Sudan University of Science and Technology

Collage of Graduate Studies

Study of Fatty Liver Disease in Type II Diabetic Patients using Ultrasonography

دراسة مرض دهون الكبد في مرضى السكري النوع الثاني بواسطة الموجات فوق الصوتية

A Thesis submitted for partial fulfillment of the requirement of MSc Degree in medical diagnostic ultrasound

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2017

الآيـة

بسم الله الرحمن الرحيم

قَالَ تَعَـالَىٰ:

﴿ وَمَا تَوۡفِيقِيٓ إِلَّا بِٱللَّهِۚ عَلَيۡهِ تَوَكَّلۡتُ وَإِلَيۡهِ أُنِيبُ ٨٨ ﴾

صدق الله العظيم

سورة هود الآية (88)

Dedication

To my father and my mother.

To my husband.

To my brothers and sisters .

Acknowledgement

First, I am grateful to Allah as he helped me to gain knowledge to finish this research.

Second, my thanks also to my supervisor Dr. Asmaa Ibrahim who devoted her time and generously gave her knowledge and experience to me without limits and the to whole staff of the collage of medical radiological science, SUST for their great help and support .

My thanks also extended to ultrasound department where I took all my samples ,and to my colleagues who helped me to finish my research.

Finally I would like to thank everybody who helped me in preparing and finishing this study.

Abstract

A Descriptive cross section study aim to study fatty liver disease in type II diabetic patients using ultrasonography to evaluate changes in size and echogencity of the liver . Study was performed at the Om durman centres (ALmohandseen Medical Center and ALmutakamil Center)during the period from January to April 2017.

The study done by ultrasound machine ((Mindary DP50 (China), multi frequency curvilinear probe(3.5 – 5 MHZ) and CHISON 600 M (China) multi-frequency curvilinear probe (2.5 – 5 MHZ), and ESAOTE Pie Medical Aquila – Japanese company – (3.5 -5 MHz).

50 patients with diabetes in age of 40-78 years, underwent U/S examination of the abdomen and exclude diabetic type I ,alcoholic patient and obesity , the liver was evaluate in all patients in sagital section.

The data was collected, classified, analyzed by using SPSS. The analysis of the results found that the diabetic patients have fatty liver (94%), .the female patients more (60%)compare with male (40%) and no effect in liver size.

The study showed relationship between BMI and fatty liver and no relationship between duration of illness and control blood sugar and follow up.

The study recommended utilization of ultrasound in diabetic patients' management and follow up.

ملخص الدراسة

هذه الدراسة وصفية الهدف منها دراسة مرض دهون الكبد في مرضى السكري النوع الثاني بواسطة التصوير بالموجات فوق الصوتية ل تقييم التغيرات في الكبد.

أجريت الدراسة في مراكز منطقة ام درمان (مجمع المهندسين الطبي ومركز المتكامل)في الفترة من يناير _ابريل2017 .

اتبعت الدراسة البرتوكول العالمي لانجاز فحص الكبد بواسطة الموجات فوق الصوتية. أجريت الدراسة على خمسين مريض من مرضى السكري النوع الثاني في الفئة العمرية بين 40-70 سنة واستبعدت الدراسة مرضى السكري النوع الأول ومرضى الكحول ومرضى السمنة.

تم جمع البيانات وتحليلها بواسطة برنامج التحليل الإحصائي وجدت الدراسة مرضى السكري النوع الثاني المصابين بدهون الكبد بنسبة (94%) ونسبة الإناث (60%)أكثر من الذكور.

وجدت الدراسة ليس هناك تأثير على حجم الكبد ,وليس هناك علاقة بين فترة المرض والمتابعة والتحكم في سكر الدم .كما وجدت الدراسة علاقة بين حجم الجسم ودهون الكبد.

أوصت الدراسة باستخدام الموجات فوق الصوتية بصورة روتينية في وحدات معالجة مرضى السكري وعمل متابعة دورية للكبد.

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List of Abbreviations

ALT	Alanine aminotransferase
AST	Aspartate amino Transferase
BMI	Body mass index
HbA1c	Haemoglobin A1c (Glycosylated haemoglobin)
HCC	Hepatocellular Carcinoma
NAFLD	Non Alcoholic Fatty Liver Disease
T2DM	Type Tow Diabetic Militias
U/S	Ultrasound

Chapter One

Introduction

ChapterOne

1-1 Introduction

Diabetes mellitus is a group of metabolic disorders manifested by abnormally high levels of glucose in the blood. Over the past two decades, total cases diabetes mellitus have risen dramatically in almost every country(Williams, (1998)).

There are two types of diabetes mellitus which are Type I and Type II. Type I is an autoimmune disorder where the immune system attacks the insulin-producing beta cells in the pancreas and destroys them where as Type II is insulin resistance condition, where the pancreas is usually producing enough insulin, but for unknown reasons, the body cannot use the insulin effectively. Pancreas, which acts as the insulin-producing gland is changed and destroyed in the process, thus leads to diabetes. (http://www.biomedical.utm.my).

The liver lies in the right upper quadrant of the abdomen, immediately inferior to the diaphragm. The liver is covered by a connective tissue capsule and a layer of visceral peritoneum, except for a small region on its diaphragmatic surface called the bare area.(McKinley, (2008)).

Fatty liver is an acquired, reversible disorder of metabolism, resulting in an accumulation of triglycerides within the hepatocytes**.** Fatty infiltration implies increased lipid accumulation in the hepatocytes and results from major injury to the liver or a systemic disorder leading to impaired or excessive metabolism of fat. Fatty infiltration is a benign process and may be reversible with correction of the process, although it has been shown that fatty infiltration of the liver is the precursor for significant chronic disease in a percentage of patients. The patient is usually asymptomatic; however, some patients may present with jaundice, nausea and vomiting, and abdominal tenderness or pain.(Sandra L.(2006))

A liver ultrasound is a medical procedure in which sound waves are transmitted to form images that are projected in a video monitor, ,allowing

operator to view the inside of the body and see the pictures of the liver.The liver is responsible for filtering out waste and toxins as well as absorbing the nutrientsin food there for a condition that affect its proper functioning may become fatal without treatment.Ultrasound my be done in order to check for abnormalities, such as mass or discoloration, that may indicate a liver condition, including cirrhosis or cancer.The procedure may also allow a doctor to find out the severity of condition and determine the best treatment course (boelche, 2013).

1-2 Problem of the study

The wide spread of diabetes among children and adults, and effect in organs pancreas, kidney and liver,that cause liver disease such as fatty liver as well as leading cause of cirrhosis.

usefulness of ultrasound in determining the effect of diabetes in liver very important and noninvasive.

1-3 Objectives

1-3-1 General Objective

To study of fatty liver disease in type II diabetic patients using ultrasonography.

1-3-2 Specific Objectives

- To evaluate the echogencity and echo textureof the liver.
- To evaluate the size of the liver.
- To evaluate the relation between the duration of illness, diabetes control and the liver echogencity.

1-4 Significant of the study

This study intended to give knowledge and full information about the effect of diabetes on the liver morphology ,size and liver echogencity related to duration of diabetic.

1-5 Overview of study:

This study was consist of five chapters, chapter one was an introduction introduce briefly this thesis and contained (problem of study also contain general, specific objectives, significant of the study and overview of the study). Chapter two literature review in which contain anatomy, physiology, pathology, physics ultrasound, technique of liver and previous studies. Chapter three was describe the methodology (material, method) used in this study. Chapter four was included result of presentation of final finding of study; chapter five included discussion, conclusion and recommendation for future scope in addition to references and appendices.

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Chapter Two

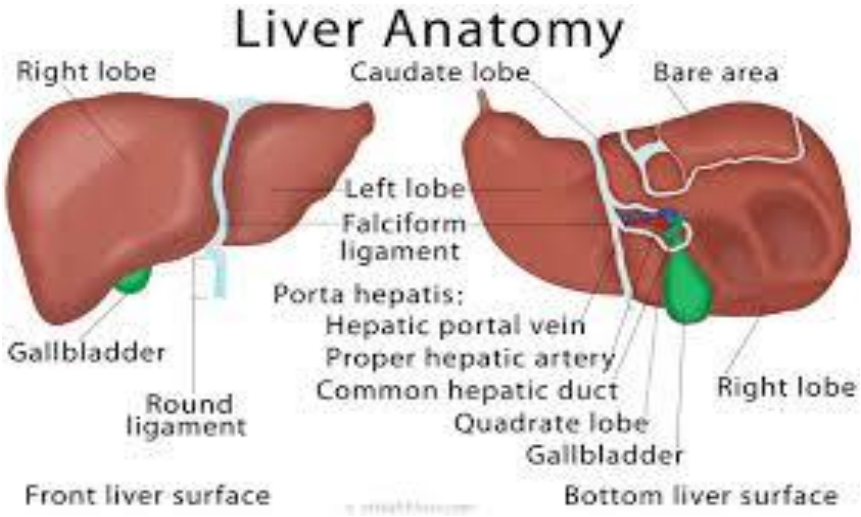
Literature Review

Chapter Two

2-1.Anatomy

The liver lies in the right upper quadrant of the abdomen, immediately inferior to the diaphragm. Weighing 1–2 kilograms, it constitutes approximately 2% of an adult's body weight. The liver is covered by a connective tissue capsule and a layer of visceral peritoneum, except for a small region on its diaphragmatic surface called the bare area.(McKinley, (2008)).

The liver is composed of four incompletely separated lobes and supported by two ligaments.The major lobes are the right lobe and the left lobe**.**The right lobe is separated from the smaller left lobe by the falciform ligament, a peritoneal fold that secures the liver to the anterior abdominal wall. In the inferior free edge of the falciform ligament lies the round ligament of the liver(or ligamentum teres), which represents the remnant of the fetal umbilical vein. Subdivisions of the right lobe include the caudate lobe and the quadrate lobe**.**The caudate lobe is adjacent to the inferior venacava, and the quadrate lobe is adjacent to the gallbladder. the inferior vena cava and the ligamentum venosum form the vertical inferior parts.This vessel shunted blood from the umbilical vein to the inferior venacava.) Finally, the porta hepatis represents the horizontal and is where blood and lymph vessels, bile ducts, and nerves enter and leave the liver. In particular, the hepatic portal vein and branches of the hepatic artery proper enter at the porta hepatis.(McKinley, (2008)).



Figure(2-1) (McKinley, 2008).

The blood supply: Blood is supplied from the hepatic artery,and

branch of the celiac artery, divide into right and left terminal branches that enter the porta hepatis.

The portal vein divides into right and left terminal branch that enter the porta hepatis behind the arteries.The hepatic veins (three or more)emerge from posterior surface of the liver and drain into the inferior vena cava.(Anne, (2005))

Lymph Drainage of the liver: The liver produces a large amount of lymph about one third to one half of all body lymph.The lymph vessels leave the liver and enter several lymph nodes in the porta hepatis.The efferent vessels pass to the celiac nodes. A few vessels pass from the bare areaof the liver through the diaphragm to the posterior mediastinal lymph nodes (Anne, (2005)).

2-2Portal circulation

The blood vessels conveying blood to the liver are the hepatic artery (30%)and portal vein (70%).The hepatic artery brings oxygenated blood to the liver, and the portal vein brings venous blood rich in the products of digest ion, which have been absorbed from gastrointestinal tract.The arterial

and venous blood is conducted to the central vein of each liver lobule by the liver sinusoids.The central veins drain into the right and left hepatic veins, and –these leave the posterior surface of the liver and open directly into the inferior vena cava.(Anne,(2005)).

2-3 Physiology

Metabolic Functions: Fibrinogen, Prothrombin and Heparin SynthesiThe liver manufactures the clot proteins fibrinogen and prothrombin and also the anticoagulant heparin. (Heparin is also found in several other organs of the body).People with liver disease will have longer clotting times because the clot process is slower due to the lack of fibrinogen and prothrombin.(Devin, (2005))

Amino Acid Synthesis: Many of the liver functions are achieved through enzymes, which it also manufactures. Enzymes called transaminases are stored in the liver and are used by the liver to move amino groups around from protein to protein as different amino acids are made.

Aspartate aminotransferase (AST) and alanine aminotransferase (ALT)are two important enzymes that will back up into the bloodstream whenever there is acute hepatic cell damage or death. Therefore marked elevations of these transaminases in the serum are indicators of an acute hepatic disorder. It is important to note though that marked elevations of AST and ALT are nonspecific indicators of an acute hepatic disorder in that these can be elevated for a variety of causes.(Devin,(2005)).

Carbohydrate Metabolism: The pancreatic hormones insulin and glucagon work in conjunction with glucose regulation by the liver.

Fat Metabolism:The liver removes fatty acids from the blood and changes them into lipoproteins which are more readily used by the body. (Devin, (2005)).

2-4Pathology

2-4-1Diabetes

Diabetes mellitus is a clinically and genetically heterogeneous group of metabolic disorders manifested by abnormally high levels of glucose in the blood. The hyperglycemia is the result of a deficiency of insulin secretion caused by pancreatic b-cell dysfunction or of resistance to the action of insulin in liver and muscle, or a combination of these. Frequently this metabolic disarrangement is associated with alterations in adipocyte metabolism. Diabetes is a syndrome and it is now recognized that chronic hyperglycemia leads to long-term damage to different organs including the heart, eyes, kidneys, nerves, and vascular system.(Yoon et al.(2003)).

2-4-2.Cirrhosis

Cirrhosis is a devastating liver disorder that is definedas hepatocyte death, fibrosis and necrosis of the liver, and the subsequent development of regenerating nodules.

Common sequela of cirrhosis includes portal hypertension, the development of varicosities within the abdomen, portal vein thrombosis, splenomegaly, and HCC. The most common cause of cirrhosis is alcoholism.However, cirrhosis can also be caused by primary biliary cirrhosis, hepatitis, cholangitis, and hemochromatosis.Sonographic finding, hepatomegaly (initial), shrunken right lobe of the liver, enlarged caudate and left lobe, nodular surface irregularity,coarse echotexture, splenomegaly, ascites, monophasic flow within the hepatic veins and hepatofugal flow within the portal veins.(Steven M.2011).

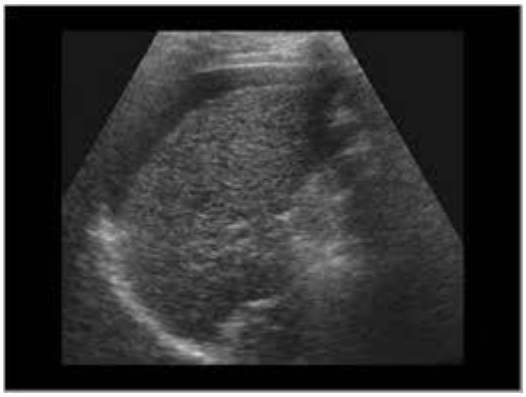


Figure (2-2)liver cirrhosis.(Rumack (.2011)).

2-4-3Fatty Liver

Fatty liver is an acquired, reversible disorder of metabolism, resulting in an accumulation of triglycerides within the hepatocytes. The most common cause likely is obesity. Fatty liver is recognized as a significant component of the metabolic syndrome, which has recently increased in significance. Excessive alcohol intake produces a fatty liver by stimulating lipolysis, asdoes starvation. Other causes of fatty infiltration include poorly controlled hyper lipidemia, diabetes, excess exogenous or endogenous corticosteroids, pregnancy, total parenteral hyper alimentation, severe hepatitis, glycogen storage disease, jejunoileal bypass procedures for obesity, cystic fibrosis, congenital generalized lipodystrophy, several chemotherapeutic agents, including methotrexate, and toxins such as carbon tetrachloride and yellow phosphorus.Correction of the primary abnormality will usually reverse the process, although it is now recognized that fatty infiltration of the liver is the precursor for significant chronic disease and hepatocellular carcinoma in some patients.(Steven M.Penny.2011).

The clinical finding of fatty liver, asymptomatic, alcohol abuse, chemotherapy, diabetes mellitus, elevated liver function test,

Obesity,and pregnancy. .(Steven M.Penny.(2011)).

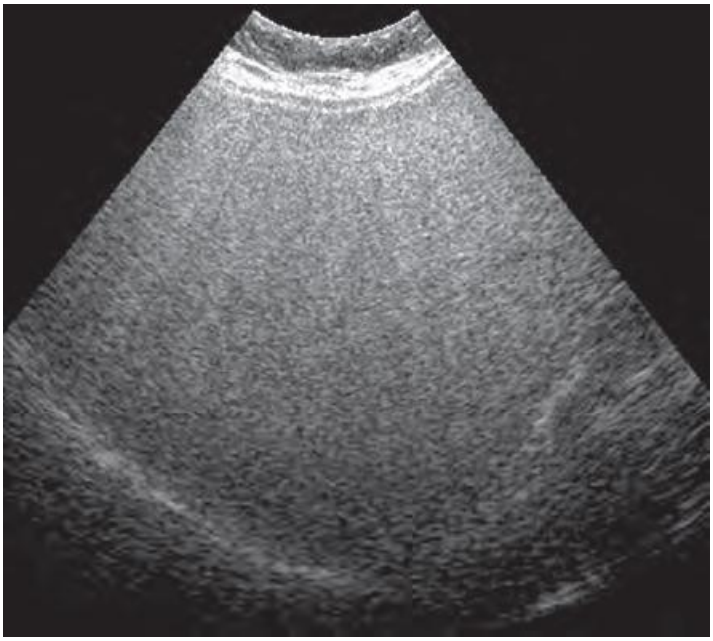
The fatty liver is diagnosis, routine blood test, imaging and histopathology.The routine tests for diabetic patinents having fatty liver, - the liver enzymes (AST, ALT)may higher than normal, fasting lipid profile shows dyslipidemia, high blood sugar profile and HbA1C is above normal level.(htp\.www.slid share.com)

Fatty liver have tow types:diffuse fatty liver , mild minimal diffuse increase in hepaticechogenicity with normal visualization of diaphragm .Moderate diffuse increase in hepatic echogenicity with slightly impaired visualization of intrahepatic vessels and diaphragm. Severe—Marked increase in echogenicity with poor penetration of posterior segment of right lobe of liver and poor or no visualization of hepatic vessels and diaphragm.(Rumack (.2011)).

Focal fatty liver Rapid change with time, both in appearance and Resolution no alteration of course or caliber of regional vessels, no contour abnormality, preferred site for focal fatty spring, anterior to portal vein at porta hepatis.(Rumack.20011).

Fatty sparing and focal fatty liver most often involve the periportal region of the medial segmentof the left lobe (segment IV).Sparing also frequently occurs by the gallbladderfossa and along the liver margins.

Focal subcapsular fat may occur in diabetic patients receiving insulin in peritoneal dialysate.Lack of mass effect; hepatic vessels generally are notdisplaced, although traversing vessels in metastases have been reported.Geometric margins are present, although focal fat may appear round, nodular, or inter digitated with normal tissue.(Rumack(.2011)).



Figure(2-3) diffuse fatty liver(.(Rumack(.2011)).

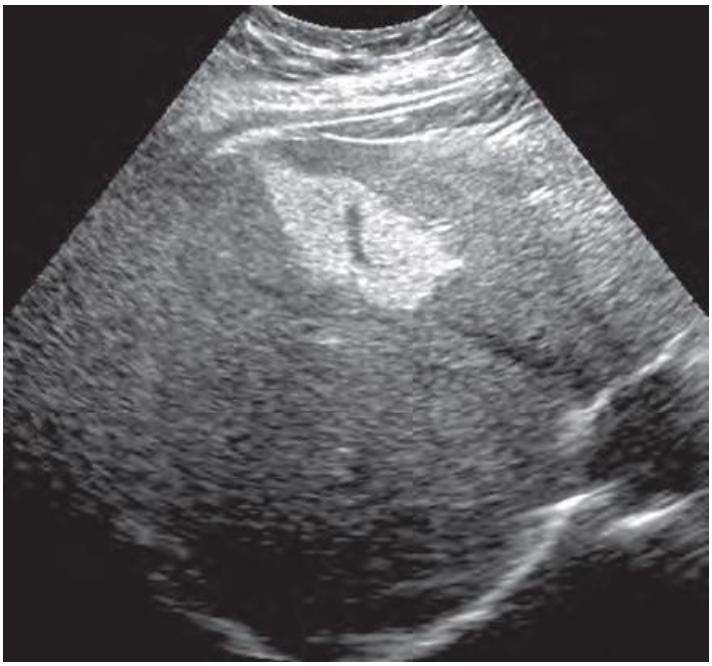


Figure (2-4) focal fatty liver((.(Rumack(.2011)).

2-5Ultrasound

2-5-1 ultrasound physics

Ultrasoud is the name given to high –frequency sound waves.over 20 0000 cycles per second (20KHz).These waves, inaudible to humans, can be transmitted in beams and are used to scan the tissues of the body.

Ultrasound pulses of the type produced by the scanners described here are of a frequency from 2 to 10MHz (1MHzis 1000 000cycles per second).The duration of the pulse is about 1 microsecond and pulses are repeated about 1000 times per second.Different tissues alter the waves in different ways:some reflect directly while others scatter the waves before they return to the transducer as echoes.(Palmar, 2003).

2-5-2 Ultrasound Technique

The patients were done in supine position.A coupling agent is necessary to ensure good acoustic contact between the transducer and the skin and allow total transsimation of the sound beam.

Scanning should be in sagittal, transe verse, and oblique plans, including scanning through intercostal and subcostal spaces. Scanning should be done with slow rocking movement of transducer in all planes to obtain beset

visualization of the whole liver.(Palmar2003).

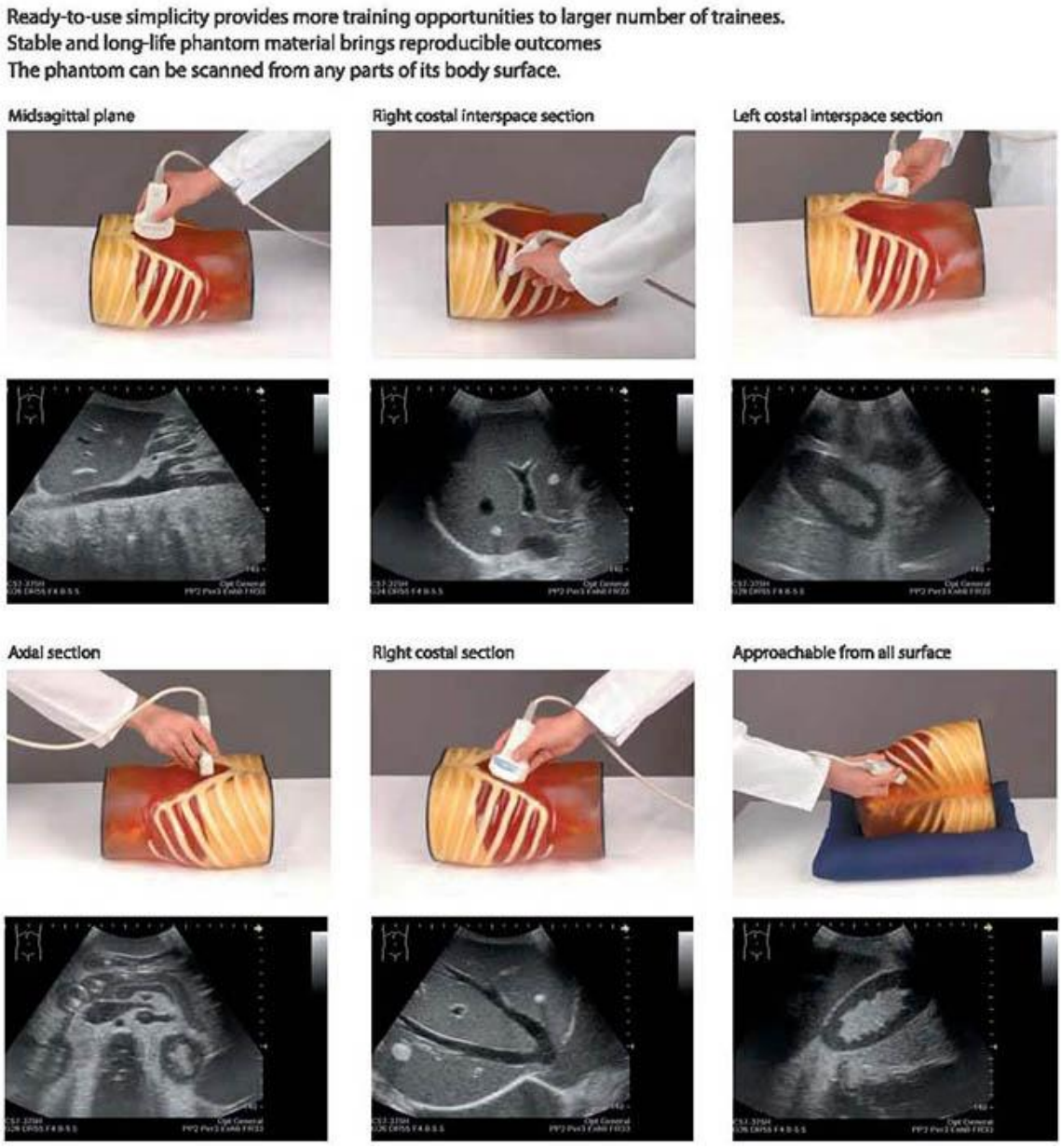


Figure (2-5)Liver Technique (www.radiopedia.com)

2-5-3 Normal Sonographic Appearances of the Liver

The liver capsule, also known as Glisson's capsule, is a thin capsule that appears highly echogenic if the sound beam strikes it perpendicularly. The liver capsule is a specular reflector. Frequently the capsule echoes blend with the adjacent structures such as the anterior wall muscles or the diaphragm.The liver parenchyma is homogeneous and of medium texture and echogenicity and is interrupted only by vessels and ligaments.A Riedel's lobe is an inferior

extension of the right anterior segment. It is a normal variant and may extend almost to the iliac crest.It is most prevalent in women and maypresent as a palpable right upper quadrate mass.Other normal variants are a small or absent left lobe.(Devin.2005).

2-5-4Normal Liver Measurements

Liver come in a variety of shapes. Numerous approaches have been used with both CT and ultrasound. The midclavicular line is the simplest measurement and is considered the liver length. Normal liver length is in the range of 10.5 cm (plus or minus 1.5 cm)6, with 13 cm considered a highly reliable cut-off for normal liver.It is also possible to use the midclavicular plane to measure anteroposteriorly. At the thickest point the normal range is 8.1 cm (plus or minus 1.9 cm).(Devin.2005).

2-6 Previous studies:

T.K.V. Sharavanan (2013) for a period of 3 months (August-September) aimed to study Prevalence of non-alcoholic fatty liver disease in type II diabetes mellitus patients in a rural health care hospital. The study population included a total of 249, patients with T2DM, in the age group of 20-70 years, The patients were interviewed using a structured questionnaire. Acomplete history taking and physical examination were performed. using a high resolution B-mode ultrasonography system . The results among the 249 patients with T2DM, a total of76 patients were identified to have fatty liver by ultrasonography (Majority of the NAFLD patients showed Grade I fatty liver (22.9%), followed subsequently by Grade II (6.8%) and Grade III (0.8%).The present study observed a higher frequency of NAFLD in the diabetic female population (47/249)compared with the male population (29/249).

Shobha Luxmi, Rukhsana Abdul Sattar and Jamal Ara (.from September2006 to March 2007).aimed to study association of Non Alcoholic Fatty Liver with type II Diabetes mellitus . 120 diagnosed type 2 diabetic patients of both sexes were patients with known chronic liver disease and history of alcohol intake were excluded. These patients were evaluated by abdominal ultrasonography to determine the presence of fatty liver. They were divided into fatty liver group and non fatty liver group; and were further evaluated by measurement of body mass index, HbA1c, liver function tests and lipid profile. The data obtained was analyzed using SPSS version 10.The results of 120 type 2 diabetic patients, 73 (60.8 %) had fatty liver on ultrasonography. An increase in the BMI and levels of HBA1c, ALT, AST, alkaline phosphatase and GGT, total cholesterol, triglycerides, LDL and a decrease in HDL was observed in the fatty liver group as compared to non fatty liver group.

Li-hui Yan, Biao Mu, Yue Guan, Xinyu Liu, Nan Zhao, Da Pan, Shao-zhen Wang(from April 2014 to May 2015),aimed to assessment of the relationship between non-alcoholic fatty liver disease and diabetic complication.During the study. A total of 212 individuals with type II diabetes were included in the about individuals using abdominal ultrasonography for the diagnosis of fatty liver disease. Patients were divided into three groups based on the duration of diabetes and NAFLD diagnosis. Type II diabetes patients were placed in group A; patients with type II diabetes longer than NAFLD were placed in group B; and patients with NAFLD longer than type II diabetes were placed in group C.The results compared with groups A and B, the patients of group C showed a higher prevalence of significant coronary artery disease and hypertension ($P < 0.05$). Compared with groups A and B, the patients of group C showed a lower prevalence of diabetic retinopathy and diabetic peripheral neuropathy ($P < 0.05$). There was no significant difference in the prevalence of diabetic nephropathy among the three groups ($P > 0.05$).

Hajieh Bibi Shahbazian1, Seyed Jalal Hashemi 1, Seyed Mahmood Latifi 2, GholamrezaLashkarara 1, GholamrezaAlizadeh Attar(: 7 March 2011 – Accepted: 28 April 2011),aimed to study prevalence of fatty liver disease and its risk factors in type II diabetic patients.Received.Two hundred and seventy two (186 females and 86 males) diabetic patients were studied. Liver ultrasound was performed along with the measurement of such labratoary tests as alanine transaminase, aspartate transaminase, alkaline phospahatase, fasting blood sugar, glycosilatedhemoglobin,triglyceride.The mean age of the subjects was 51±10 years. One hundred and eighty nine of them (70%) had fatty liver, of whom 60 (32%) and 129 (68%) subjects were males and females, respectively. One hundred and fifteen (61%) out of 189 patients were in grade 1, 66 (35%) were in grade 2, and the rest, 8 (4%), were in grade 3 of fatty change in liver. In logistic regression analysis, the variables with

significant changes were Body Mass Index (BMI) with OR = 1.26 (95% CI = 1.16-1.37) and triglyceride (TG) with OR = 1.46 (95% CI = 1.01-2.11.

Chapter Three

Methodology

ChapterThree:

3-1Materials

3-1-1 Specification of the ultrasound machine used in this study:

The researcher used Mindary DP50 (China) (ultrasound machine with multi frequency curvilinear probe(3.5 – 5 MHZ) which has variable focal zone and frequency capability and CHISON 600 M (China) with multi-frequency curvilinear probe (2.5 – 5 MHZ), and ESAOTE Pie Medical Aquila – Japanese company (3.5 -5 MHz), Which also has variable focal zone and frequency capability. Proper setting of the overall gain (system) gain and time gain or depth gain compensation (TGC/ DGC) was adjusted to optimally visualize each organ.

3-1-2 Type of the study:

Across section descriptive study deal with ultrasound findings in patients with diabetes type II among Sudanese population.

3-1-3 Area of study:

The study was conducted in some ultrasound departments in omdurman, AL-mohandeseen Medical Center and Al-mutakamil Health Center.

3-1-4. Duration of the study:

The duration of the study from January to April in 2017.

3-1-5.Sampling and sample size:

Sample frame was comprised of 50 confirmed type II diabetes and were scanned by ultrasound.

3-1-6. Study variables:

Size of liver.

Echo texture of liver.

Echogenicity of liver.

3-2. Method

3-2-1 Technique:

The patients was done in supine position. A coupling agent is necessary to ensure good acoustic contact between the transducer and the skin and allow total transsimation of the sound beam. Scanning was done in sagittal plane through intercostals and subcostal spaces.

3-2-2 image interpretations:

Sonoghrapher was interpret ultrasound images and wrighten ultrasound reports.

3-2-3 Data analysis:

The data have been analyzed by SPSS by using the various statistic computerize methods.

3-2-3 Data presentation:

For data presentation dummy tables and figures has been used.

Chapter Four

Results

Chapter Four

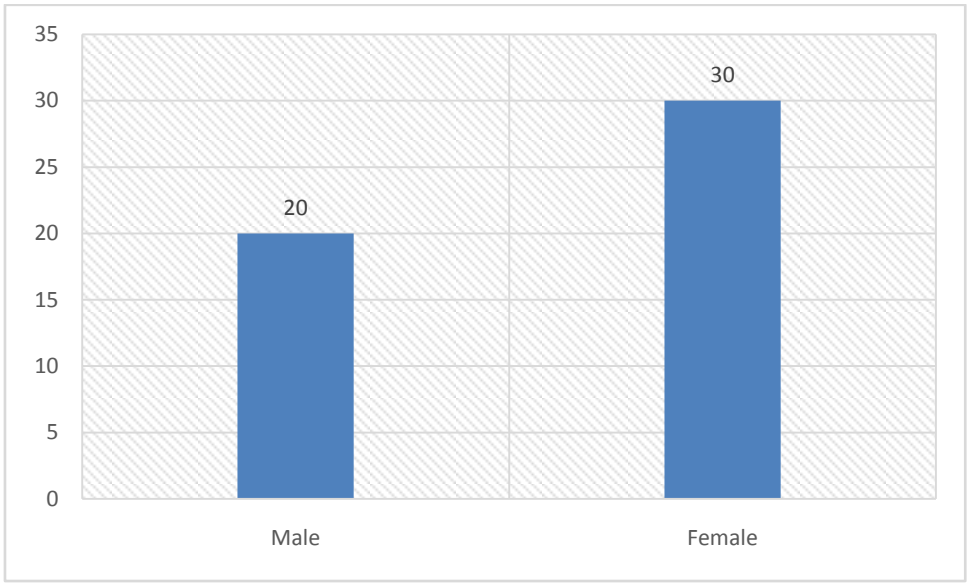
Results

Table 4.1 shows the Mean ± Std.Deviation for all patients:

Variables	Mean	SD	Min	Max
Age	58.84	9.16	40	78
Weight	72.90	6.62	56	92
Duration	9.40	6.35	1	30
Liver size	14.78	3.17	12	20

Table 4.2 show gender (sex) distribution for all patients:

Gender	**Frequency**	**Percentage**
Male	20	40 %
Female	30	60 %

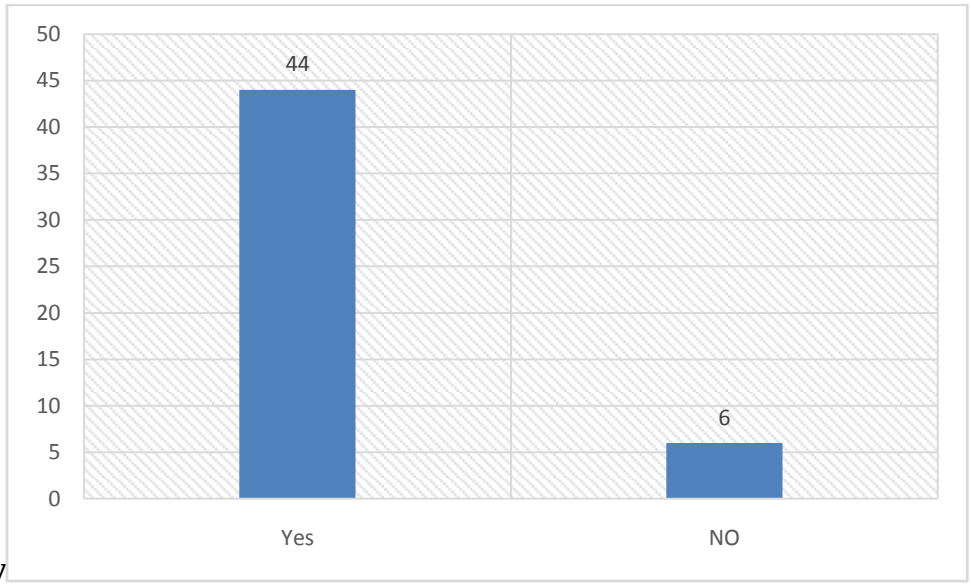


Frequency

Figure 4.1 show gender and frequency for all patients:

Table 4.3 show follow up frequency and percentage:

Follow Up	Frequency	Percentage
Yes	44	88%
No	6	12 %

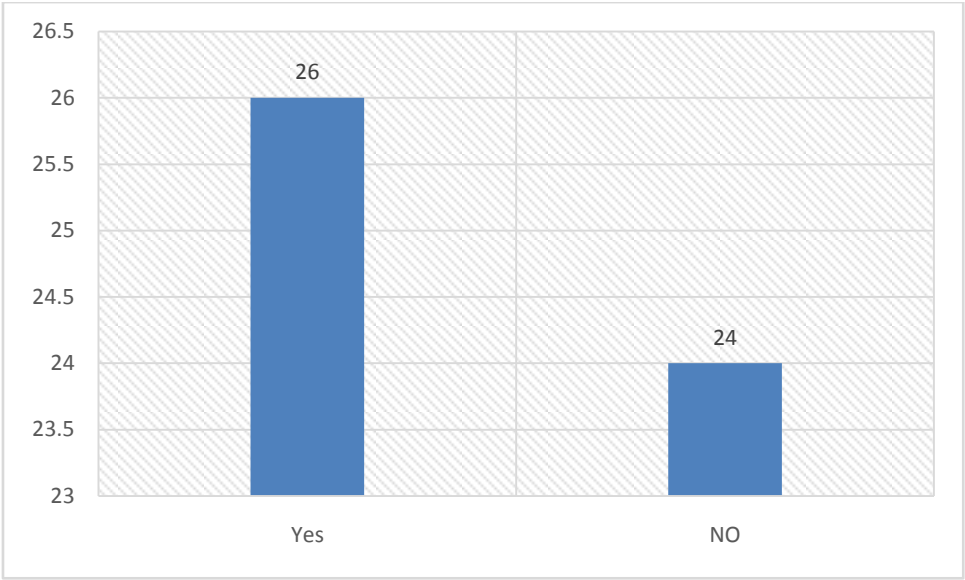


Frequency

Figure 4.2 show follow up frequency:

Table 4.4 show Control frequency and percentage:

Control	Frequency	Percentage
Yes	26	52 %
No	24	48 %



Frequency

Figure 4.3 show Control frequency:

Table 4.5 show Liver size frequency and percentage:

Liver Size Cm	Frequency	Percentage
12	2	4.0 %
13	2	4.0 %
14	9	18.0 %
15	21	42.0 %
16	10	20.0 %
17	2	4.0 %
18	2	4.0 %
20	2	4.0 %

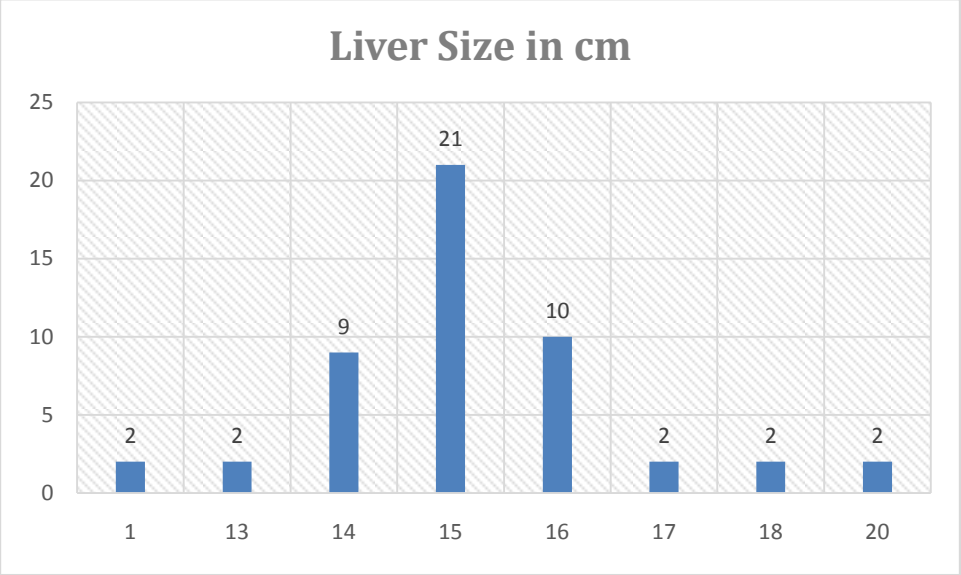
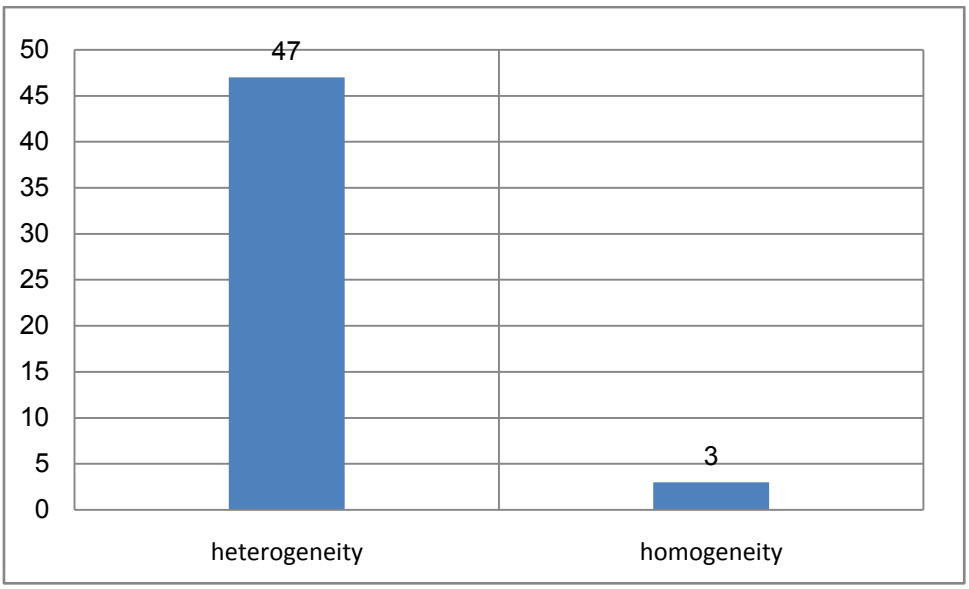


Figure 4.4 show Liver size frequency

Table 4.6 show Echo texture frequency and percentage:

Echo Texture	**Frequency**	**Percentage**
homogenice	47	94.0 %
heterogenice	3	6.0 %

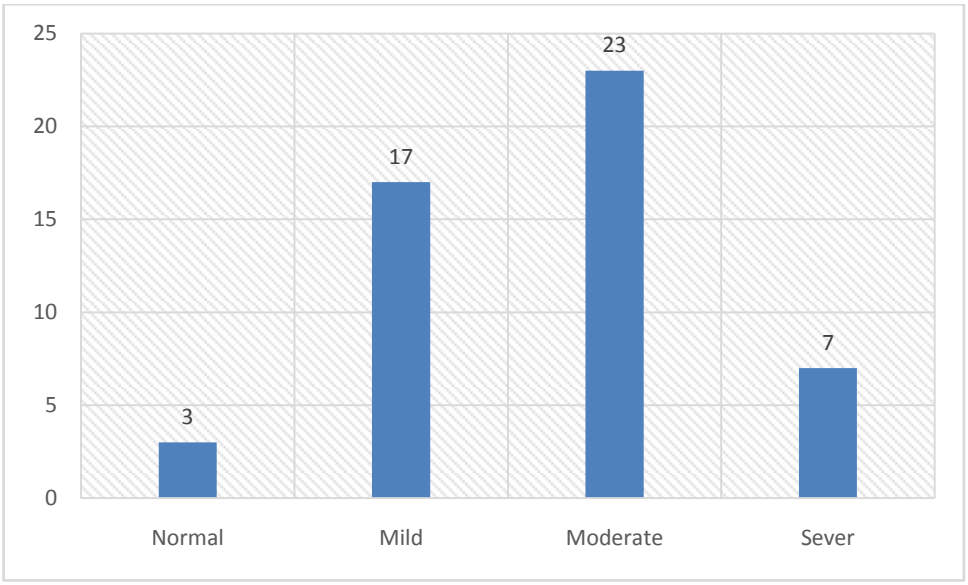


Frequency

Figure4.5 show Echo texture frequency:

Table 4.7 show Degree of fatty liver frequency and percentage:

Echogenicity	**Frequency**	**Percentage**
Normal	3	6.0
Mild increased	17	34.0
Moderate increased	23	46.0
Sever increased	7	14.0



frequency.

Figure 4.6 show fatty liver degree frequency

Table4.8 show cross tabulation between duration and degree of fatty liver ：

Count

		echogencity				Total
		Normal	Mild increase	Moderate increase	Sever increase	
duration	1	0	1	0	1	2
	2	0	4	0	0	4
	3	0	0	2	0	2
	4	0	0	1	0	1
	5	1	7	1	0	9
	6	0	1	1	0	2
	7	0	0	1	1	2
	8	1	0	2	1	4
	10	0	2	7	1	10
	12	0	0	1	0	1
	13	0	1	1	1	3
	15	0	1	2	0	3
	16	0	0	1	0	1
	20	0	0	2	1	3
	22	1	0	0	0	1
	23	0	0	1	0	1
	30	0	0	0	1	1
Total		3	17	23	7	50

table 4.9 show cross tabulation between degree of fatty liver and control:

Count

		control		Total
		Yes	NO	
Echogencity	Normal	0	3	3
	Mild	8	9	17
	Moderate	14	9	23
	Sever	4	3	7
Total		26	24	50

Chapter Five

Discussion,

Conclusion&Recommendations

Chapter Five

5-1.Discussion

This study aimed to study fatty liver disease in type II diabetic patients using ultrasonography to evaluate changes in size and echogencity of the liver . Study was performed at the Om durman centres (ALmohandseen Medical Center and ALmutakamil Center)during the period from January to April 2017.

50 patient with diabetes in age of 40-78 years, underwent U/S examination of the abdomen ,the study exclude diabetic type 1,alcochlic patient and obesity. The liver wasevaluate in all patients in sagital sectionusing the US machine (Mindary DP50 (China), curvilinear probe(3.5 – 5 MHZ) ,CHISON 600 M (China) curvilinear probe (2.5 – 5 MHZ), and ESAOTE Pie Medical Aquila – Japanese company – (3.5 -5 MHz).

Table (4-2) and figure (4-1) show that 30 at the patient out of 50 (60%) are female while 20(40%) are male. A mong the 50 patients with diabetic type II .

Table(4-3)and figure(4-2)show 44(88%)patients follow up while 6(12%)have not.

Table (4-4)and figure(4-3)show 26 (52%)of patients control of blood sugar while 24(48%)have not.

Table (4.5)and figure (4.4)show liver size frequency that 15cm (42%)that in range in normal and (4%)in range abnormal.

A total of 47(94%) patients were identified to have fatty liver by ultrasounography(table4.6)and figure (4-5), majority of degree fatty liver disease patients showed moderate hyperechogenicity(46%)followed subsequently by mild hyperechogenicity (34%) and sever hyperechogenicity(14%)(table 4.7)and figure(4-6).

The study showed higher frequency of fatty liver in diabetic female(60%) compared with the male(40%)male table (4.2), similar to study was done by (T.K.V.Sharavanan, 2013).

Table (4.8)and table (4.9)show no relationship between duration of illness and degree of fatty liver and control of blood sugar, these agree with study done by (Li-hui yan, 2014).

Table (4.2) show weight mean72.90 and median 73.50 that is significant relationship with the presence of fatty liver.

5-2Conclusion:

This study found high prevalence of fatty liver (94%) in type II diabetic patients, the study showed higher frequency of fatty liver in diabetic female compared with the male.

The results indicate no change in normal size of the liver, body mass index (BMI) and triglyceride had significant relationship with the presence of fatty liver.

The study showed no relationship between duration of illness and control of blood sugar and follow up.

5-3. Recommendations

0The high incidences of fatty liver findings in diabetic type tow patients support the need for ultrasound screening in each diabetic centre.

0Liver scanning should be planned as one of the basic necessary exam in diabetic centers to aid in diagnosis, management and follow up.

0Another research studies should be done with expanding period of time and include more sample data for more precise and accurate results.

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  -www.slidshare.com

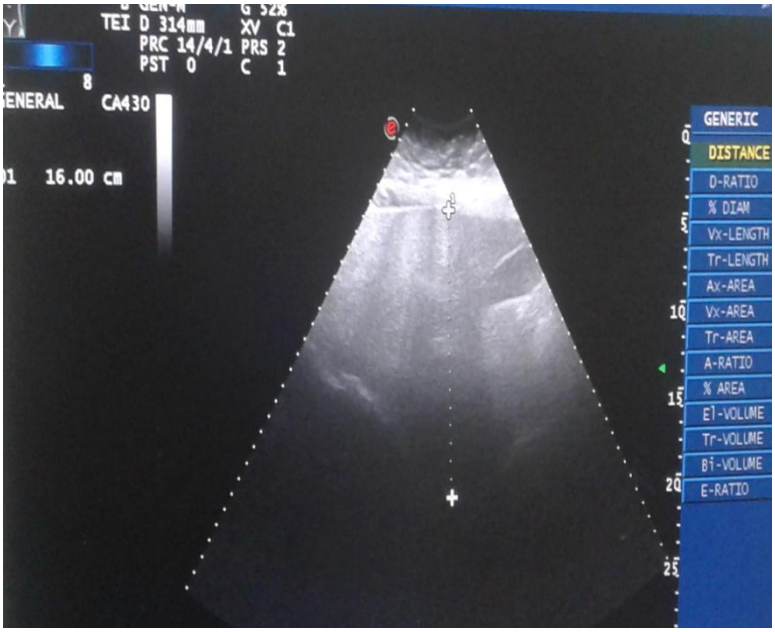
Appendices

Appendix(1)

U/S images

Appendix

Image (1)male70 years show mild fatty liver



image(2).Female 53 years show moderate fatty liver

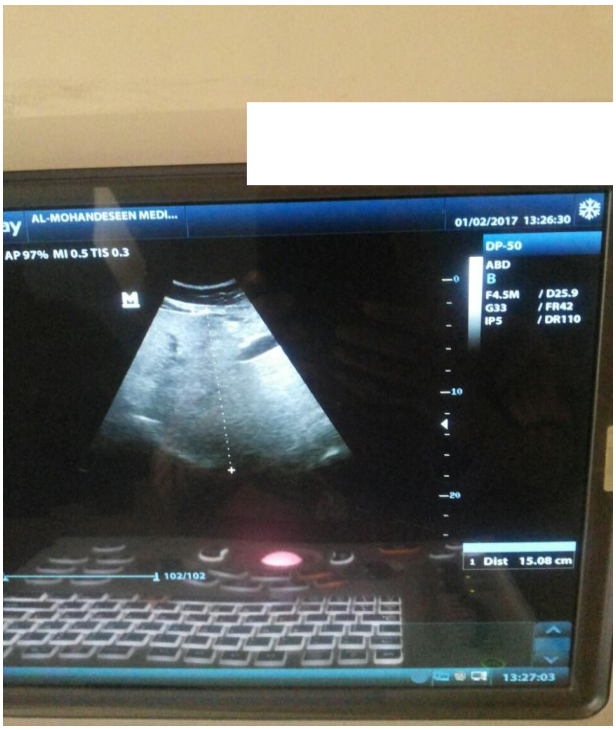


Image (3). male 72 years show moderate fatty liver

image (4).female 58 years show mild fatty liver

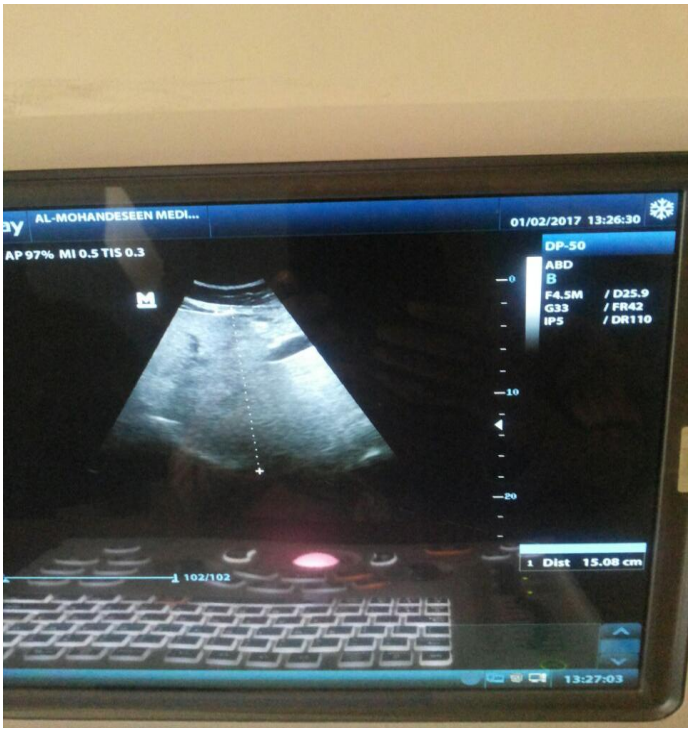


Image (5).female 40 years show moderate fatty liver

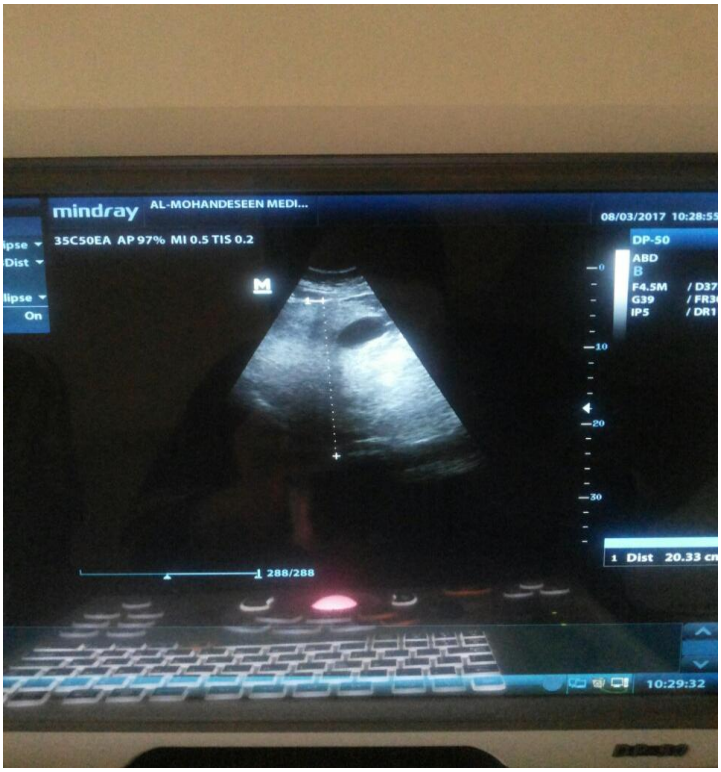


image (6).female 61 years show moderate fatty liver

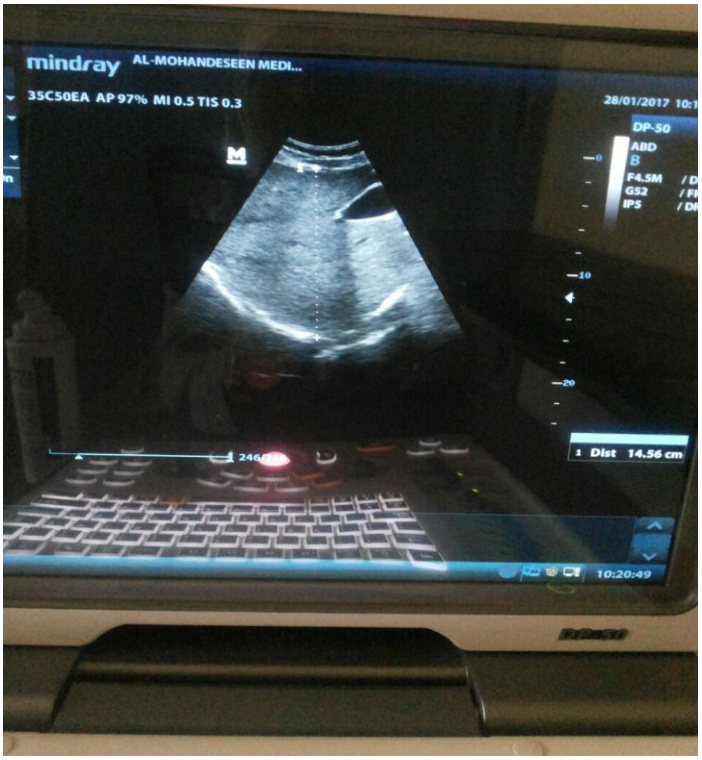


Image (7).male 73 years show mild fatty liver

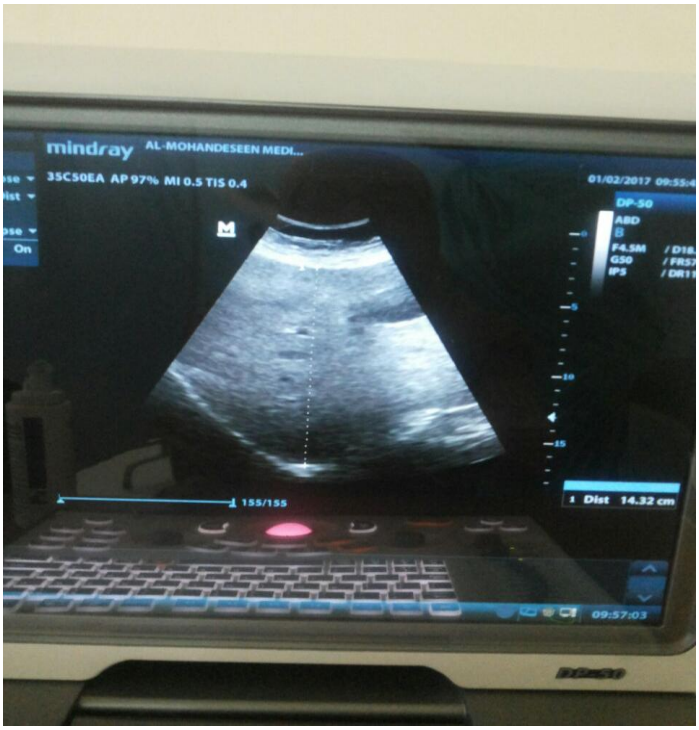


Image (8).female 58 years show mild fatty liver

Image (9).female 55 years show mild fatty liver

Image (10).male 68 years show mild fatty liver

Appendix (2)

Data Sheet

No	Age years	Gender M/F	Weight kg	Duration of illness years	Follow up Yes/No	Control Yes/No	Liver Size cm	Liver echotexure	Liver echogenicty