Ant wall	Tall	width	hepatitis			cirrhosis			Failure		
							Ant wall	tall	width	Ant wall	Tall	width	Ant wall	Tall	Width
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															